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**TOTAL
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p209



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Letter from the editor

Innovation is the Key to Success

Welcome to the official show issue of the Arab Health Exhibition & Congress 2019! We are bringing you a packed edition featuring all the latest developments being showcased at the event along with a wealth of information and opinion on the future of the industry.

The Arab Health 2019 Congress is offering 11 CME-accredited conferences to help delegates keep their finger on the pulse of medicine in the region. In our pages, conference chairs and speakers give an insight into cutting-edge procedures, right from the use of stem cell in orthopaedics to developing novel drugs, devices, and less invasive surgical procedures that can replicate the metabolic benefits of surgery.

The key theme of this year's show revolves around 'Innovation' and we capture the impact of these changes in our 'Innovation' section (pages 36 to 64) that takes a deeper dive into facets such as clinical mobility, Artificial Intelligence (AI), and more.

Also, in an exclusive interview (page 32), HE Humaid Al Qutami, Director-General, Dubai Health Authority (DHA), discusses a number of key factors that are playing a crucial role in enhancing the emirate's healthcare system, right from the mandatory health insurance scheme to the use of AI and 3D printing for complex surgeries.

Furthermore, this edition includes the 'Total Radiology Magazine' (pages 209 to 229) that features articles by discussing the advancements in the field. We also have a dedicated 'UK Report' (pages 135 to 144) that charts the country's shift in approach to care delivery. Plus, our 'Medical Tourism Special' (pages 147 to 157) highlights the current global wellness trends and fundamental drivers of this industry.

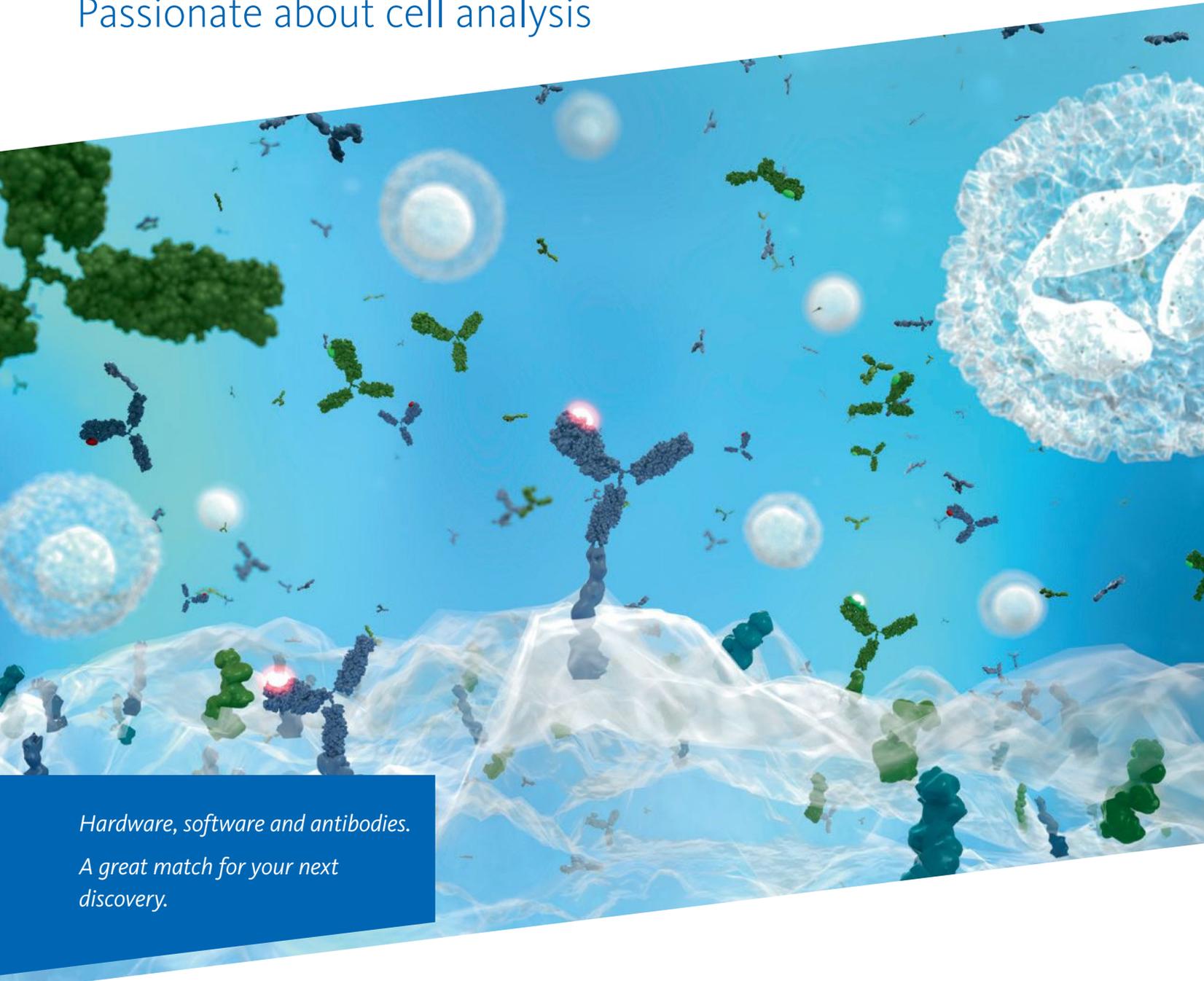
Lastly, we strive to evolve with the changing times and as part of that, we are embracing the print + digital future. From this year, instead of publishing six bi-monthly print issues, we will bring out three print (January, April, August) and three digital magazines (February, June, October). In addition, we will produce six dedicated e-newsletters and topical supplements throughout the year. Plus, in order to connect with you, our readers better, we will regularly report the latest news and trends on the revamped www.arabhealthmagazine.com and on Twitter – @Arab_Health.

We hope you have a productive show and look forward to welcoming you back to our print as well as digital pages soon.

Deepa Narwani

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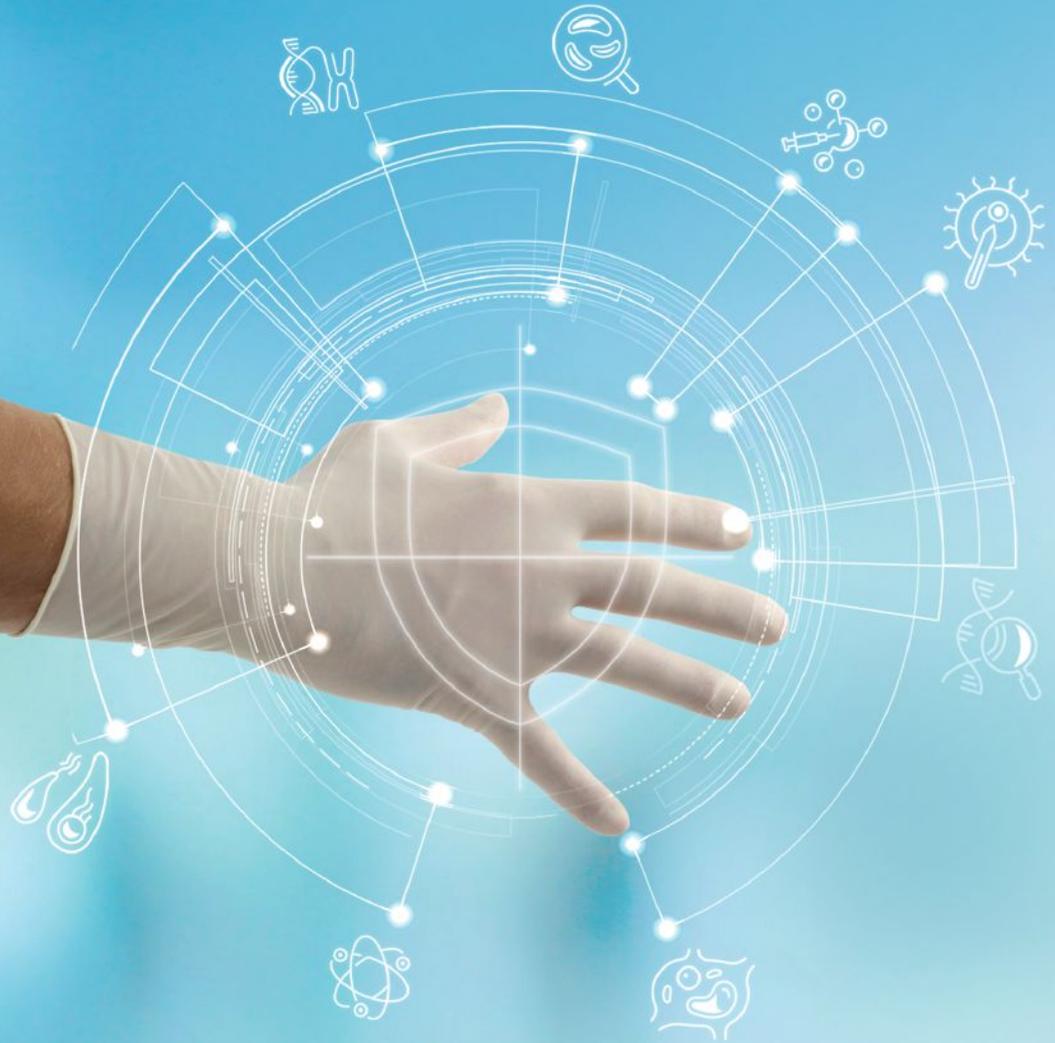
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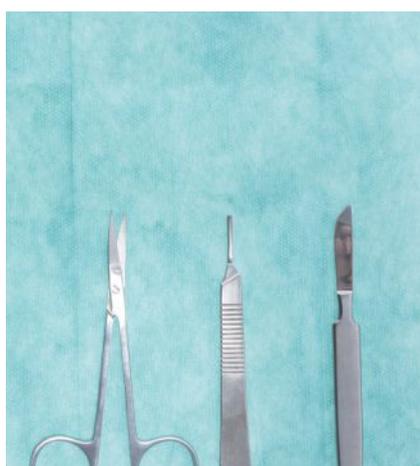
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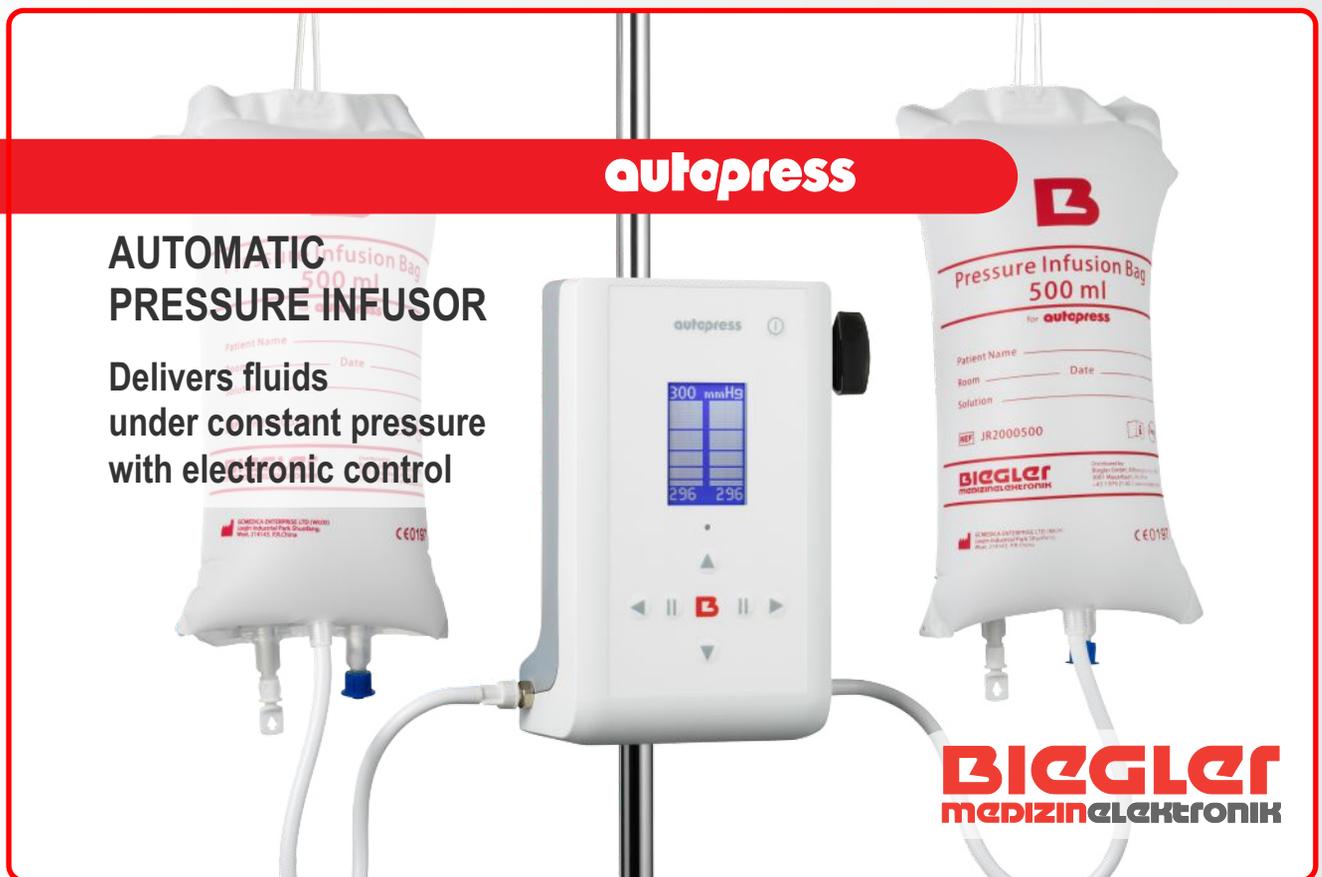


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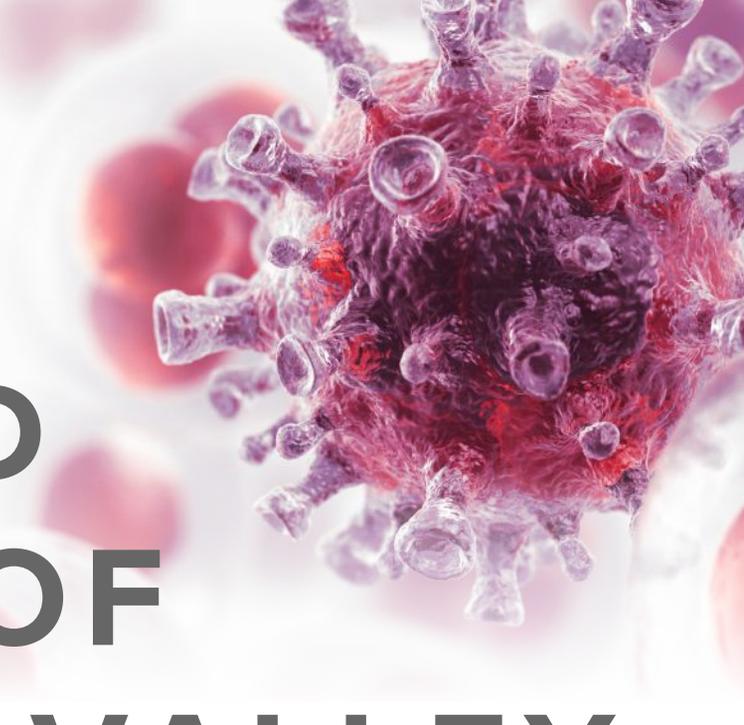
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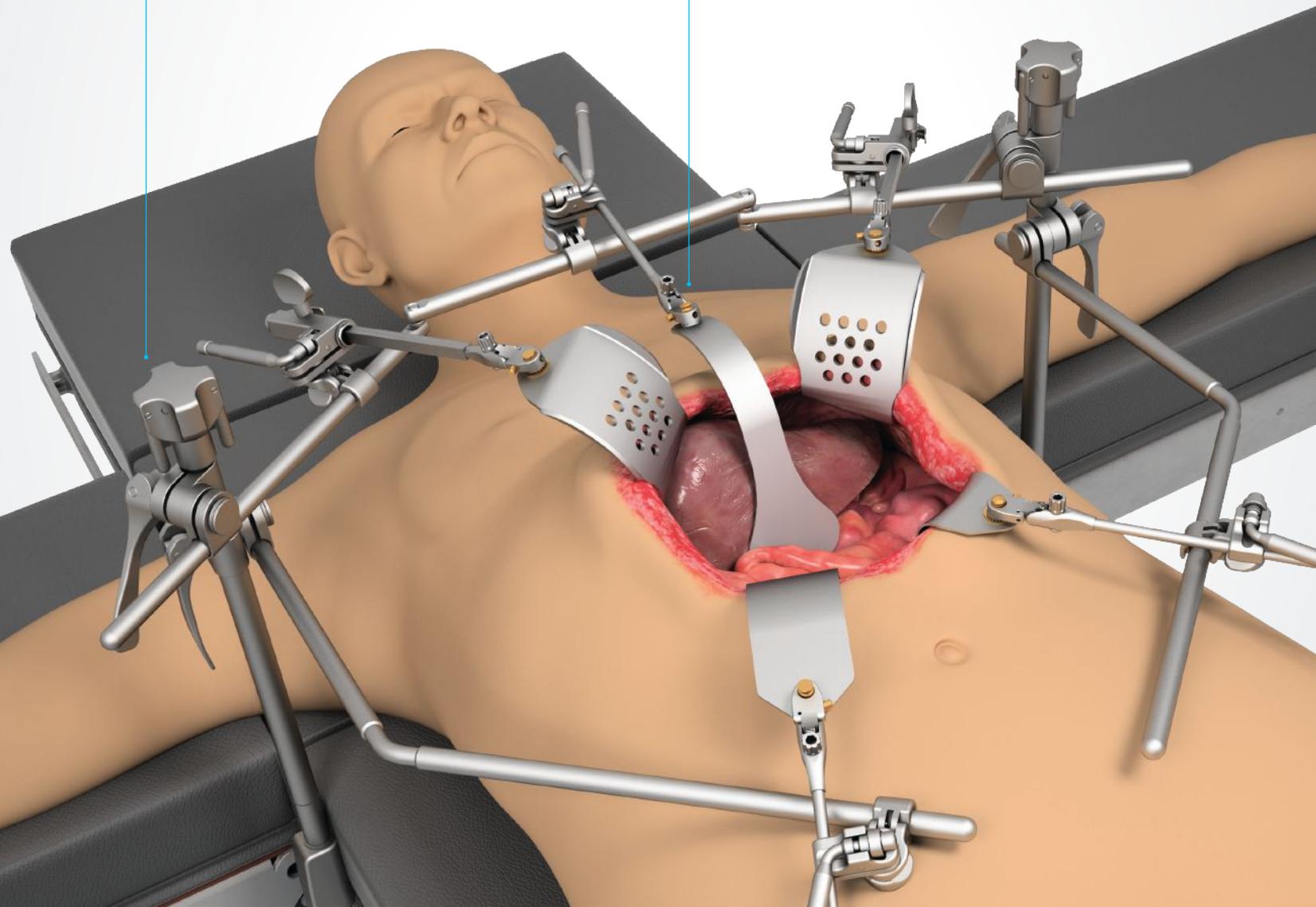
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Sources: Internal data, Hillman Center for Pediatric Transplantation; Scientific Registry of Transplant Recipients (www.srtr.org), December 2015 release.





ARAB HEALTH EXHIBITION & CONGRESS 2019

Dates: 28 - 31 January 2019

Venue: Dubai International Convention and Exhibition Centre and Conrad Dubai

Exhibiting companies: 4,150+

Exhibiting countries: 66

Dedicated country pavilions: 39

Expected attendees: 84,500+

Conferences: 11

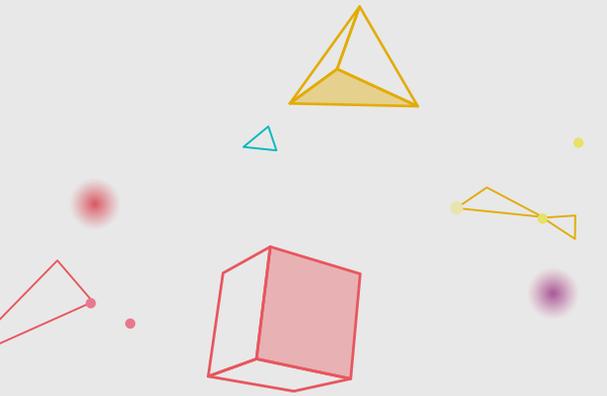
Expected delegates: 5,800+

Total countries represented at the show: 160+

GAME-CHANGING INNOVATIONS AND GROUND-BREAKING TECHNOLOGIES IN THE SPOTLIGHT

The 44th edition of Arab Health will see more than 50 healthcare start-ups and SMEs showcasing new products and technological innovations.

By Arab Health Magazine Staff



Arab Health – the largest healthcare business platform in the MENA region – is all set to welcome an anticipated 84,500+ attendees from across the globe as it sets the stage for the world's leading manufacturers, wholesalers and distributors to meet the medical and scientific community in the Middle East.

To be held from 28 - 31 January 2019 at the Dubai International Convention and Exhibition Centre and Conrad Dubai this is the perfect opportunity to stay abreast of the industry's latest trends and advancements and engage with more than 4,150 companies from 66 countries that will be showcasing the latest healthcare technology, products and services.

Organised by Informa Healthcare, the 44th Arab Health Exhibition will also host the Arab Health Congress, reputed for delivering the highest quality programme of Continuing Medical Education (CME) to medical professionals. At this year's Congress, international speakers will cover the latest updates and insights into cutting-edge procedures, techniques and skills across 11 CME-accredited conferences.

Innovation Hub

Working alongside government entities such as the UAE Ministry of Health and Prevention, Dubai Health Authority, Department of Health Abu Dhabi and SEHA, Arab Health will host the new Innovation Hub – a dedicated area at the show for attendees to immerse themselves in the latest healthcare innovations.

The Innovation Hub will feature the Innovation Showcase allowing visitors to explore the latest healthcare technology including AI, disease management and home care devices, mobile device accessories, telemedicine platforms, to name a few.

The Innovation Hub will also be the platform for the inaugural Innov8 Talks at Arab Health. As well as daily free-to-attend talks with discussions led by keynote speakers, the Innov8 Talks will also host a series of pitch sessions for the region's most creative and forward-thinking healthcare start-ups and SMEs to sell their ideas to an esteemed panel of judges that are involved in driving innovation in the UAE.

Arab Health Generates US\$ 778 Million Worth of Business

More than US\$ 778 million worth of business was generated by exhibitors during the 2018 edition of the show, a figure that is in line with Alpen Capital's projections that the GCC healthcare spend will reach US\$104.6 billion in 2022. With an anticipated need for an additional 13,000 hospital beds and the employment of 10,000 new physicians to the region, the demand is being mitigated by the 700 healthcare projects worth US\$ 60.9 billion under various stages of development as well as government initiatives such as the recently launched Dubai Health Investment Guide 2018-25 designed to increase private sector participation.

According to Ross Williams, Exhibition Director of Arab Health, "Some of the key factors stimulating the growth of the healthcare market in the region include the ageing population, increasing frequency of non-communicable disease, high cost of treatment and mandatory health insurance.

"The trade generated during the last edition of Arab Health is a strong indication that the private sector is also playing an important part in the development of the healthcare industry and we anticipate that these figures will continue to grow in subsequent years."

The Arab Health Exhibition and Congress experienced year-on-year (YoY) growth of 3 per cent in exhibitor numbers between 2017 and 2018 while this year sees a 2 per cent YoY growth. Dealers and distributors accounted for 37 per cent of total attendees in 2018 with the UAE, Saudi Arabia, India, Pakistan and Iran making up the top five countries looking to source new healthcare products and services.

Robust International Representation

With 39 dedicated country pavilions, international representation at the show remains robust with many pavilions increasing in size and number of exhibiting companies. One example is that of the Polish country pavilion, which has seen its national participation grow from 39 exhibitors in 2018 to 50 exhibitors in 2019 signifying the growing interest in the UAE as a key market for the healthcare industry. Data revealed at The First Trade & Invest Forum held in October 2018 in Warsaw indicates that three times more companies in Poland ask about the possibility of exporting goods to the UAE than to the U.S. The interest in the UAE market among Polish companies is almost equal to the interest in European countries, which are natural trade partners for Poland.

Who Will Attend

Over the past 43 years, hundreds of thousands of healthcare professionals across the globe have made Arab Health an essential part of their yearly calendar.

Manufacturers of medical devices and equipment use Arab Health as an opportunity to showcase their latest products to the MENA region's healthcare industry. Companies vary from large organisations such as Siemens and Philips to smaller business houses exhibiting for the first time. With thousands of products on display, business deals occur every minute of the show, truly making Arab Health the place where the healthcare world comes to do business.

For professionals who are tasked with purchasing and procurement responsibilities for healthcare facilities, educational providers and medical specialty associations, Arab Health is the ideal platform to get ahead of the upcoming year's product needs.

Arab Health also provides a beneficial experience for all dealer and distributor job functions – from senior management of larger organisations that are looking to connect with key industry players, sales and business development professionals tasked with expanding their product portfolios and entrepreneurs hoping to source the next 'big product' to supply in their country.

What attracts medical practitioners to the show are the incredible insights it offers into the advancements of the healthcare industry through the exhibition, and the dedicated CME-accredited conferences and hands-on-training workshops that provide the opportunity for growth in multiple fields and disciplines.

Stay up-to-date

From state-of-the-art imaging equipment to the most cost-effective disposables; developments in surgery to advances in prosthetics, Arab Health continues to be at the heart of healthcare in the Middle East. As the largest collection of healthcare product manufacturers and service providers under one roof, Arab Health is also your one-stop shop for all your healthcare sourcing and procurement needs.

In addition, a large number of business, leadership and CME conferences and workshops aim to bridge the gap in medical knowledge across a broad spectrum of medical specialities and disciplines. **AH**

PERPETUATING EDUCATION

SKILL DEVELOPMENT AT ARAB HEALTH CONGRESS

The 44th edition of Arab Health Congress will take place at the Dubai World Trade Centre and the Conrad Dubai and will feature 11 Continuing Medical Education (CME) conferences for attending healthcare professionals.

New venue

The Total Radiology Conference and the Obs & Gyne Conference will be held at the Conrad Dubai, directly opposite the main exhibition venue during the show. The new venue allows for more attendees to benefit from these conferences as well as further enhance the delegate experience.

Total Radiology Conference 28-31 January

NEW
VENUE

This four-day scientific meeting will present the latest advances in medical imaging, accurate imaging diagnosis and improvement of care quality for radiology patients within the theme "Practical advice and updates in radiology practice."

What's New:

- The Total Radiology Conference will take place at the Conrad Dubai to provide you with a better experience!
- Leadership lectures: Management skills for radiologists
- Technical skills workshops and hands-on training for senior radiologists
- Interactive masterclass on MRI for radiographers

Orthopaedics Conference 28-31 January

This conference will offer the latest information on orthopaedic treatments, advancements and research breakthroughs. Delegates can discuss the technological developments in the field, as well as the recent advances made in the diagnostics, management and therapeutics of orthopaedic diseases. This platform will also provide an opportunity to identify key areas for future research and developments in basic and clinical orthopaedics.

What's New

- Advanced and basic technical skills workshops and hands-on training
- More interactive sessions featuring debates and panel discussions

Surgery Conference 28-31 January

Discerning general surgeons can refine their procedural skills while also reviewing the latest best practice to perform advanced procedures in hepato-pancreato-biliary, minimally invasive surgery, upper GI, bariatric and onco-surgery. The conference will cover both theoretical aspects and case-based experiences to improve technical skills.

What's New

- Dedicated symposia on new topics: Management skills, tumour board review, HPB surgery
- A full day of biliary disease based on popular demand and delegate feedback
- More interactive sessions with audience polling on debates

Obs & Gyne Conference

28-31 January

Placing emphasis on practical application of the evidence-based topics presented, this will cover the most up-to-date information on treatments and technologies available in the fields of Obstetrics and Gynaecology. Experts will discuss the latest trends and treatments covering multiple sub-specialist areas such as imaging, maternal-foetal medicine, MIS, reproductive health and a myriad spectrum of women's diseases faced by practicing OBGYN professionals.

What's New

- The Obs-Gyne Conference will be held at the Conrad Dubai .
- Introduction of dedicated poster presentations sessions, enabling forefront research and emerging developments
- New sessions on hot topics such as imaging and high-risk obstetrics

Gastroenterology Conference

28-29 January

The agenda here is to provide a forum for all gastroenterologists within the region to exchange ideas, discuss innovative methods and review new developments in the field. The programme addresses the hottest topics and controversies as well as the latest in essential knowledge to reduce procedural complications and hasten patient recovery.

What's New

- Technical skills workshops after the conference
- Expert speakers from U.S. and UK

Diabetes Conference

28-29 January

Participants will learn about the most relevant developments in diabetes prevention, treatment and management. Clinicians can expect a lively exchange of ideas related to the technology and prevention of diabetes and related illnesses.

What's New

- Technical skills workshops and hands-on training
- Agenda features a non-biased technology-focused session

Paediatrics Conference

28-29 January

Hear from notable experts from around the globe as they present the most up-to-date

NEW
VENUE

information on diagnosis and treatment of paediatric conditions. This is also a unique opportunity to witness the future of paediatrics as it unfolds and to network with leaders in paediatrics from around the world.

What's New

- Now a two-day comprehensive and concise programme featuring top international speakers
- Interactive masterclasses designed to address common challenges, led by international faculty

Public Health Conference

30-31 January

The agenda covers several important areas in which public health bodies can contribute to making overall emergency and disaster management more effective. Speakers will discuss health effects of some of the more important sudden impact disasters and potential future threats while outlining the requirements for effective emergency medical and public health response to these events.

What's New

- Two-day comprehensive agenda
- Each session offers a global, regional and local speaker for a well-rounded perspective

Anaesthesia Conference

30-31 January

Held under the theme 'Tailoring anaesthesia to the individual's needs', the programme will enable anaesthesia specialists to apply the latest research with the patient at the heart of decision-making and is designed to minimise patient risk, reduce errors and optimise outcomes in a variety of challenging conditions.

What's New

- Global perspective on solutions to key challenges in the field of anaesthesia
- 20+ speakers
- Over 8 interactive Q&A sessions giving delegates face time with anaesthesia gurus

Emergency Medicine Conference

30-31 January

Through the inclusion of trauma focused symposiums, this carefully designed programme aims to deliver advanced educational content for both emergency and trauma physicians that are involved in

emergency and critical care. Speakers will provide evidence-based global insight into the management of complex emergency cases, by addressing the latest research and guidelines.

What's New

- Practical advice shared to support improved multidisciplinary care
- Dedicated debates on the latest controversial topics for each session
- Inclusion of trauma focused symposiums within the conference

Quality Management Conference

30-31 January

It will provide senior level delegates with the unique opportunity to engage with world-class quality management experts; all having distinct insight into the pitfalls and potentials, concerning healthcare quality specifically. Focusing on 'practical steps', this year's conference serves as a practical guideline for healthcare professionals, with the tools and techniques for supporting effective quality planning, assurance, quality control and improvement, being openly shared.

What's New

- New speaker line-up including speakers from renowned international organisations
- KPI hands-on interactive workshop session
- Dedicated discussions following each session 

Trainings and Workshops

Ansell Workshop - Safety Innovations in the OR: 28-29 Jan

It will cover topics such as Breakthrough System in Double Gloving, New Gloving Solutions for Allergies, Advanced Glove Technology Focused on Hand Health and Safety and Breach Protection During Surgery. It will take place at Al Ain J, above Hall 4, Dubai World Trade Centre.

Masterclasses Ultrasound - Liver and Musculoskeletal (MSK) & Small Parts: 28-31 Jan

Canon Medical will be hosting two sessions for those who want to expand their clinical capabilities with ultrasound. Each session will consist of a lecture followed by a live scan using the latest equipment. It will take place at Conrad Dubai, Khasifa Room, Level 2.

Transforming Ideas into Reality at the **INNOVATION HUB**

Healthcare start-ups and SMEs will showcase latest technological developments at this dedicated platform.

Digital health start-ups are said to have raised US\$ 11.5 billion in 2017, up 27 per cent from 2016, exponentially increasing the pace of digital innovation in healthcare, according to a new report titled *Technology: Accelerating Innovation Across Healthcare*. The report outlines the positive impact of technologies such as Artificial Intelligence (AI), Virtual Reality (VR), wearable technologies, 3D printing and drones as an agent for transformation in healthcare.

According to Ross Williams, Exhibition Director of Arab Health: “The market is ripe for new healthcare start-ups and entrepreneurs looking to make their mark on the industry. Over the years, we have seen growing interest in new products and innovations that will contribute to shaping the future of healthcare. Hospitals, medical device manufacturers and service providers across the globe are facing increasing pressure to innovate in order to

become competitive.”

Innovation is clearly driving the healthcare industry forward and advances in technologies are creating vast new possibilities and opportunities for the UAE healthcare sector.

In line with this, Arab Health 2019 will introduce a dedicated Innovation Hub to highlight some of these technological advances and innovations. At the Innovation Hub, you can discover some of the significant breakthroughs and ground-breaking technologies that will shape the future of healthcare and find out what game-changing innovations will offer provisions for cutting-edge care, improved operational efficiency, better patient outcomes, and reduced costs.

Come, discover the significant breakthroughs and the latest healthcare innovations at the Innovation Hub - Arab Health's new dedicated zone!

The two key sections at the Innovation Hub include:

■ **Innovation Showcase:** At this dedicated showcase area, you can meet and discover the start-ups, SMEs, and innovators.

Located within the central Plaza Hall, companies will display and demonstrate new products and innovations that will contribute to shaping the future of healthcare.

■ **Product areas to explore:**

- Artificial Intelligence
- Disease management devices and technology
- Health monitors and home care devices
- Healthcare start-up companies
- Mobile device accessories
- Smart watches, fitness trackers and applications
- Telemedicine platforms

■ **Innov8 Talks:** Listen to start-ups and entrepreneurs present their healthcare innovations to a panel of industry experts and potential investors at the dedicated seminar theatre at the Innovation Hub.

Innov8 Talks will host eight pitches, each eight-minute-long, across each day of Arab Health. The judging panel will determine the best innovation.

At the free-to-attend sessions, discussions will be led by keynote speakers, setting the theme for each day. Afternoon sessions will have a regional focus. The topics include:

Monday, January 28: Future of Care and Treatment

Tuesday, January 29: Changes in the Healthcare Industry to Enhance Patient Care and Delivery, and Emerging Innovations and Achieving the Quadruple Aim of Quality, Access, Cost and Patient Experience.

Wednesday, January 30: Disease Prevention and Management

Thursday, January 31: Patient Safety and Quality. **AH**



Find out more on - www.arabhealthonline.com/talks

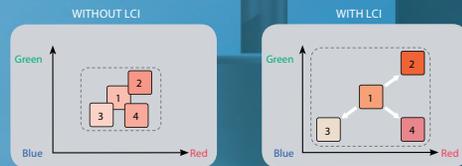
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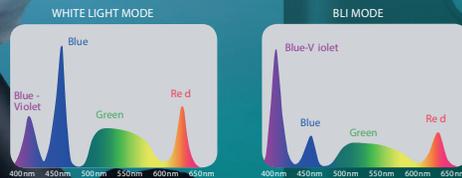
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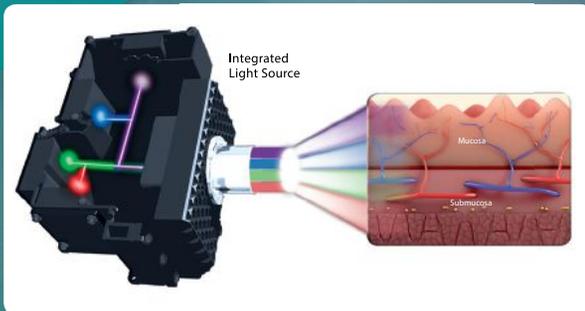
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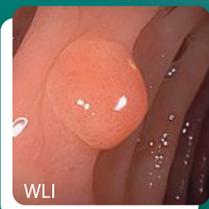
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FOSTERING INNOVATION

In an exclusive interview with *Arab Health Magazine*, HE Humaid Al Qutami, Director-General, Dubai Health Authority (DHA), discusses a number of key factors that are playing a crucial role in enhancing the emirate's healthcare system, right from the mandatory health insurance scheme, the use of AI and 3D printing for complex surgeries to the implementation of Electronic Medical Records (EMR) across all health facilities. Excerpts from the interview.

What are some of the key achievements of the DHA over the past few years?

I think the roll out and uptake of the mandatory health insurance scheme in Dubai is certainly one of our most important achievements in the last few years. This is a major milestone in ensuring access to healthcare. Today over 99 per cent of the population has access to essential health services. In addition, plans are underway to extend the health insurance coverage to include visitors to Dubai.

The mandatory insurance coverage has been a direct source of patient happiness and we will continue to enhance the system.

We have also achieved a big leap in the number of health facilities that are internationally accredited. Currently, 96 per cent of hospitals in Dubai have completed their international accreditation, which is a significant jump from 80 per cent in 2015.

The number of physicians per 10,000 of the population has reached 33 exceeding the national level (27) and approaching the level achieved by Sweden (39).

We also completed the Salama project within 21 months of its launch in February 2016. Salama is a DHA-wide project that aims to provide patients and doctors access to medical records through a patient portal and ensures that electronic patient medical record (EMR) is available across all DHA health facilities. More than 1.4 million patient medical records and more than 112 million transactions have been transferred to the Salama system

With the implementation of EMR across DHA hospitals and health centres, we are strongly moving ahead with our aim to create a paperless health system.

DHA hospitals achieved the Electronic Medical Records Adoption Model (EMRAM) score of 6 and our primary healthcare centres are rated as per Ambulatory EMRAM. EMRAM is accepted today worldwide as an international benchmark to stage hospital's electronic efforts. The model uses a 0-7 stage scale to rate hospitals based on the extent to which they have adopted a paperless, digital system. Stage 7 means the hospital is a fully digital one with reference to medical records.

In pursuit of achieving the Dubai Smart Government vision, we have launched several health apps that will benefit the public. We also forayed into the use of technologies



HE Humaid Al Qutami

such as AI and 3D printing and successfully used 3D printing for complex surgeries as well as implemented it on a wide scale across our dental centres.

We developed a comprehensive 2016-2021 health strategy, that has 96 initiatives and is divided into short (quick wins), medium and long-term initiatives and has tangible goals so that we can achieve concrete results and sustain the momentum of growth to realise DHA's vision "Towards a Healthy and Happier Community".

We launched several important policies that will directly benefit the public health system. We launched the School Health Policy and the Hasana unified immunisation system, which will provide access to unified immunisation records at any facility and will ensure availability of relevant data. It will also enable the DHA to lay the foundation for the Population Health Management System, which will be robust enough to manage and contain the spread of communicable diseases. All private schools in Dubai will now use the Hasana system.

Additionally, we launched the mental health strategy for the emirate, the investment strategy and our teams are working on launching strategies for Non-Communicable Diseases (NCDs) and Communicable Diseases (CDs) and Health Tourism.

What are some of the future projects?

Some of the projects we are working on include developing an oncology and cardiovascular centre of excellence, establishment of the innovation centre, the Rashid Medical Complex Project and a skin bank.

The bank will be established before the end of 2019. It will be the first-of-its-kind in the Middle East and will provide a ready source of clinically safe human donor skin to treat severe burns and other cases where donor skin is needed to provide patients with a new lease of life.

The bank will follow stringent international protocols and the DHA has already sought and obtained approval from the Islamic Affairs Department on the subject as per Sharia rules and regulations.

The DHA is planning to implement the Rashid Medical Complex project in phases. The complex will be built on 600,000 square metre space next to Rashid Hospital. It will be equipped with the latest technology and will provide a unique treatment experience for patients.

The Rashid Medical Complex will include a 10-floor hospital that will be home to 1,000 beds. The complex will include a five-floor Centre for outpatient clinics and 100 medical clinics. It will also have a six-floor building for medical clinics in addition to four specialised Centres (Cardiology, Neurology, Trauma and Emergency Medicine), Labs, a Rehabilitation Centre that can cater to 320 beds as well as Centres for Sport Injuries and two centres for research and conferences.

DHA recently launched the investment strategy for the health sector, can you tell us more about it.

I believe an efficient way to foster and promote health investment is to have a dedicated health investment promotion agency; several countries have successfully followed that model. At the DHA, we recently formed a specialised health investment and public private partnership (PPP) department. One of the initiatives of the department was the introduction of a detailed and in-depth health investment strategy, which was rolled out after extensive consultation and feedback with the private health sector.

The strategy will help foster and promote health investment in areas where there is a lack of services or where there are opportunities for growth.

Investors will have easy access to ►

information, support and guidance, at the same time; the investments will be need-based and thus will directly improve the existing landscape of the health sector in the Emirate.

We will work on several PPP models to establish COE's in Dubai. In November last year, we began the tendering process for the establishment of a state-of-the-art cardiac centre.

The centre will follow the public-private partnership (PPP) model. DHA has appointed a team of advisors, led by PricewaterhouseCoopers and supported by Mott MacDonald as the technical adviser and Allen&Overy as the legal and transaction adviser, to help select a suitably qualified private-sector partner.

The Cardiac Centre of Excellence (CCoE) will be a 110-120-bed facility covering cardiac emergency and inpatient and outpatient services. The centre will be located in the Rashid Medical Complex with easy access to and from the Rashid Medical Complex Emergency and Trauma Centre.

We can expect other projects that will follow a PPP model as well. We believe the private sector is our partner and together we can enhance the health sector and provide the highest quality of medical services to the community and medical tourists alike.

How important is health regulation and what are some of the advances in the regulatory framework?

Regulation plays a pivotal role in the healthcare industry. Healthcare regulations and standards are necessary to provide safe and high-quality healthcare to every individual who accesses the system.

The DHA is continuously developing as well as updating its regulatory systems to provide healthcare professionals and facilities with convenient licensing processes.

We will implement the Dubai Healthcare Professionals Registry to provide healthcare facilities and investors with detailed information about medical professionals in the Emirate.

The registry will include details about all medical professionals including doctors, nurses, paramedics, radiologists etc. Dubai has seen a robust growth in the number of medical professionals over the years. In 2009, there were 14,677 medical professionals in the Emirate, as of October 2018; there are approximately 38,000

medical professionals in Dubai.

The registry has many benefits especially for professionals who no longer need to reapply if they leave the Emirate and work abroad.

We will also implement easier medical regulation processes in line with international best practices. The total number of health professional license increased by 15 per cent and number of licensed facilities increased by about 27 per cent. We are working on revamping the health governance structure, which will result in increased accountability of hospitals and further improve patient safety and experience.

What role will innovation and smart technologies play in the development of Dubai's healthcare sector?

Innovation and smart technologies play an important role in our overall strategy. We have developed a Care Innovation Model as part of the DHA strategy, as we are keen to create an environment that is conducive to foster innovation and drive efficiency. Our aim is to promote an atmosphere that is conducive to innovation, not just for medical treatment but also in technology, healthcare management, pharmaceuticals, medical devices etc., so that all aspects of the health sector develop and thrive. Innovation cannot take place in isolation and thrives on collaboration; we are keen to work with innovators, healthcare entities, scientists and researchers so that we improve healthcare outcomes and focus on improved patient care and experience.

We are in the process of building an innovation centre and we are working with the private sector to establish the most suitable model to foster this concept.

Innovation and technology go hand-in-hand. We are keen to harness the latest technologies in healthcare.

In terms of 3D printing, we have successfully deployed 3D technology across our dental services department. We have carried out complicated surgeries using this technology. The DHA also worked with the private sector on 3D-printed artificial legs that was used to provide amputees with a new lease to life. An important benefit of 3D printing is the cost-effectiveness of the technology, which makes it affordable across a wide spectrum of patients who need it and that is the scale we are looking at so that we can use technology to reach out to the

maximum number of people.

In AI, we are working closely with world-class companies that have implemented it in various fields to see how we can utilise these services in the healthcare landscape of Dubai. The DHA's team at Dubai Future Accelerators' initiative is currently in its fifth cycle and is working with innovative firms in the field of healthcare.

As part of the fifth cycle, we are working with four international firms that will present proofs of concepts and pilot projects at DHA hospitals to see how their technology can be incorporated in Dubai.

The technologies that we are accessing include Proximie, a cloud-based augmented reality platform that allows doctors to virtually transport themselves into any operating room or clinic to collaborate, guide and support surgeons and healthcare professionals.

We are also carrying out PoC's for a portable and connected device developed by Scanbo that can capture multiple vitals from the human body and transfer data to mobile app using Bluetooth.

Dubai Health Investment Guide

DHA's Dubai Health Investment Guide 2018 provides investors and private-sector health facilities with information on investment priorities, gaps in health provision and key developments in the health sector. The guide is available online on www.dha.gov.ae. **AH**

DHA's Investment Focus for the Near Future

- Innovations in primary care
- Ambulatory care
- Urgent care clinics
- Mental Health
- Chronic Disease Management
- Tertiary Care for diabetes, cardiology and oncology
- Diagnostic Health and Remote Monitoring
- Rehabilitation and Physical Therapy
- Home-based care
- Long-term and extended care

DHA's Long-term Investment Focus

- Prevention and Pharmacy beyond-the-pill
- Precision Medicine and Genetics
- Population Health Management
- Nursing Homes and Palliative Care

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Although still in its pre-clinical stage, research into tissue engineering such as this could lead to a new standard of care for patients with complex physical conditions especially in the case of children with damaged organs.

”

Thinking Innovatively in Paediatrics

How stem cell and tissue engineering is breaking new ground in complex paediatric medical conditions

By Inga Louisa Stevens, Contributing Writer

As advancements in technology continue to make waves in all fields of medicine, one particular field that continues to greatly benefit from innovative new devices, medicines and procedures is paediatric medicine. Scientists, researchers and physicians from around the world are working on creating novel solutions to treat complex paediatric diseases with the potential to change the lives of thousands of sick children around the world.

One such example is a pioneering new study from Great Ormond Street Hospital (GOSH) in London and The Francis Crick Institute that has seen researchers grow the world's first oesophagus engineered from stem cells and successfully transplanted them into mice.

It is hoped this new research could pave the way for clinical trials of lab-grown food pipes for children with congenital and acquired gut conditions. In the study, researchers used a rat oesophagus "scaffold" and human gut cells to grow engineered tubes of oesophagus. These were implanted into mice and within a week the engineered tissue developed its own blood supply, which is important for a healthy gut that can squeeze down food.

Although still in its pre-clinical stage, research into tissue engineering such as this could lead to a new standard of care for patients with complex physical

conditions especially in the case of children with damaged organs. The method avoids the need for a donated organ, which are often in short supply for the paediatric population and significantly lowers the risk of organ rejection.

Arab Health Magazine had the opportunity to sit down with co-lead author on the research paper, Professor Paolo De Coppi, who is a Consultant Paediatric Surgeon at Great Ormond Street Hospital (GOSH) and Reader and Head of Stem Cells and Regenerative Medicine at the UCL Institute of Child Health in London, who shared his thoughts on innovation in paediatric medicine.

Although the study is in pre-clinical stage, when do you think we can potentially see it used in the treatment of humans?

Great Ormond Street Hospital for Children (GOSH) in London has already started using similar tissue products in children. For example, GOSH has already conducted three successful stem-cell trachea transplants. GOSH was the first children's hospital in the world to do this and remains the only children's hospital in the world to be involved in conducting this cutting-edge work.

One of the patients, Ciaran Finn-Lynch underwent the transplant in March 2010 at GOSH, when his own trachea was removed and replaced by a donor windpipe laced with

Ciaran's own stem cells, so it would not be rejected. The donated trachea was obtained from a deceased adult in Italy and was stripped of the donor's cells, down to the inert collagen. Ciaran's bone marrow stem cells were collected at GOSH, isolated at the Royal Free Hospital (RFH) and returned to GOSH the same day, where they were applied to the implanted trachea inside Ciaran's body. Biopsies of epithelial tissues – the lining of the organ – were taken from the patient's removed trachea during surgery and applied as the new graft was implanted in his body, to kick-start the gradual growth of a lining in the transplanted organ.

The graft was injected with additional cytokines – proteins that stimulate cell growth – to support the growth and differentiation of cells within the new trachea. Following the transplant, Ciaran was given further cell growth-inducing compounds known as granulocyte colony-stimulating factors or G-CSF. This is the first attempt to grow stem cells in vivo – within the body rather than in a laboratory – in a child in an operation of this kind.

In another world-first, a biodegradable stent was inserted to maintain Ciaran's airway while the cells regrew within the organ over the following six months. When it comes to the most recent study in which researchers grew the world's first oesophagus engineered from stem cells and successfully transplanted ►

them into mice, the oesophagus is a much more complex organ to work on. While the team has published research on pre-clinical trials in small animals, as well as is currently working on a study in larger animals, it will be two to three years before we can effectively and safely translate this approach to humans. A lot more research lies ahead but we are really excited about these promising pre-clinical findings.

How important is the use of innovative therapies such as stem cell regeneration in the treatment of paediatric diseases?

Innovation is very important in children's medicine. Most of the children who are seen at GOSH have a rare and complex condition, which means all the teams must constantly work and think innovatively in order to treat them. In adult cases, there are usually treatments that will work for the majority of patients. However, when it comes to children with rare and complex condition at GOSH, the treatments may have to be modified and adapted for every single child that is seen.

This is why innovation is so important.

Not only that, but tissue regenerative medicine can be very successful in children. In adults, there are fewer stem cells available and it is much more difficult to get the body to regenerate. In children, however, there is a lot more potential for regenerative medicine to provide effective and kinder treatment options.

Children requiring transplants of the trachea or oesophagus often require multiple operations because, as they grow older, they grow out of the constructed materials implanted. This is why a trachea or oesophagus that is made from stem cells and grows with the child is a much better and kinder option for the child.

Are there any other breakthrough medical innovations that we should be aware of in paediatrics?

GOSH is a globally renowned children's hospital, championing innovation across more than 60 clinical specialties and providing groundbreaking treatments for the rarest and most complex conditions.

Alongside a focus on regenerative medicine research at GOSH, there are many breakthroughs being worked on by my colleagues in the hospital and in the University College London Great Ormond Street Institute of Child Health. Examples include Professor Qasim and his team's work on the world's first use of gene-edited immune cells to treat an incurable leukaemia, as well as the haematology team's work to make the innovative T-cell therapy available for international patients with acute lymphoblastic leukaemia. Not only are new research and treatments being pioneered at the hospital, but also new surgical techniques, such as laser ablation for epilepsy. GOSH expects to be the first European hospital to offer this pioneering procedure for children.

Recently, I read an exciting research paper into the use of stem cells and gene therapy to cure a young Syrian boy of epidermolysis bullosa by a team in Germany. It's very exciting to see where this type of medicine will go and how it can be used to help more children internationally. **AH**

Professor Paolo De Coppi is a Consultant Paediatric Surgeon at Great Ormond Street Hospital (GOSH), and Reader and Head of Stem Cells and Regenerative Medicine at the UCL Institute of Child Health in London.





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- Bone Marrow and Stem Cell Transplant Program
- Investigational MIBG therapy for neuroblastoma

Urology/Genitourinary Institute

- Ambiguous genitalia/ disorders of sex development
- Anorectal malformation
- Bladder exstrophy
- Cloaca
- Hypospadias
- Kidney transplant
- Urogenital sinus

Neurosciences Center

- Deep brain stimulation
- Motion analysis lab for patients with cerebral palsy and movement disorders
- Stroke and Thrombosis program

Orthopedic Surgery

- Amniotic band
- Arthrogryposis
- Hand and foot abnormalities
- Hip dysplasia
- Limb length discrepancy



INNOVATIONS IN HEALTHCARE:

CHALLENGES AND THE ROLE OF DIGITAL TRANSFORMATION

By Reenita Das, Partner & Sr Vice President and Kamaljit Behera and
Siddharth Shah, Industry Analysts, Transformational Health, Frost & Sullivan

Asclepius was the God of Medicine, according to ancient Greek Mythology; and his 'rod of Asclepius', the snake entwined staff, is still a widely recognised symbol of medicine. For centuries, Asclepius was (and is) considered as perhaps the greatest healer. But surprisingly, 'medicine' is defined a little differently: according to the Oxford dictionary, it is 'the science and practice of diagnosis, treatment, and prevention of disease (often excluding surgery)'. Yet, in healthcare today, we focus on providing reactive care – treating sick patients, instead of proactive care – helping prevention of diseases as well, in line with the complete definition of medicine. We are now therefore facing challenges with chronic conditions, for example, and don't really have a Panacea (incidentally a daughter of Asclepius), at least a quick one for these problems.

That healthcare is undergoing transformation is a given fact. Dealing with expensive, life-long chronic conditions and an ageing population on the one hand, and with several technology innovations touted to address these challenges on the other, the model of delivering care is being upended. Moving towards a proactive or preventive care approach requires data-driven, clinically meaningful insights to be available for a physician to make prognostic, predictive decisions early-on. Luckily, with technology advances the healthcare industry is undergoing a digital transformation towards a much anticipated decentralisation of the care delivery models to bend the cost curve for lifestyle-driven chronic health conditions.

Today, digitisation of drugs (therapies), devices, services, and business models is democratising current healthcare systems, unlocking new values by displacing high-cost gatekeepers and previously inaccessible segments. This has made the digital transformation theme a core strategic priority for all healthcare industry participants, as they strive to justify the value in the much-anticipated data-driven, outcome-based reimbursement regime. The adoption of these technologies is being incorporated even in national strategies for healthcare, such as Saudi Arabia's National Transformation Plan 2020, for example.

But implementing such advances in healthcare leads to another set of challenges altogether – privacy and cybersecurity of

patient data for one, but even the ability to sift through and make sense of such large volumes of data (a long view for a patient, and at a population level). As we continue tracking the several technologies in healthcare at Frost & Sullivan, we continue to see emerging innovations in care delivery, with novel business models and some growth opportunities along the way. Here, we present our top three picks of transformative technologies in healthcare, and where we think they are heading.

Internet of Medical Things – Care Delivery Innovation Promoting Anytime, Anywhere Care

The Internet of Medical Things (IoMT) or the Healthcare Internet of Things (IoH) is a vast umbrella term with many applications of the technology. IoMT is well-suited to meet the needs of today's transforming healthcare industry, supporting the transition from disjointed care to co-ordinated care and reactive to proactive care delivery approaches, for example. Capitalising on this trend with the right applications, for the right customers with the right partners and relevant business models is crucial for healthcare stakeholders to survive the fierce competition, which is supported by start-ups and tech giants alike. There are four broad application segments for IoMT that support the development of the 'anytime, anywhere care' approach of healthcare delivery, allowing for insights to be collected and shared with medical care practitioners, and allowing them to intervene when necessary in a proactive approach to lead to better patient outcomes:

- **On-Body (aka Wearables):** After a wave of consumer-grade wearables tracking fitness, medical-grade wearables and 'smart' implants that can communicate parameters and be used by patients are now coming to the market. Even makers of consumer grade wearables are developing medical-grade features for their products; the most recent example being Apple Series 4 Watch for ECG monitoring that secured US Food & Drug Administration approval.

- **In-Home (extending to Smart Homes):** Similar to the wearables, other connected and smart diagnostic medical devices that support telehealth services are also used at home by patients – such as TytoCare at-home physical examination device for ears,

throat, heart, lungs, abdomen, skin, heart rate and temperature. Another example is of Inui Health that provides in-home urine testing using a smartphone app for colorimetric analysis, for testing kidney and general health, and urinary tract infections. All such devices and sensors, in combination with smart home systems can also provide better monitoring and care for residents, especially the ageing-in-place community.

- **In-Hospital (extending to Smart Hospitals):**

Clinicians in primary care are beginning to use smart, digitised clinical devices like digital stethoscopes. Hospitals are employing RFID, beacon or indoor GPS technologies for wayfinding within the their premises and smart hospital rooms that allow patients to communicate with care teams virtually, from their bedside – all in a bid to improve patient experience. IoMT technologies enable hospitals by providing data that can be processed for providing a valuable service or insight, which was not possible or available earlier – the very definition of smart hospitals. A great example is the use of advanced technologies at the Johns Hopkins Hospital's Capacity Command Centre, built in partnership with GE Healthcare Partners.

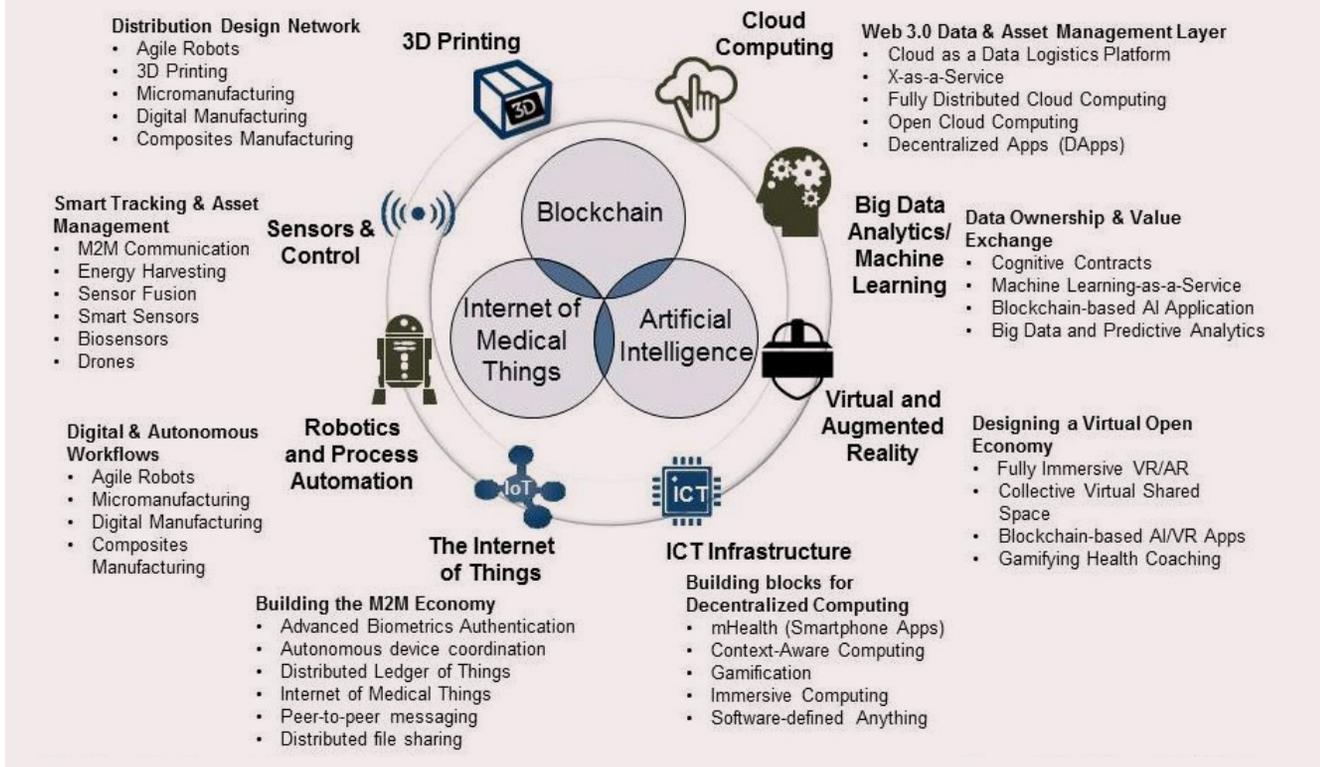
- **In-Community (extending to Smart Cities):**

Outside of homes and hospitals, smart cars can track vitals of passengers during transit, and any exigencies can be supported by drones for emergency response. From a public health perspective, the MIT Underworlds Project explores sewers as a source of information to track spread of diseases using sensors, but smart city projects are probably not geared for healthcare at the moment, we envision these to become a reality in the 10-20-year timeframe.

Artificial Intelligence (AI) – Collaboration of Man-machine Intelligence to Redefine Healthcare

Adoption of AI in the global healthcare market is expected to accelerate due to the need to automate the process of evidence-based business decision making and increasing availability of both platform grade and modular machine learning or deep learning solutions. With 55 per cent of the EMEA region, and 66 per cent respondents in Saudi Arabia and 62 per cent in UAE ►

▼ **FIGURE 1:** Convergence of Technologies in Healthcare



willing to have AI technology to help treat them, the potential for the technology in this region is high. We believe that AI solutions may never replace doctors but will definitely allow them to be more efficient and accurate. AI's ability to help physicians identify disease patterns that were historically untraceable, will break new grounds in healthcare research and delivery. On the other hand, the surge in patient generated data can be handled and interpreted by AI platforms and can have multiple utilities for diverse set of healthcare stakeholders. The use cases for AI are plenty, but we will restrict them to the following two:

■ **Medical Imaging:** Apart from the most famous, and most advanced image analysis applications (detecting a tumour in a CT scan for example), there are several other applications in the medical imaging workflow for AI. Along all of the steps of the workflow, from ordering of imaging studies by a physician, to acquisition of the images by the imaging equipment, to assigning the images for review by a radiologist, to viewing, analysing, interpreting, deciding next steps and reporting – all can benefit from AI in different formats. And in almost each

case, we are seeing some developments already. Even medical imaging equipment is becoming 'smart', and using AI to position the patient correctly while imaging to remove operator variability for example, saving time and also reducing patient radiation exposure. There also are pre-clinical applications in research using medical imaging such as imaging biomarker validation for radiomics, for example.

■ **Patient-Facing Apps and Devices:**

Consumer or patient facing medical devices and mHealth apps are also equipped with AI to drive intuitive patient monitoring, patient safety management and self-care. Patient engagement is another important area where AI has multiple applications. Payers and providers are actively trying to automate the process of identifying patients who need preventive screening and cross-continuum follow-up support. The most recent example from the Middle East is the agreement between the Dubai Health Authority and Babylon Health, which provides medical consultation through an AI-based chatbot and telehealth support as well.

Blockchain – The New Trust Code for Digital Health Workflows

As the healthcare industry struggles to find the trade-off between the risk and reward of going digital, potential application of blockchain technology provides a timely solution to mitigate some of its pressing needs. Despite the enormous potential of blockchain in disrupting healthcare digital workflows, it may not be the panacea for all healthcare industry challenges. It therefore is critical for healthcare industry's senior executives to first understand and decode the hype cycle of blockchain technology, and its realistic healthcare applications. By doing so, we believe that among several hundred use cases, the blockchain-based healthcare use cases mentioned below demonstrate more convincing opportunities, albeit at varying degrees of adoption across countries and health systems.

■ **Health Data Exchange and Interoperability:**

It is important to understand that true interoperability transcends beyond the technical facets of information exchange - it is the ability of two or more systems or entities to trust each other and then use the information

with shared accountability. As a result, despite increasing adoption of EMR/EHR systems and digital health solutions, lack of trusted digital workflows has resulted in disparate HIT systems and centralised health data management models. Based on industry estimates, current centralised IT systems for health data exchange cost about 150,000 lives and \$18.6 billion every year globally to health systems. The unique properties of blockchain technology provide an immutable and trusted workflow with a “single source of truth” to warrant integrity around health data exchange, minimise cybersecurity threats, and augment health data governance applications. The recent collaboration between Guardtime, the data-centric security company, and the Estonian eHealth Foundation to secure the health records of one million Estonian citizens using its proprietary Keyless Signature Infrastructure® (KSI®) is a classic example of blockchain technology.

- **Healthcare Frauds Waste and Abuse:** An estimated \$455 billion in global healthcare spending is lost every year due to fraud, waste, and abuse. As countries move towards universal health coverage via health insurance, health insurance fraud and claims leakages continue to concern insurers globally including those in the Middle East. Industry estimates suggest that about 10 per cent of insurance claims in Middle East are fraudulent leading to waste and increasing cases of medical claim. For example, Saudi Arabia insurance companies are rejecting about 25 per cent of medical claims from hospitals and other service providers on the grounds of fraud. Blockchain-based systems can provide realistic solutions for minimising these medical billing related frauds. By automating the majority of claim adjudication and payment processing activities, blockchain systems could help to eliminate the need for intermediaries and reduce administrative costs and time for providers and payers. Recently announced limited availability of Change Health’s medical billing management blockchain solution called the “Intelligent Healthcare Network”, is a great example, which at its current capacity is processing 550 transactions per second.

■ **Precision Medicine and Population**

Health Research: The precision medicine concept promises a paradigm shift in the care delivery arena. It aims to integrate personalised health data from direct (e.g., omics/health vitals) and indirect (e.g., environmental/exogenous) sources, targeting individuals’ health and well-being. However, with personalised health data being the “Holy Grail” for precision medicine practice, it is not unique to some of the prevailing challenges involving health data interoperability, privacy, ownership, and security. Additionally, current legal and ethical frameworks for health data exchange were built with a very different generation of medical and research practices in mind and raise some serious challenges for seamless exchange of personalised data to population-based genomic studies and research commons. Furthermore, blockchain technology, with its ubiquitous security infrastructure for seamless health data exchange, promises to drive unprecedented collaboration between participants and researchers around innovation in medical research in fields such as precision medicine and population health management. Furthermore, the trusted digital workflow of blockchain technology will promote Research Commons and remunerative models for data sharing and crowdsourcing-based research models. For example, emerging start-ups such as Encrypgen LLC, BitMED are working on blockchain-based patient-centric platform that would allow individuals and patients to securely grant access to their personal health information to researchers and pharma clinical trials sponsors and get rewards or even free telehealth consultation.

Summary

Emerging technologies outside and within healthcare are converging (see figure 1), along with the three technologies of AI, IoMT and Blockchain, that together are creating a significant impact on the healthcare industry in general. Needless to say, the state of healthcare by 2025 will be very different from the picture today, and the focus then will be on the patient to get better outcomes at lower costs and with an improved patient experience. **AH**

References available on request.



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Transforming Healthcare in Dubai with **INNOVATIVE TECHNOLOGIES**

Article provided by Dubai Health Authority

With the aim of revolutionising the way healthcare is delivered in Dubai while at the same time, focusing on patient-centric care, the Dubai Health Authority (DHA) is working with private companies from across the world to implement cutting-edge technologies to provide patients with the very best standards of care. This initiative is part of the Dubai Future Foundation's Dubai Future Accelerators (DFA) programme, which recognises that technology has the power to improve efficiencies of the overall health

sector, improve healthcare management and bring down the cost of care.

Launched in 2016 by His Highness Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai and the Chairman of Dubai Future Foundation, DFA serves as a platform to work on transformative solutions using latest digital technologies in several fields including healthcare.

"DHA is keen on exploring the use of technology in healthcare as technology has the power to transform lives and in the healthcare space, it is even more impactful as it directly improves patient care," said

Dr. Mohammed Redha, Director of Project Management Office, Informatics and Smart Health at DHA.

Constructive Partnerships

As part of its participation in the fifth Dubai Future Accelerators cycle, HE Humaid Al Qutami, Director General of the DHA met with the four companies that DHA is working with to brainstorm and discuss ways to implement these innovative solutions in the health sector in Dubai.

According to Al Qutami, "The Dubai Future Accelerators programme is a platform

that provides us with an opportunity to explore the use of cutting-edge technology in the healthcare space. At the end of the day, patient-outcomes and happiness is our core priority, and technology has the potential to transform healthcare for the better.”

The fifth cohort of Dubai Future Accelerators consisted of nine weeks of joint work between the government entity and four selected accelerators. The programme saw the companies presenting proofs of concepts and pilot projects at DHA hospitals to see how this technology can be incorporated in Dubai.

Six Body Vitals on a Single Smart Device

Scanbo, an AI-based healthcare start-up, is one of the companies working with the DHA’s Dubai Future Accelerators office. The company has invented a portable and connected device that can capture multiple vitals from human body and transfer data to a mobile app using bluetooth.

According to Ashish Raichura, Founder & CEO of Scanbo, “The device is very easy to use. The patient simply needs to place his fingers on the device and in less than two minutes, the device provides accurate details of six body vitals: blood pressure, temperature, heart rate, ECG, blood sugar and oxygen levels. The data will be stored on a mobile app and also maintains the history. We also have future versions planned, which will have 18 vitals in a compact and portable device.”

“The idea,” says Rohini Kaul, Co-founder and Chief Business Officer of Scanbo, “is to empower the patient to self-check regularly. This app can also be accessed by doctors; so it allows both the patient and the doctor to foresee any minute deviation for early intervention and further investigation.”

Remote Doctors for Specialised Surgeries

Another technology that was assessed is Proximie, a cloud-based augmented reality platform, which allows doctors to virtually transport themselves into any operating room or clinic to collaborate, guide and support surgeons and healthcare professionals.

The technology is being used in several countries, including across South America, for complicated surgeries for children with cleft lips. It is also being used at different hospitals around the world, as well as medical device manufacturing companies, and teaching hospitals and institutions.

Tariq El-Titi, Commercial Director of Proximie Gulf, explained, “The technology allows doctors to virtually scrub in, without being in the operating theatre. The technology literally augments the transmission of the real physical world on screen with additional, digitally generated content. It allows remote hands-on virtual assistance and provides specialised care and input at affordable costs.”

Pre and Post-Natal screening

P4 Medical Laboratory (P4ML), Ireland’s first ever precision medicine company, has designed a non-invasive prenatal test (NIPT), which is a simple blood test that is CE-IVD marked. PJ Moloney, Managing Director of P4ML, explains that the test is called Eolas Plus and helps detect specific chromosomal disorders as early as 10 weeks to provide valuable information in pregnancy management. “We have developed very specific IP to also screen for biomarkers for foetal growth restrictions (FGR) in tandem with our NIPT test,” he added.

“Preeclampsia and FGR are disorders that cause short-term complications for the infant and have been associated with a range of diseases in adult life, such as ischemic heart disease, stroke, type 2 diabetes, and long-term neurodevelopmental disorders,” says Moloney. “Moreover, these complications have profound effects on maternal morbidity and mortality. Preeclampsia is one of the leading causes of maternal death globally, and preeclampsia and FGR are markers for the mother’s later risk of cardiovascular disease. Both preeclampsia and FGR are associated with abnormal placental function and metabolism. We pick up biomarkers for foetal growth disorder or pre-eclampsia so that the clinician can then advise and put the patient on a dose of aspirin to help bring the mum and baby to full term.”

Normally, in cases of pre-eclampsia the only solution is a C-section at week 28 or at 32 and the baby is born preterm and needs admission in an INCU. “However, early detection at 10 weeks allows the doctor to put the patient on aspirin so that they can bring the mum and baby to term at 38 to 40 weeks,” he added.

Robotic Assistant for Surgeries

Amer Khayel from Amico explained how his company supplies a robotic assistant known as ROSA with a robotic arm for minimally invasive spine surgeries.

“ROSA automatically positions the guide according to the planned screw trajectory and allows precise adjustment of the guide’s position. The robot arm follows the patients’ movements in real time, a feature that mimics real life and responds to one of the common unmet clinical needs,” he said. **AH**



ARTIFICIAL INTELLIGENCE for Sepsis Management

Article provided by Dubai Health Authority

A new protocol using Artificial Intelligence to detect hospital-acquired infections (HAIs) and pre-empt sepsis early to prevent fatalities arising due to this condition has been launched by Dubai Health Authority (DHA) across all its hospitals. It is the first-of-its-kind in the MENA region.

The AI system is incorporated with the DHA's Electronic Medical Record (EMR) or Salama system to predict sepsis using Modified Early Warning Scores (Mews) and Laboratory testing to save lives.

Sepsis is the body's overwhelming response to infection, which can lead to tissue damage, organ failure and death.

When a person gets sepsis, the body goes into sepsis or septic shock. Although in many instances, lives are saved by using existing and proven protocols, worldwide, one-third of people who develop sepsis die. Many who do survive are left with life-changing effects, such as post-traumatic stress disorder (PTSD), chronic pain and fatigue, organ dysfunction etc.

Almost 90 per cent of septic patients present to clinics and hospitals from the community. Hospitals and clinics also have the potential to infect people, especially immunocompromised and geriatric patients.

Sepsis is a medical emergency that requires urgent attention and rapid treatment for survival. According to the *Sepsis Alliance* report, "Mortality from sepsis increases eight per cent for every hour that treatment is delayed. As many as 80 per cent of sepsis deaths could be prevented with rapid diagnosis and treatment."

"Given the importance of early intervention in saving lives, we developed this system using international benchmarks to develop protocols in place that promote early intervention and



Dr. Younis Kazim, CEO of Dubai Healthcare Corporation

management to save lives," said Dr. Younis Kazim, CEO of Dubai Healthcare Corporation. "The system uses AI technology that is linked to the DHA's Electronic Medical Record System. The AI algorithm reviews the progress of the patient and links variables together to identify patterns that indicate a patient may be developing a severe infection. When the nursing staff enters into the EMR the vital signs (pulse, temperature etc.), the system calculates a score. This scoring system is Mews. This is an international evidence-based tool that monitors the vital signs to flag changes if the patient is getting sicker. This score is then linked to recent laboratory results. If this score is 3 or above an automatic warning comes to the nurse and the physician that this patient is at risk of sepsis."

Dr. Kazim added that the Sepsis Management Workflow was developed by a team comprising both clinical staff from all DHA hospitals and technical staff, who worked together from January 2018 to identify the

components of the system required and to build these actions within the Salama EMR.

How will the initiative work?

Once the automatic warning is fired, the nurse contacts the physician urgently. Once the physician reviews the patient, they click on this warning and a set of orders is provided instantly to the physician. These orders include:

- Nursing instructions
- Laboratory tests
- Medications
- Intravenous fluids

This allows the first hour of treatment to start immediately.

Early symptoms of sepsis:

- Fever and chills
- Very low/very high body temperature
- Decreased urination
- Rapid pulse
- Rapid breathing
- Nausea and vomiting
- Diarrhoea

Benefits of the system:

- Early identification of patients with suspicion of sepsis as the EMR automatically identifies the patients becoming sicker and notifies both nursing and medical staff to take action
- Early start of sepsis management
- Improvement of sepsis outcome due to early identification and treatment
- Establishment of sepsis registry

According to Dr. Kazim, smart technologies not only help improve patient care but also help improve the overall efficiencies and management systems of healthcare entities.

DHA has also been working on the use of AI enabled workflows in Radiology with Agfa HealthCare, since the past two years. **AH**

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CARE MODEL INNOVATION AND TECHNOLOGY ADOPTION:

The Next Investment Big Bets for Health Systems in GCC

By Ahmed Faiyaz, Advisor at the Health Investment & PPP's Department, DHA

The GCC has seen significant growth in health infrastructure over the past decade, with the mushrooming of several types of specialised clinics serving the needs of the communities, as well as large medical cities and general hospitals that have been set up to offer secondary, tertiary and quaternary care across specialties. While access to care has improved considerably and is also supported by mandatory health insurance programmes in many countries and city states, there still exists gaps in the health system largely driven by the lack of specialised and highly experienced clinical talent and a lack of trust and poor perception of quality of services for a number of specialties and complex conditions. The next wave of investments in the GCC has to largely focus on bringing in highly specialised clinical talent, and offering multi-disciplinary, coordinated care to address the growing needs of the patient population.

The investment focus thus needs to shift to value-based care models and innovation that can enhance and improve clinical outcomes, and further build trust in the health ecosystem. Among the most important challenges that need to be addressed is the seven to 10 per cent growth in health spending year-on-year over the past four to five years. This increase is unsustainable as it affects and impacts both the GCC governments and businesses in a negative way resulting in growing healthcare budgets and rising premiums for healthcare plans thus increasing the cost of doing business.

The public sector health facilities in the GCC region, however, face a bigger challenge with the growing challenge of attracting and retaining highly qualified and experienced clinical talent, especially as the private sector facilities in most cities in the GCC have seen a faster growth in inpatient and outpatient utilisation. Driven by mandatory

health insurance reforms, patients are preferring to visit private sector facilities for non-urgent elective care, particularly when they have insurance coverage. Amongst the several reasons for this include the long waiting times for diagnostics and surgical procedures, poor perception of patient experience (related to admissions, discharge, appointments and billing) in the public sector, and a lack of insurance coverage of services in many pockets, although this is now changing. The slower growth of the public sector is leading to spiralling costs especially as many pockets of the private sector healthcare market continues to be fee for service and utilisation driven. Since there are significant incentives and referral fees being paid to doctors and facilities that is linked to utilisation, it results in overutilisation and challenges with claims approval and settlement with the health insurance companies who are focused on

curbing utilisation and optimising costs.

Most GCC health systems have also seen a growing spending on nationals through the overseas treatment programmes, with costs rising disproportionately to the increase in the number of patients. On the other hand, businesses are struggling with the rising costs of health premiums, and many organisations are shifting to lower coverage plans with restricted networks, which constraints and seriously limits the access to health services for the patient population. Health insurance companies and their third-party administrators (TPAs) across most GCC countries have started sending patients to the home country (more often South Asian countries) for elective procedures and treatment for health conditions ranging from obstetrics to cardiac surgeries and interventions (particularly for low to middle income segments of the insured population) and are covering this through insurance reimbursement at significantly lower costs, which has impacted patient flow and volumes for the private sector facilities addressing the mid and low-income populations.

GCC health systems thus need to drive efforts and investment to support the following:

■ **Technology adoption for care coordination**

in the health systems: A big positive is the fact that there is evidence of technology adoption driving savings in costs and reducing or curbing utilisation of services through early stage interventions. The focus should be to evaluate and adopt technologies to support a more coordinated care model for patients with chronic conditions (such as Type 1 diabetes, respiratory conditions, etc) where predictive models and analytics can identify risks and trigger early stage interventions. This could bring in nurses to support these services or can be managed to care coordinators thus avoiding frequent and unnecessary hospitalisation and re-admissions when the condition gets worse. Technology investments should be made in devices and systems that can improve health system efficiency and access to care in the public and private sector, as well as improve the quality of care and response time to patient needs.

■ **Integration of hospitals and medical cities with home-based care and telehealth:**

The focus here is to effectively integrate electronic health records across the health system thus allowing seamless access to patient data and interventions that can

enable home-based monitoring, follow ups and telehealth supported services through real time monitoring via smart devices or applications, which will allow physicians and/or nurse practitioners to intervene where necessary. Evidence of implementing such models across integrated delivery systems in the U.S. as well as in health systems in Europe has shown that this can significantly reduce costs particularly for emergency admissions and visits, and has helped reduce lengths of stay, while also improving clinical outcomes for patients with chronic conditions. Better integration would also enable patients to be transferred to nursing homes or long-term care centres, which are largely nurse-managed and have a lower cost base, and would unlock capacity that is taken up at acute hospitals for long stay patients. This would also support a growing convergence for health services delivered between large hospital systems and smaller clinics and pharmacy clinic models that can support chronic disease management programmes and early interventions with greater convenience and lower costs.

■ **Specialised centres for tertiary services:**

GCC health systems need to target and facilitate investments in smaller, more convenient and efficiently set up Centres of Excellence to treat a number of advanced specialties and sub-specialties (e.g. Oncology, Cardiology, Neurology, Orthopaedics & Rheumatology among others) aimed at addressing the needs for screening and early detection of chronic conditions, appropriate diagnosis and treatment from outpatient to inpatient services including extended rehabilitation and/or physical therapy. These centres need to focus on and support clinical education programmes, research and affiliation with best in class international providers to bring in effective clinical pathways and enable the use of the most advanced technologies to treat patients thus focusing on improved clinical outcomes and patient trust, and reduced lengths of stay and readmissions.

■ **Encourage the set up of urgent care**

clinics: It is well known and widely reported that 60-70 per cent of patient visits to ER in GCC hospitals are for services that are non-urgent in nature and can be treated in outpatient centres. Efforts need to be made to drive and encourage the set up of smaller urgent care clinics

across communities that work round the clock, led by GPs and are mostly staffed with physician assistants and nurse practitioners, to address the challenge of rising costs, and to treat these minor conditions and ailments in a less expensive setting. Many such models have proven to be cost-effective, thus offering quicker access to patients with no compromise in quality of care, given that the clinical staff is well trained and has the experience of seeing a constant flow of patients having similar conditions. Telehealth applications and services could also collaborate with urgent care clinics and ambulatory care centres to triage patients, reduce waiting times and improve patient access and convenience. Dubai and Abu Dhabi in the UAE are witnessing the growth of such models and the rest of GCC can follow suit and support these cost-effective models.

While innovative and disruptive models need proactive investment facilitation support by regulators, it is imperative for the regulators to review policies and legislations that could enable the licensing of these facilities and applications, and encourage their roll out and set up to improve access to patient services. The success of innovative models listed above need close collaboration between regulators and insurers to effectively reimburse and support patient flow to such models that could address the rise in cost of health services, and improve patient access, experience and clinical outcomes for the sustainable future. ^{AH}



Ahmed Faiyaz is a health strategy and investment professional and is currently the Advisor at the Health Investment & PPP's Department, DHA

HEALTHCARE STAFFING:

How Technology is Having a Significant Impact

By David Taylor, Managing Director, Medacs Global Group

Nearly 20 years ago when I started my first job in a traditional recruitment office in Stockport in the North West of England, I was greeted by my eight new work colleagues, one office computer, a printer and a time slot to get in front of the screen and check our emails – not that there was ever that many received in a day! On my desk, the rolodex held the names and numbers of our clients, and candidates used to call in at the end of each week to drop off their paper timesheets to be processed for payroll and most picked up their pay cheque from the previous weeks work.

How Times Have Changed

The introduction of so many technological advances in the time period since my first job in recruitment is quite astonishing. Many different service industries have gone through an ultimate paradigm shift in the way in which they operate all thanks to technology.

Twenty years ago, organisations such as Facebook, Uber, Twitter, Airbnb, Instagram, YouTube and LinkedIn didn't even exist. The Apple iPhone has only been around for just over 10 years and as it stands today you can now download over 2.2 million apps for a variety of different uses on such devices.

Let's take the example of banking. If you would have said 20 years ago that only 10 per cent of banking transactions would

be done in person at a local branch, and 90 per cent would be completed either on the telephone, online or on your mobile phone, you would have thought the person making the statement was delusional. The actual fact is that a staggering 82 per cent of 18-24-year-olds only ever use their mobile phones to deal with their financial transactions – the future in this industry is pretty clear and self-explanatory. Technology has changed the way we deal with our banking needs fundamentally and forever.

So, Is Healthcare Any Different?

It is absolutely fair to say that over the years technology has had a dramatic effect on the delivery of healthcare, however whilst these changes have been somewhat, in my view, incremental, the biggest fundamental impact on the delivery of care happened in the late 1800's with the introduction of connected sewage systems to provide clean drinking water. Since that time, we have taken smaller steps in the advancement of healthcare delivery than you might think – until now that is.

The advancement of technology, particularly in the last few years, is already having such a massive and positive impact on the healthcare sector, with buzzwords like Artificial Intelligence, blockchain, robotics and telehealth finally coming into fruition across the sector. So, how does this all come together to change the way

healthcare staffing is delivered?

The answer lies in the way in which a healthcare facility in the future needs to be staffed to deliver a new era of healthcare.

Over 50 per cent of any hospital operating budget is spent on staffing. As the way in which the care is delivered evolves, so does the way in which we need to staff the facilities. Consider that during the end-to-end delivery of care to patient, a large percentage of the treatment or diagnosis they receive is conducted by specialists that the patient never actually meets.

If the patient does not meet the healthcare professional then that tells me they don't actually need to be physically present. The care can, for all intents and purposes, be delivered by the right specialist located practically anywhere in the world. The increase in network connectivity and the fact that more and more of the world is now connected to the Internet via a multitude of different devices, allows us to approach the staffing of healthcare facilities with a new approach.

Not only does this help us to tackle with various global shortages of candidates in certain specialisms, but also allows us to increase the level of care being delivered to the patient. We can ensure the right specialist is delivering the care for a patient that they have spent many years training for.

If we take diagnostics as an example, allowing a healthcare facility to virtually plug into another healthcare facility or

facilities, can allow the resource being used to be shared, utilised and optimised amongst one another. This will allow the skill set to be deployed to where the medical need is whilst increasing efficiency for the healthcare system in its entirety.

Other examples of technology impacting the delivery of care, and ultimately how this impacts the staffing of healthcare professionals lies in the use of various tele-consultation platforms now on the market.

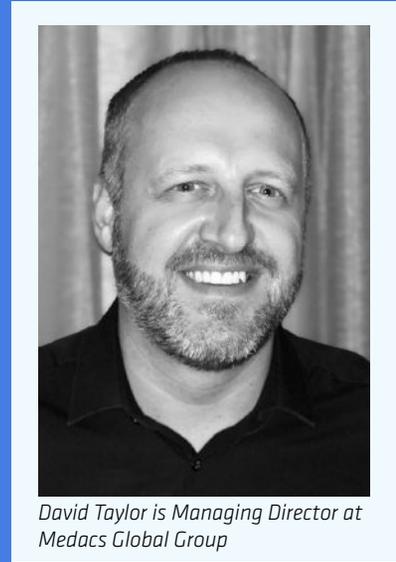
Allowing doctors and specialists to have tele-consultations either with other healthcare professionals, or directly with patients, allows us to impact a wider geography and shift the current landscape of healthcare staffing.

We are already seeing a plethora of companies in the market where you can talk to a doctor on the phone. Doctor on Demand in the U.S., Babylon in the UK and the recent launch of Health at Hand in the UAE are

just some of the innovators and industry leaders in this space. With a conservative estimated 80 per cent of consultations being able to be carried out through the power of video, this can allow a healthcare facility to either reduce the FTE requirements or more importantly increase the number of patients they can look after.

Overall, this shift to implement advanced technology into the healthcare sector will have a direct positive impact on the overarching care delivery to a patient. It will provide improved access to specialists, improved quality, improved efficiency, a reduction in FTE and cost with an increased quality of care delivery to patients – and let's face it, that is what we are all working in the healthcare sector for every day.

If I rewind those 20 years and walk into that same office in Stockport for my first day in recruitment, what would I be faced with today? More interestingly, what will the next 20 years



David Taylor is Managing Director at Medacs Global Group

bring to the healthcare staffing industry?

As we continue to work relentlessly to deliver outstanding care, I am very much looking forward to finding out. **AH**





THE BEST HEALTHCARE SYSTEM IN THE WORLD: DOES IT EXIST?

By Brian de Francesca, Chief Executive Officer, Ver2 Digital Medicine

While there are many very good caregivers (doctors, nurses etc.) and some excellent healthcare institutions around the world; at present, all healthcare “systems” sleep on a continuum ranging from terrible to almost acceptable. There is not one national healthcare “system” that is an Apple, Google or Kenya’s Eliud Kipchoge of healthcare (the world marathon record holder – by far). But we are on the precipice of massive change, opportunity and potential – and those bold and brave enough to see and embrace it – will create a better healthcare future; that will serve as a role model for all others to follow.

How can someone be so bold and brash

to blanketly state that at best, only a few national healthcare systems are “almost acceptable” and the rest, much less so? Because, it is the truth – and yes, the truth at times hurts hard. You may push back with: “What about the Americans? The Europeans? The Martians?”

Yes, the Americans have some very high-quality centres of excellence that are unfortunately embedded in a national system costing over three trillion dollars a year – approximately 20 per cent of the U.S. GDP. Aside from being a ridiculous amount of money – it is a system that is not sustainable and will eventually blow up – needlessly injuring and killing many people along the way

into the abyss. My friend’s boss is American and currently in the States with a diagnosis of acute gall stones. He’s in agony and has yet chosen to take pain meds and wait until he comes back to Dubai to have his surgery. That’s what he thinks of the healthcare system there. He was made to wait four hours in emergency before anyone would speak to him and said that if this is what would have happened to him five years ago when he was rushed to the emergency in Singapore – he would have died. And yes, many European countries have excellent healthcare quality, costing less than the wasteful U.S. model; except, you may die waiting to get access to that “great quality” of care across Europe.

Current healthcare systems fail in one or more of the following areas; quality, cost, access and patient experience.

Sadly, most countries around the world have healthcare infrastructure, staffing and practices that are lacking for a myriad of reasons – mostly caused by self-interested humans, who continue to pretend that medicine is a dark art, only understood by a select group of sorcerers. The origin of medicine is in religion and magic – not science, and this is the origin of its ailments as well. We must imbue medicine with more science, and less magic. By building on the healthcare infrastructures, institutions and illusions created in the past; this tepid minestrone soup of mediocrity will continue into the future – until someone is bold and brave enough to think and behave differently and create a better future.

It is time for the disruption of not merely a piece of the system – but the entire system. The way we currently “do healthcare” is antiquated; however, there is a better way on the horizon that will be built upon new technologies. The future of a better healthcare will not be born in the currently developed countries – but will be designed and implemented in regions that are not hindered by massive legacy systems.

Of all industries, healthcare has continually been the laggard when it comes to embracing technology. There are some reasonable reasons for this, and some sad excuses as well. Regardless of the past, going forward, technologies in their broadest sense have the potential to “save healthcare from itself” not by fixing old models – but creating new ones. We are at the dawn of a new age in medicine – if we choose to open our eyes to see the sun rising.

It is well beyond embarrassing that most countries cannot sort out national patient medical records system. The task and technology are not complex – really, they are not. Nothing more than huge relational databases. Somehow Amazon, Ali Baba and others, manage global relational databases – and yet, we cannot sort out country level medical records systems. Are we that incompetent? No, it is a combination of politics, self-interest, a fear of transparency by providers and the normal human resistance to change, that has been holding this first important foundation step back.

Here are two examples of how we can fail:

In 2009, the Americans allocated US\$20.6 billion as part of the American Recovery and Reinvestment Act to encourage doctors and hospitals to adopt and use IT systems and migrate from their old paper records to the new electronic health record systems. The programme failed spectacularly – providers took the free money to buy and install electronic record systems – but then neglected or refused to actually use them.

The Brits were quick to follow in being underwhelming. For a country which has only 20 per cent of the entire U.S. population, they wasted nine years and lost 12.7 billion pounds trying to complete one of the largest and ambitious health IT projects that the world had ever seen: The National Programme for IT (NPFIT), which attempted to create a national electronic health record system for the entire UK – and it fell firmly on its face losing its wallet in the process.

Give me 12 billion pounds (or US\$20.6 billion) and a “big strong stick” of authority – and I will get all of those disparate health record systems interoperable in 12 months – and that is not even the sort of work that I do. It is not an impossible task. But forget about me – consider what Bezos or Buffet or Musk or Gates would do with that kind of budget. It's time to privatise the public healthcare system or hold it to the same standards that shareholders do of private companies. Get the new age experts in – the ones that understand healthcare but more importantly understand technology and are not afraid of it.

There are thousands of smaller examples of healthcare technology incompetence from around the world – health records are only one piece, albeit a very important one, of a very important global digital health ecosystem that is suffocating as it is trying to come to life.

The Rest of The Puzzle

It has been said that healthcare slowly evolves and there are rarely any revolutions in healthcare – and for the most part, this is true. The last revolutionary improvement in the health of the public occurred in during the Victorian Era with the advent of systems for distributing potable water; and removing raw sewage from homes and cities. With this, the health of the public soared. Since

then, it has been an evolutionary slog – until now. In addition to electronic health records, there is a large handful of technologies, that when used collectively, will usher in a magnificent healthcare revolution, that will eclipse that of the Victorian era.

Too often, we waste time and energy attempting to understand how something works; instead of being focusing on “what it does.” Very often technology sounds complicated and people get lost in the complexity instead of focusing on the use. For example, most of us cannot comprehensively explain how the Internet works, how planes fly, or especially how sunlight is transformed from heat in the sun to the fat on our thighs – but also, we don't need to, unless we are designing or modifying these systems. As a user, we only need to know the benefits of them doing what they do (not how they do it). Take blockchain as an example. How does it work? Who cares? It is what it does, that matters most to us. For the very first time in the history of the Internet, we will be able to “trust” data that we receive and access via the Internet – this is all you need to know about blockchain – that it enables the fast and safe “authentication” of data – which is of paramount importance as a foundation infrastructure for a future of digital health.

But There is so Much More

Let's not get lost in the complexities of understanding how new technological advancements like blockchain work – let's instead focus on how all the new tech we have at our disposal can work together to provide better, cheaper, faster more accessible healthcare for everyone.

We already have high speed wireless connectivity of everyone and everything to everyone and everything – everywhere, all of the time. This connectivity is becoming more ubiquitous, cheaper, faster and more secure. Humans and all of the following and more, will be continually connected and accessible. Connectivity is an exponential enabler of the following technologies.

All knowledge, data, and information will not only be continually accessible by every human – but every thinking machine as well. All knowledge, plus massive thinking machine power supporting collaborating humans – will result in exponential improvements.

Genomics (sequencers plus) – gene sequencers are getting less expensive and more accessible by the day ►

– eventually, everyone will have their genome sequenced, and be able to predict the future.

Sensors (biosensors, environmental sensor and more) – there are already sensors that can be injected into your body, that can be powered by your body chemistry and to work for up to four to five years – monitoring and measuring a variety of things from blood oxygen levels, to screening the blood for biomarkers related to the findings of a previous genetic screening. These sensors will continually monitor your health and body chemistry and more – transmitting this information outside of your body to powerful thinking machines.

AI (machine learning) has finally arrived. The foundation of healthcare delivery is the “diagnosis.” The diagnostic process consists of: data acquisition, information retrieval and analysis, pattern recognition, and following various algorithms, all of which is better done by machines than humans. The tasks associated with the entire diagnostic process will gradually shift from being performed by humans to machines, allowing humans more time to spend more time with each patient.

Quantum Computers: These are not small or just faster computers – these are machines that function differently. It will take another five or more years for quantum computers to become viable healthcare tools, but once they do they will be putting artificial intelligence on steroids. And you will not need to invest hundreds of millions of dollars purchasing quantum computers, but will be able to gain access to these powerful tools on-line in a software as a service manner.

Blockchain: Forget cryptocurrencies and think fast and secure “trust”, which will serve as the foundation of our digital health future.

The above have the potential to completely alter the entire healthcare landscape – lowering cost, improving quality and access and making life better. But for these magical tools to realise their potential, it will require letting go of the past and that is not going to happen easily in parts of the world with self-interested legacy systems.

That is why Dubai has the potential provide the best healthcare in the world. It has visionary leadership that is investing in a 100-year plan that will see what we consider miracles today unfold.

What Is Needed to Make This Happen?

There is a wrongheaded rumour being globally spread that “The Patients” will not

embrace all of this new technology – that they “fear” losing the personal touch of their favourite doctor. This is an ignorant lie.

I know from decades of experience with patients young and old from around the world that they want something more than the distracted, hurried interaction with their physician – they want to live healthy lives; and they can get this from a healthcare system that does not hide from the transparency and power of technology and process literacy – but wholeheartedly embraces both. Would you prefer a doctor who is gentle and warm versus one who is direct, gives you facts and has the latest knowledge and technology to save you? When it comes to life or death, everyone wants the best not the nicest. Fortunately, by properly embracing the integrated technologies mentioned above – we can have both.

And here is the secret formula: Patients will not benefit from technology that is not offered by the providers; and providers will not use and offer new technologies for patients, that are not reimbursed by the payers and the payers will not reimburse for anything that is not approved by the Regulators. The technologies briefly described above, when implemented in unison, have the potential to serve as the foundation for the greatest healthcare system on the planet; upgrading everything from medical education and research to healthcare delivery and payment. To do this demands that we completely re-engineer the regulatory function of our healthcare system. Instead of being mere “approver” and maker of rules – regulators must become knowledgeable hubs of innovation. Regulators do not need to employ experts in AI, biosensors, genomics, quantum computers and more – but they do need to formally connect with global experts, so that they can effectively assess and approve valuable new technologies as they come online. Innovation Labs should not be separate entities from the regulatory functions they must be one.

As long as the regulators in this region, wait for a technology to be CE marked or U.S. FDA approved, regional healthcare systems will always “follow” and never lead. There is a real and present potential to take the lead. This region is not hindered and held back by the massive legacy systems and infrastructure of the West. No, it is not a perfectly blank slate but very close to it. Creating the future of healthcare is more challenging than stacking rocks, steel and glass into skyscrapers; doing this will require bold and

brave action. But how often, are you given the opportunity to create the best healthcare system on Earth? Fortune favours the bold.

I have often thought, that as someone in the forefront of disruptive healthcare technology and proposing that Dubai can be the city that delivers – what would I say to its leaders if I had the chance? If I had an audience with the ruler of Dubai, a man whom I consider a great visionary and one of the few leaders with the courage, vision and power to embrace the new I would say – don’t wait for the U.S. FDA approval; grab the reigns and lead the way – because, we can.

Highlighting this Dr. Ramadan AlBlooshi, CEO, Dubai Healthcare City Authority – Regulatory (DHCR), said, “The UAE’s advantage in becoming a global leader in the healthcare delivery lies in the agility of its government in responding to the impact of disruptive technologies. In the last five years, the country’s leadership has launched several strategies, including the National Innovation Strategy, the AI Strategy, and Block Chain Strategy with the aim of being at the forefront of this fast-paced industry. Introducing new legislations and developing those that exist across different sectors including the health sector are at the centre of these strategies, and the different government stakeholders are working eagerly to achieve these objectives. Earlier this year, we in Dubai Healthcare City, signed partnerships with several government bodies, which will enable us to integrate our systems through blockchain. We are continuously working to develop our legal framework to be responsive to the changes that new technologies are offering with the aim of enabling the development of the health sector in our country and beyond.” ^{AH}



Brian de Francesca is Chief Executive Officer at Ver2 Digital Medicine.



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CLINICAL MOBILITY:

On the Move to Improving Healthcare Delivery

From accessing health records on tablets at the point-of-care to enabling remote monitoring of patients, mobile devices are at the heart of today's enhanced patient care

By Deepa Narwani, Editor

Say goodbye to paper for good in healthcare as digital transformation is currently revolutionising outdated patient care. Today, both providers and patients require access to their data and devices at all times and clinical mobility and cloud solutions are making this possible. Not only that, it is also driving efficiencies across all areas right from improved care to streamlined clinical workflows.

Clinical mobility has started to create a profound impact not just on IT executives but also on nurses, doctors, and patients. For example, the use of handheld computers and mobile printers by doctors and nurses at the bedside or providing a tablet to patients to allow them access to their reports and care programmes, along with social media apps, is not a scene from Netflix's sci-fi show *Black Mirror* anymore. It has become today's reality and leads to an overall better patient experience.

Around the world, clinical mobility is transforming care at healthcare facilities by digitally capturing data and transmitting it in real time to clinical staff, thereby eliminating manual error-prone procedures and delivering critical time-savings. As an early adopter of innovation across the board, Dubai is also witnessing this trend in healthcare. For

instance, the newly opened Mediclinic Parkview Hospital in Umm Suqeim, Al Barsha South 3, recently entered into a partnership with Zebra Technologies in order to digitise its processes and enhance patient safety and care.

Digital Hospital Model

A greenfield construction, the Mediclinic Parkview Hospital, Mediclinic Middle East's seventh general hospital in the UAE, opened in September 2018. As part of the tie-up with Zebra, the hospital is utilising the tech company's healthcare solutions that will be used for patient identification, increased visibility of medication administration and clinical mobility with mobile access to medical data. The facility's 'digital hospital model' sees it using Zebra's printers, barcode scanners, wristbands and tablets that are integrated with the Mediclinic Group's new Health Information System (HIS).

Barry Bedford, Hospital Director, Mediclinic Parkview Hospital, told *Arab Health Magazine*:

"Healthcare is a combination of service providers, doctors, and pharmaceutical companies. It is an amalgamation of a lot of people and just in this hospital, we have more than 35 different specialities and highly qualified people from 40 different

nationalities. Everyone comes from different backgrounds and we want to make sure that technology is somehow aligning them. Safety is important to us that is why we have adopted systems such as Electronic Health Records (EHR) and have top-class doctors.

"Mediclinic Parkview is a flagship hospital in the southern part of Dubai. There are 800,000 people around this hospital. After just one month of opening, we see almost 260 patients almost every day. This includes around 10 in-patients, which for us is critical and we can achieve that only thanks to the technology we employ. We don't want technology only in the hospital, we want it in our ambulances and in pre- and post-operative care."

Zebra's healthcare solutions for Mediclinic identify and track patients from admission to the bedside, medical laboratory, and pharmacy, ensuring visibility of key data at the point-of-care, to help enhance the quality of patient care and safety, and overall hospital efficiency. Furthermore, these mobility solutions support clinicians across the hospital including doctors on their daily rounds to assess patients with access to medical records such as patient medical history, treatment, and test results. These solutions include tablets, ►

barcode scanners, especially when it comes to patient identification and access to medical records and ensure that the right treatment or medication is available to the right patients. It also includes specialised type of printers and scanners that can be sanitised.

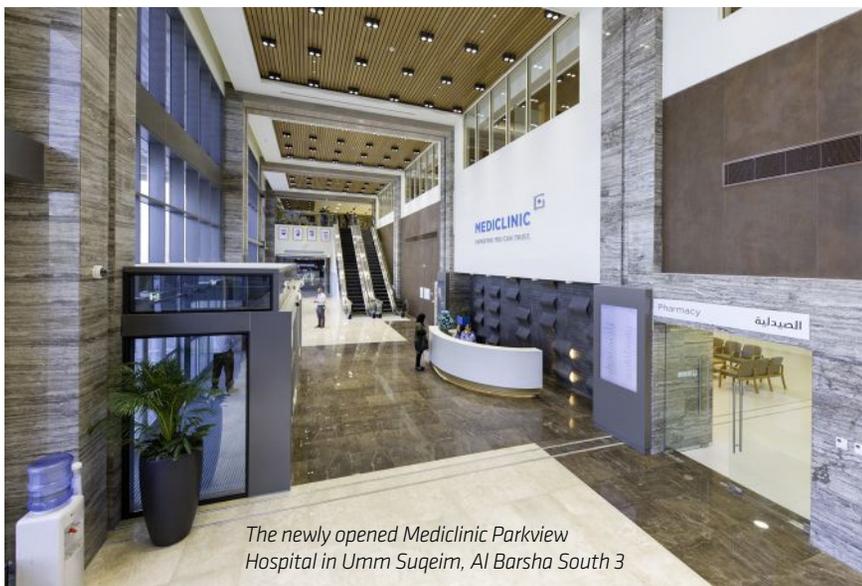
Bedford highlighted that one of the first international patient safety goals is the proper identification of the patient. Also, one of the biggest errors in the world is medication errors or near miss of medication errors.

“Can you imagine receiving someone else’s blood results! This is where technology plays a crucial role in filtering these aspects for the doctor. But in the old days, it used to be what’s your name, etc.? But now you scan, and as soon as that’s done it meets five criteria’s immediately. For me it’s so refreshing as between the different languages and cultures around us, there can be a gap. And thanks to technology, with one scan we are able to bridge the gap and minimise and even eliminate all these human factors that could cause errors. From a patient safety point of view, it makes it 10 times easier for us to manage,” he explained.

Raziel Peña, ICT Operations Manager, Medclinic, added: “This integration allows for standardisation of products across the board. One of the key things we have received from Zebra is healthcare grade equipment, which means the hospital staff can safely clean the whole thing and make sure everything is up to standard when it comes to infection control, without degrading the quality of the equipment. Furthermore, it makes it easier for the staff to access information. That translates to patient safety and they can comfortably concentrate on actual patient care.”

While Thamer Nouri, Business Development Manager, Zebra Technologies explained that the company’s goal is to not to talk only about products and hardware, but put emphasis on discussing patient safety, medication administration, mobility, patient quality of care, and how technology can be used to improve patient care. He highlighted that staff from different levels of Medclinic, such as the end-users, IT and chief nursing officers were involved in evaluating the technology that would be the right fit for the organisation.

He said: “Our technology acts as the “digital voice” for a patient and links them to the HIS to ensure that it enhances clinical mobility and intelligence.”



The newly opened Medclinic Parkview Hospital in Umm Suqeim, Al Barsha South 3

Integrated Care

According to Bedford, an integrated hospital is a safe hospital. He expressed that EHR integration is not only clinical, it also is about the financials and the revenue. When you compare a paper-based system to an integrated one, he stressed, the integrated system also includes people, audits, recordings, and lessons learned, and everything becomes easier to extract. However, a reliance on paper could lead to errors, which might not be easy to pick up.

He said: “You often have a lot of standalone systems, but technology is able to interface and integrate it all from the end-user’s perspective. This includes everything right from barcode systems, tablets, and could even include integration between ventilators. Plus, it’s easy to use these systems. For example, a nurse takes a scanner, does the scan and puts it down, it’s as simple as that. It’s faster, more user-friendly and accurate, and gives more credibility from a patient’s point of view.

“When someone comes into the hospital, what is the safest way to treat them? You don’t want to bring a patient to the hospital and keep them around equipment that is not vetted by international standards. We follow all the required regulations to ensure that technology is helping us to be able to provide that service. Tomorrow if you want to start a cancer database, by integrating this technology with our lab results you will be able to easily identify when cancer has been diagnosed. Cancer often gets diagnosed not in the hospital but in primary care facilities. That’s where you

DIGITAL TRANSFORMATION

Zebra is working with the Dubai Health Authority (DHA), to provide new specialised healthcare technology solutions to enable the digital transformation of the emirate’s healthcare sector. As part of the DHA’s Salama unified electronic medical record (EMR) system, the collaboration with Zebra provides enhanced patient identification and mobile access to medical data, from patient admission to bedside to discharge.

The Salama system was launched in April 2017 to provide patients and doctors with access to medical records through an electronic patient portal. In this regard, Zebra manages the deployment of a broad range of solutions including healthcare purposed mobile computers, scanner, printers as well as wristbands. These products have been specifically designed to meet the unique demands of the healthcare environment, in conjunction with DHA’s Information and Communications Technology (ICT) and clinical team requirements. The solutions have been deployed across all of DHA’s four hospitals, specialty centres and 13 primary healthcare centres across Dubai.

need to get the integration right.”

Zebra’s *Future of Healthcare: 2022 Hospital Vision Study* identified the rising adoption of clinical mobility – the use of mobile devices such as handheld mobile computers, tablets, cordless barcode scanners, and mobile printers – in hospitals

around the world. Seventy-two percent of surveyed decision-makers say that mobile devices are improving the quality of patient care, giving clinicians actionable intelligence at the bedside with the effect of increasing time with patients and reducing errors.

The numerous benefits of clinical mobility are fuelling an increase in adoption of mobile technologies at every level of care. According to survey respondents, nearly all hospitals estimate that mobile devices will be used at the bedside by nurses (97 per cent) and physicians (98 per cent) by 2022, but also increasingly by other members of the care team such as pharmacists, lab technicians, radiologists, and patient transport professionals. The study also highlighted how patients perceive the rise of clinical mobility with nearly eight-in-ten survey respondents feeling positive about mobile tools being used to improve their care.

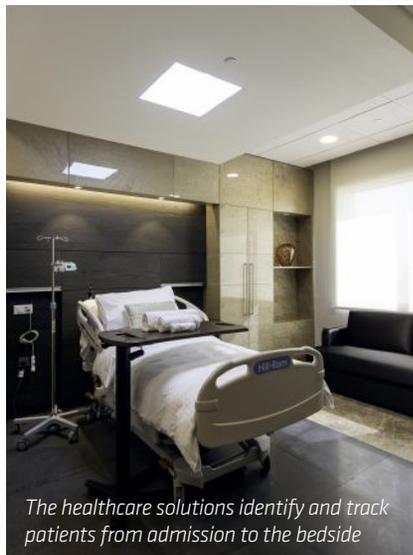
Focus on Quality

Peña shared that involving the doctors and nurses and finding out what they think about the product, was an important step, as it helped them understand how the staff could do their jobs easily.

“For example, in the pharmacy and the lab, we have heavy-duty printers, as they have a lot of stuff to label. In terms of printing, everything is networked in the hospital. That includes printing solutions in terms of labelling and wristbands and ensuring that everything goes seamlessly via the EHR solution network and also allows to share the resource. Before we could have only one printer per workstation but now that allows us to save a little bit in terms of space and cost and now, for instance, the nurses are sharing these printers, as they are customisable. A happy staff equals to happier and healthier patients,” he described.

According to Nouri, most hospitals don't have a high level of mobility, or probably no mobility, but he expressed that he can see a change in this trend in both the UAE's public and private sector.

“What we are seeing among our clients in terms of applications is that when it comes to mobility or mobile computing, they look at medicine administration, or bedside sample collection and identification using a mobile printer or a mobile Personal Digital Assistant (PDA), to identify these samples and reduce risk of misidentification,” he explained. “However, there is much more that can



The healthcare solutions identify and track patients from admission to the bedside

be done around mobility. For example, we can have connected biomedical devices, where you receive patient alerts about blood pressure, it could be connected to a ventilator, could be a heart monitor, so the vital signs, are connected to the HIS and at the end of the day the nurse in charge would receive the notification about the patient. Also, these devices will be able to connect with voice, so there will be a voice solution for communication, different types of alerts, secure messaging, and that in a way encapsulates a connected hospital.”

But according to Peña, the intelligence of these machines comes down to how much data you put in and how it can be used for different purposes. Having everything connected, right from tablets to scanners to biomedical devices, is making it easier to have the information centrally and easily accessible. These systems offer analytics that can be used for different purposes such as management decisions, or to get highlights of the records that will help doctors identify some cases later and gain knowledge. In the future, that is probably the kind of intelligence the government will be looking at, for example, to find out what the population is complaining about or getting sick of and later launch prevention programmes.

He concluded: “Innovation is very important, and we are investing in the necessary technology to make sure that the patient care is improved. I am sure that soon enough there will be a mandate from the government in terms of collaboration with other healthcare providers and the government itself, and I like to think we are ready.” **AH**



Barry Bedford, Hospital Director, Mediclinic Parkview Hospital



Raziel Peña, ICT Operations Manager, Mediclinic



Thamer Nouri, Business Development Manager, Zebra Technologies



RISING HEALTHCARE COSTS: Is There Light at the End of the Tunnel?

With healthcare costs continuing to rise, David Healy, CEO at Aetna International, explores the factors influencing this trend and what can be done to address the challenges

According to a 2018 report by the U.S.-UAE Business Council, expenditure on healthcare in the UAE is estimated to rise at an annual rate of 5.5 per cent to AED 73.52 billion (US\$20.03 billion) in 2020. This figure is expected to reach AED 101.94 billion, or US\$27.78 billion by 2025. Moreover, Alpen Capital's *GCC Healthcare Industry* report predicts that the GCC's current healthcare expenditure is expected to reach US\$104.6 billion in 2022, at a compound annual growth rate (CAGR) of 6.6 per cent from an estimated US\$76.1 billion in 2017.

Numbers at this scale are causing governments across the GCC to monitor healthcare expenditure closely.

The causes behind these rises are varied and challenging. There's the simple fact, for instance, that the healthcare sector itself is expanding. The U.S.-UAE Business Council notes that in 1971, the country had just seven hospitals and 12 health centres. In 2015, there were 126 public and private hospitals with a combined capacity of over 12,000 beds. This rapid increase has, in part at least, been driven by demand. Lifespans are increasing, and by 2050 approximately a quarter of the GCC population will be over the age of 65, according to Deloitte's January 2018 report on *Life Sciences and Healthcare Predictions: GCC Trends*.

The UAE's population is also

expanding. Growth is estimated at approximately 1.5 per cent per annum, although this figure has been historically far higher. By contrast, Saudi Arabia is showing higher population growth figures at around 2 per cent.

The prevalence of chronic conditions such as diabetes is another challenge for the region, one that severely impacts healthcare expenditure. A recent survey has revealed that 19 per cent of Emiratis have diabetes, undiagnosed cases are at 11 per cent of the population and 18.6 per cent are in a pre-diabetic phase. By any measure, these numbers are significant.

Population demographics such as those noted above are perhaps the more obvious and influential causes of healthcare expenditure increases. However, a variety of additional factors are influencing the situation.

Much is made of innovation, especially in drug development, but the reality is that innovation drives utilisation. New drugs can cause a short and medium-term uplift in demand before usage levels reduce more normal patterns. Drug improvements can arguably reduce the number of hospital in-patient days but, with so many factors involved, there is no easy way of measuring this.

Non-drug related innovations also affect usage. The popularity of MRI scans over a simple X-ray, for example, has raised costs. The unit cost of X-ray may increase

from US\$100 to US\$104 a year, but the unit cost from an X-ray to an MRI can mean around a seven-fold increase. PET scans are another level again.

And where hospitals have invested in new equipment they will be keen to use it, raising the demand again for more expensive types of treatment.

Demand will also increase the more a population becomes aware that high quality healthcare services are available to them. Private hospitals are becoming bolder in their efforts to promote their services and this heightened awareness will feed through into users of public sector facilities.

Waste is another possible factor, and in 2016, *The National* cited expert estimates that as much as US\$1 billion is lost to patient identity fraud and doctors over prescribing brand-name drugs.

Tackling Rising Healthcare Costs

Combatting cost and price pressures is a real challenge. The truth is that costs are rising year after year and as the sector continues to expand, the best governments can hope for is to minimise annual increases.

That said, many of the causes are being addressed, and with some success. In late 2017, a programme to detect the early onset of diabetes was launched in clinics throughout the country in an effort to reduce cardiovascular disease. And ►

in July 2018 the Dubai Diabetes Centre announced that it was to expand. To a degree these programmes do seem to be working. The *Khaleej Times* reported recently that diabetes had dropped from 19.3 per cent of the population in 2013 to 11.8 per cent in 2017.

Encouraging efficiencies through technology is another tool in the government's kit bag. The Scope of Vision 2021 for Health programme, for instance, saw a AED 2 billion fund established to support innovators across the region, including those in the field of healthcare.

Education is also key, and initiatives such as the School Health Policy launched in early 2018 is a good example of how the government is investing in early stage health and wellness learnings.

An Insurer's Perspective

Concerns over rising healthcare costs aren't only the domain of the UAE government. Expats make up almost 90 per cent of the population, and, with compulsory health insurance regulations now in place, most will be covered by either a domestic or international programme.

With such a significant proportion of the population affected, it's worth looking at the tactics insurers employ to manage costs among their customer groups. Certainly, I believe that the challenges and solutions for private and public healthcare cost increases are more aligned than many understand.

Careful network management can help to lock-in prices for some treatments. And by developing a deep and trusting relationship with each provider, insurers can make more accurate expenditure projections year on year. At Aetna International, we are certainly placing more emphasis on value-based relationships with providers, something we believe will ultimately increase the focus on outcomes and cost of care that our network delivers to individual members.

Encouraging patients to make appropriate healthcare choices helps cap cost increases. Pre-authorisation, the use of excesses/ deductibles and educating patients to choose appropriate facilities, not just high-end options, are just some examples of how patient choices can be influenced.

Technology advancements and adoption such as telemedicine can bring costs down,

too. vHealth, which we expect to launch in the region next year, allows members to have remote, face-to-face, consultations with a doctor via a mobile phone, tablet or computer and brings obvious time saving benefits, especially to those working in remote locations.

But vHealth is not about replacing physical care. In fact, it brings two major advantages. It provides a way to deal with minor ailments and routine check-ups in a more efficient manner, by avoiding unnecessary face-to-face consultations. It's also a way to ensure employees in need of physical care are transferred to the right facilities and consultants first time around with a greater degree of certainty.

The type of efficiency benefits we will see from vHealth can apply to the public healthcare sector just as much as the private.

Excesses and deductibles are proven to influence behaviour, particularly when it comes to treatments such as vision, dental, and maternity. The length of stay and facility choice tends to be elective so if a patient knows they need to pay 20 per cent of the fee, they may decide to leave as soon as they have been medically approved to do so.

Pre-authorisation can deter doctors recommending unnecessary tests.

Diagnostic tests such as PET/MRI and blood tests, for example, are frequently over prescribed and often unnecessary. Insurers will generally not look to deter this type of treatment, but if a consultant knows they have to call for authorisation there is a degree of deterrent to over subscribing.

Applying benefit sub-limits for elective treatments help to protect against excessive levels of treatment and ensure the insurer can intervene earlier in the cycle for what might be a more serious medical issue. A physiotherapy benefit, for instance, may be restricted to a maximum of 10 sessions before contacting the insurer. Once involved, the insurer can investigate the case further to understand whether a more effective treatment plan is necessary.

Healthcare costs across the Middle East remain under constant pressure. The situation in the UAE is no less acute and, with no let-up in plans to expand the medical infrastructure further, this is unlikely to change significantly in the near term. That said, there are signs that government initiatives are positively impacting some of the more challenging causes of rising costs so there is hope that long-term cost pressures might decrease. **AH**

References available on request.



David Healy, CEO at Aetna International

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INSIGHTS INTO

Artificial Intelligence for Healthcare

By Dr. Immanuel Azaad Moonesar R.D., Assistant Professor of Health Policy, Mohammed Bin Rashid School of Government, Dubai, UAE

What is Artificial Intelligence?

In the contemporary era, the UAE government shifted its policy research agenda focus towards understanding and assessing uses of social media, e-services, digital transformation, smart cities, open government data, robotics, deep learning, machine learning, the blockchain, big data, and Artificial Intelligence. The phrase “Artificial Intelligence” was first coined by John McCarthy at a famously held workshop at Dartmouth College, Hanover, U.S. during the summer of 1956.

The father of Artificial Intelligence (AI), John McCarthy, defined it as “the science and engineering of making intelligent machines” and furthermore, researchers define AI as the aim to “mimic human cognitive functions.”

For the field of healthcare, AI is bringing a paradigm shift, powered by increasing availability of healthcare data and rapid progress of analytics techniques. AI, in other words, is making machines act intelligently, which would include IBM DeepBlue for instance. AI generally comprises of various activities such as deep learning, machine learning, and robotics. Deep learning is where there are artificial neural networks, such as AlphaGo. While machine learning is making machines that learn from data, for instance, Automatic Teller Machine cheque readers. Robotics is creating devices and machines that move such as autonomous vehicles.

Some researchers and even practitioners may debate that the drivers for fuelling the rise of AI come from many sources of big data including the geospatial data, Internet of things (IoT), sensors data, machine to machine data, security systems data, financial transactional data, and other drivers. For instance, the *Arab World Online Report 2017* highlighted that by 2021 over one billion personal IoT devices will be in

existence, mobile penetration will be up to 100 per cent, with social media penetration of at least 80 per cent across the Arab World.

In October 2017, the UAE Government launched ‘UAE Strategy for Artificial Intelligence (AI),’ one of the ‘handful of countries worldwide’ to develop and adopt a National AI strategy, which marks the post-mobile government phase that relies on various future services, sectors and infrastructure projects. While there are many benefits of AI, there are some public concerns and risks on AI black box including ‘auditability’, certification, transparency, misuse of data, faulty analysis, ethical dilemmas, wide-scale infringement of privacy, misinterpretation of digital behaviours, automation bias, algorithmic bias, and unrestricted mass surveillance and also, weaponising data. According to Gartner Inc., by 2020, AI is projected to create 2.3 million new jobs worldwide while eliminating 1.8 million traditional jobs. In the UAE, the financial services, healthcare, and transport sectors reported benefiting the most from AI according to a report done in 2018 by Accenture and Frontier Economics. The AI revolution in healthcare has been focusing on defining ‘New Health’ with focus on improving training, research, keeping good and well-being status, having earlier detection, making clear-cut and informed decisions on diagnosis, treatments, and end of life, according to PwC in 2017.

Current Applications of AI in the Health Sector

AI enables greater access and democratisation of quality healthcare. For instance, AI allows for faster, cheaper and better medical services. In addition to cheaper options (such as AI doctors, nurses, therapist, etc.) in areas that are more rural

and promotes apps for access to rural and low-income communities and avoiding higher travel costs with specialists. Some of these remote healthcare apps include snake-bite diagnostics, skin cancer detection, malaria and malnutrition diagnosis, and cardiovascular abnormalities.

A PwC study (2017) highlighted that 67 per cent of respondents in the UAE are willing to use an ‘intelligent healthcare assistant’ via a smartphone, tablet or personal computer; while, in Nigeria, the willingness to use an ‘intelligent healthcare assistant’ via a smartphone, tablet or personal computer is 95 per cent. The study highlighted the top advantages of using Robots and AI for healthcare as illustrated in Figure 1, while the disadvantages are displayed in Figure 2.

Health insurance companies today are using AI and machine learning to assess better and pinpoint at-risk individuals to reduce costs according to reports from Healthcare Finance. Apart from reviewing previous medical records, the application of AI and machine learning algorithms to risk management is performed, which allows for better understanding the specific patients in need of disease management. Additionally, doctors are utilising AI to optimise health; moving from conventional patient care management to more standardised and proactive management of patient care.

Healthcare administrators have been looking to bend the cost-quality curve in the sector regarding utilising AI and machine learning, according to reports from Healthcare Finance. The areas of opportunity that may be most beneficial to improving the revenue cycle are predicting claim denials, patient billing, and cut readmissions. AI could be transformational in predicting claim denials through the appropriate reasons and

then preventing the issues before it occurs. Using AI to cut readmissions was dependent on how the data and the risked patients were utilised and interpreted. Measures include sending out healthcare professionals post-outpatient to those high-risk patients to ensure that the medication regime is adhered to, and the appropriate food and nutrients were met, according to the Executive Director at Grady Health System.

Furthermore, revolutions in healthcare particularly for pharmaceuticals, the 'new drug development' and 'repurposing of existing drugs' are two examples of applications of AI. The new drug development can teach a machine learning model the rules of drug design, for instance, the structure of therapeutic molecules; afterward it can apply models to improve the existing drugs or even generate novel compounds or combinations of drugs. A case in point, BERG Health, a biopharmaceutical start-up that uses an AI platform for drug discovery, initiated a phase II clinical trial in April 2016 for a drug compound that could potentially treat pancreatic cancer. For the repurposing of existing drugs, AI allows for the learning of complexed relationships among drugs, pathways, conditions and side effects while conducting large-scale testing and data analysis using the machine learning-driven data analysis. For instance, in December 2014, Atomwise found two existing drugs- reportedly in one day using AI technology that may significantly reduce Ebola infectivity.

AI revolutions in healthcare range from imaging diagnostics through medical imaging to tackle medical conditions such as cancer, diabetes, eye health, brain disease, and heart disease. The medical imaging team at IBM include data from medical journals, electronic health records, lab results, radiology and pathology reports, doctors' progress notes, clinical care guidelines, and published outcomes studies. In doing so, such efforts and data may help physicians make personalised care decisions relevant to a specific patient while building a body of knowledge to benefit broader patient populations, according to IBM reports in 2016. Recently, the U.S. Food & Drug Administration and the National Institute of Health approved the first medical device, IDx-DR, which employs AI to improve the quality and speed of various imaging methods

to detect retinopathy among the diabetic population. Researchers have unanimously concurred that this new medical device could help hospitals reduce costs in the long-run.

In the UAE, the 'Dubai 10X' initiative part of the Dubai Future Foundation, sets the Government of Dubai on a mission to be 10 years ahead of all other cities. The programme '10X DCAS', where the Dubai Future Foundation in collaboration with the Dubai Corporation for Ambulance Services have leveraged AI for the quick response before the ambulance arrives where the patient's vital signs are being monitored through sensors on smart devices. Another example is the programme '10X DHA' where machine learning and genomic analysis are conducted for early disease predictions such as the DNA sequencing (genome mapping) for the entire population, analysing genetic traits of existing patients to predict future cases and also personalising treatments based on the analysis.

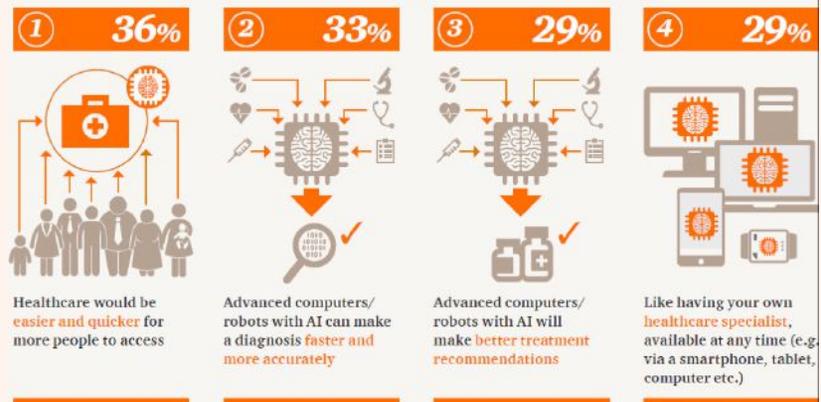
As the UAE enters the AI era among other countries, it is paramount for governments

to enable digital transformation, promote and foster capacity building and the right set of skill sets for medicine precision, to best adapt and deliver the 'smart' AI governance in healthcare particularly. ^{AH}



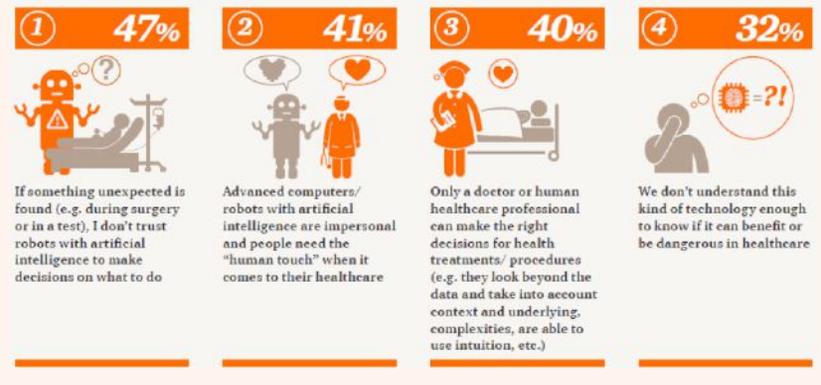
▼ FIGURE 1: Source: PwC, (2017). "What doctor? Why AI and robotics will define New Health."

The top advantages in order were:



▼ FIGURE 2: Source: PwC, (2017). "What doctor? Why AI and robotics will define New Health."

The top disadvantages in order were:



Is the Pharma Supply Chain Ready for True Medicine Traceability?

By Wayne Miller, Healthcare Director EMEA, Zebra Technologies

More than 400,000 pharmacies in Europe will be impacted by European Directive 2011/62/EU, ratified by the European Parliament in 2016 and effective in February 2019. The intent of this measure is to prevent the introduction of illegal medicine into the legal supply chain. This means pharmaceutical industry players must consolidate their medicine traceability practices to fight a rise in medicine counterfeiting. What lessons can be learnt from this supply chain revolution?

According to the World Health Organization, about 700,000 deaths worldwide every year are caused by the sale of counterfeit medicines. No country is immune from this scourge, with traffickers primarily targeting anti-cancer drugs, which can carry an annual treatment cost of more than \$50,000. To counter this trend and alleviate patient concerns, the pharmaceutical industry has already established several defensive procedures, which will be reinforced with the Parliament's Directive. But how ready is the entire pharma supply chain to apply this new regulation?

The Pharmaceutical Industry is Committed to Patient Protection

One result of Directive 2011/62/EU is the introduction of a unique serial number to be applied to the packaging of all medication. Known as serialisation, this labelling process has set a race against time for all branches of the global pharmaceutical industry including laboratories, manufacturers and pharmacies who must integrate it to help ensure the meticulous monitoring of all medicines, from their manufacture to their sale in pharmacies.

Updating the production lines and installing appropriate coding equipment is a complex task. It requires first-rate technical abilities and machines, which can deliver high-quality printing. Similarly, serialisation introduces substantial production investments for most companies in the pharmaceutical industry, as revealed in a KPMG survey published in May 2017. Europe's pharmacies will also have to



adapt by procuring 2D barcode scanners, which are critical in checking the compliance of any medicine sold. The result is a major upheaval throughout the supply chain, where monitoring of this new unique number is vital both upstream and downstream.

Traceability is Vital in Fighting Counterfeiting

This substantial investment is a critical support in fighting counterfeit medicines and vaccines. In fact, anti-counterfeiting and safety procedures will continue to play a significant role in the folding carton packaging sector. According to a report by the Smithers Pira design office titled *The Future of Folding Cartons to 2022*, traceability solutions represent one of the four major advances in technology set to transform the market by 2022.

Indeed, once it is possible to identify where a medicine package has come from, the risk of getting a counterfeit product is drastically reduced. An increase in traceability procedures should help scale down a massive global counterfeiting industry, estimated by the World Economic Forum to exceed \$200 billion worldwide in 2017.

Serialisation Provides a Means to Secure Every Level in the Supply Chain

That which holds true for the pharmaceutical industry also applies to other sectors

like the food, textiles and leather goods industries, which are also facing increasingly sophisticated counterfeiting schemes. In certain food industry scandals, serialisation would have helped in identifying fraudulent products or batches bearing inaccurate labels.

Thanks to a unique identification code, specific to each unit being sold, the origin and composition of a product could easily be ascertained. Using a basic 2D barcode flash, distributors would be able to follow their listed products in real time anywhere in the world. In the example of a bacterial contamination, distributors could react quickly to prevent it reaching consumers.

This trend involves the entire supply chain. Beyond printing and monitoring hardware, it also requires software to be integrated into the production line to generate unique codes that can be adapted to the MES (Manufacturing Execution System) and ERP (Enterprise Resource Planning) widely used by enterprises. With this in place, all that remains is applying the unique code to the primary package using printers that can produce a code, which will remain legible throughout the product's lifecycle.

Boosting Product Traceability: A Key Objective for Other Sectors

The serialisation set to come into effect within the pharmaceutical industry should help monitor the supply chain and fight the spread of fraudulent medicines and vaccines. The process may also provide some additional benefits including a more accurate view of stocked products with better historical data of the origin and quality of the purchased goods. These benefits could also apply to other sectors confronted with the hazards of counterfeiting.

Serialisation represents an opportunity to modernise current traceability systems. Through this win-win model, any action taken against parallel markets would be significantly enhanced by controlling the supply chain and the application of data-driven best practices. **AH**



ARAB HEALTH CONGRESS 2019

In the following pages, speakers from the show's conferences give an insight into the latest updates on cutting-edge procedures, techniques, skills, and developments transforming healthcare delivery.

When Healthcare Becomes a
Business Who Do We Protect First:

Patient or Revenue?



The answer should be easy, but it is not, and it becomes more and more complicated as the medical industry continues to flourish

By Dr. Teodora Elena Ucenic, HOD - Consultant OB-GYN, NMC Speciality Hospital, Al Ain, UAE

Everybody knows healthcare is expensive. And as science and technology continue to advance, medical devices and treatments are becoming more sophisticated and certainly more expensive.

Even more, the costs are naturally and artificially increasing in order to cover not only the medical service per se but also medical education, research, pharmaceutical industry profits, luxurious hospital buildings, etc. The last addition to the medical cost is the insurance industry profits.

Worldwide, healthcare spending is increasing but the rate is very much different and not necessarily reflected in the quality of care or population health status.

For the relation between patient and doctor to even exist, few more additions are necessary e.g. nurses, laboratory, pharmacy and auxiliary services, such as cleaning, laundry, catering, safe/protection, IT, maintenance, etc. The more complex the structures are, the larger the managerial team, including HR, marketing, quality control, and so on and so forth, will be. All these are built and sustained by patient-doctor binomial.

From the financial point of view, a healthcare entity can be categorised as either non-profit (generally administered by government) or profit making (typically private). While the non-profit hospitals largely accept and treat all ranges of age/social/pathology and diversity of patients, the profit-making hospitals have the tendency to treat selected population groups.

While the non-profit hospitals – under the umbrella of national plans – concentrate

to reduce costs and maximise population health, the profit-making hospitals focus on reducing costs and maximising profits. Even so, the difference in the strategic targets should not impact the quality of clinical care.

In many EU countries, strict laws and regulations ensure that profit healthcare organisations are not a threat for medical ethics, traditional mission and values of healthcare, and the autonomy and ideals of the medical profession.

So, Who Is Paying?

There are more than 200 countries on our planet and each struggle with its own healthcare problems and cost cover. In some countries the burden is shared between the patient and the government in different scales of participation. In others, the patients cover all treatment costs through lifetime instalments paid through taxes or insurance companies, or ad-hoc at the point of service.

Generally, there are four systems which are applied with some local variations:

The Beveridge Model

It is named after William Beveridge, the social reformer who designed Britain's National Health Service (NHS). In this system, healthcare is provided and financed by the government through tax payments, just like the police force.

Many, but not all, hospitals are owned by the government. In Britain, you never get a doctor's bill. These systems tend to have low costs per capita, because the government, as the sole payer, controls what doctors can do and what they can charge.

Countries using the Beveridge plan or variations of it include Great Britain, Spain, most of Scandinavia, New Zealand and Hong Kong. Cuba represents the extreme application of the Beveridge approach; it is probably the world's purest example of total government control.

The Bismarck Model

It is named after Prussian Chancellor Otto von Bismarck, who invented the welfare state as part of the unification of Germany in the 19th century. This system uses an insurance system – the insurers are called “sickness funds” – usually financed jointly by employers and employees through payroll deduction.

Bismarck-type health insurance plans have to cover everybody, and they don't make a profit. Doctors and hospitals tend to be private, but tight regulation gives government much of the cost-control clout similar to the single-payer Beveridge Model.

The Bismarck model is found in Germany, France, Belgium, Netherlands, Japan, Switzerland, and, to a degree, in Latin America.

The National Health Insurance Model (NHI)

This system has elements of both Beveridge and Bismarck. It uses private-sector providers, but payment comes from a government-run insurance programme that every citizen pays into. Since there's no need for marketing, no financial motive to deny claims and no profit, these universal insurance programmes tend to be cheaper and much simpler administratively than ►

To make things worse, financial temptations often challenge the ethical balance. Performance incentives (mostly volumes without quality), covert bribes from suppliers, research temptations etc., become daily threats to medical ethics and morality.

American-style for-profit insurance.

The single payer tends to have considerable market power to negotiate for lower prices.

The classic NHI system is found in Canada, with variants in Taiwan and South Korea.

The Out-of-Pocket Model

Only the developed, industrialised countries – perhaps 40 of the world's 200 countries – have established healthcare systems.

This model applies to most of the nations that are too poor and too disorganised to provide any kind of mass medical care. The basic rule in such countries is that the rich get medical care; the poor stay sick, die, or have some medical care depending on urgency and ability to afford.

Where Does The Doctor Stand?

The intellectual, emotional and psychological challenges a doctor faces day-by-day are extremely complex. Medical decision is one of the most intense brain processes, involving memory, situational analysis, perceptions, emotions and sometimes instincts, not to mention that this exercise is done multiple times in a day in an expected empathic way. There are in addition education, teaching, coaching and leading/managerial activities. New applied technologies require one of the fastest professional adaptation.

This is a profession where quality is demanded to the highest and there is no place for error or second chance.

Historically, the doctor-patient relationship was built on equal trust and need. A doctor had a large grade of independence and his/her name or reputation was mostly based on clinical results, ethical behaviour and community recognition.

As societies developed, the health systems changed gradually to an extent where the doctor became a crushed layer between the patients and the medical organisations.

While the patient is interested to have the best possible care provided at the lowest possible cost, the organisation is interested to have the lowest possible costs for the unit of care. Even a non-profit organisation wants

to be on a positive financial balance. When the hospital is a profit-making organisation, the financial pressure is significantly higher.

The doctor is faced with a dilemma of being a patient advocate but at the same time needing to respect and represent the hospital interests. Although intermediary structures were created to ease medical reporting and deal with the revenue, they are rarely appropriately and adequately staffed or have enough expertise. They usually have limited decision making authority and ultimately refer all problematic cases back to doctors.

To make things worse, financial temptations often challenge the ethical balance. Performance incentives (mostly volumes without quality), covert bribes from suppliers, research temptations etc., become daily threats to medical ethics and morality.

How Is A Patient Protected?

Overtime, various mechanisms were created to safeguard the patient during the tenure of medical care. They are all oriented towards medical units headed by doctors. Each hospital, each national policy maker or administrator, produce an impressive amount of quality checks and indicators to protect the patient once medical care has been initiated. Loss of health due to medical error is amply analysed, and ultimately, guilty or not, doctors usually face the blame.

There is no tool to evaluate or ensure quality of medical care when there is no actual treatment offered. This means nobody can protect the patient against barriers in accessing medical help. Unaffordable medical care or refusal of treatment from insurance companies make far more victims than medical errors; and no one quantifies this.

How Are Hospitals Ensuring Revenue Protection?

Both non-profit and profit, hospitals aim for a positive financial balance. Various services, internal or commissioned, were put in place to ensure this task. The more sophisticated and competent the service, the higher costs for operation. Mind that this operational price is

paid by the doctor's service, which the doctor will afterwards be scrutinised on for productivity.

Positive and negative incentives were created in order to stimulate doctors to work hard. Enforcing volumes before quality typically increases income but is detrimental to clinical accuracy and evidence based best practice.

Whenever a profit insurance company is collaborating with a profit hospital and either of them has an unusual high revenue, there will be a large element of suspicion and distrust.

Who Is Protecting The Doctors?

Interestingly, in spite of having minimal or no quantitative targets for doctors in public sector and self-imposed plans in private sector, the majority of European countries own the most developed health systems (WHO Report 2000, 21 among first 25 are European).

The U.S., where the productivity obsession applies, occupies the 37th position worldwide while having the highest spending.

In the majority of European countries there are professional organisations (physician colleges or councils) that are authorised to judge medical errors. They are independent, and their expert decision cannot be overruled by individual hospitals, Ministry of Health or court. Unless intentional crime is proven, a doctor cannot be judged under criminal laws.

These are also countries where physicians feel most secure and protected. In the U.S., in case of medical liability, the hospital's defence strategy may or may not include a doctor, depending on financial loss.

Reloading the initial question, the answer should be simple, but it is not. It is therefore fair to say that every system has and may use enough tools to encourage and protect doctors in making the right decision. **AH**

References available on request.

Dr. Ucenic will be speaking on 'Protect your Revenue and Optimise Insurance Reimbursement' at the Obs & Gyne Conference on January 28, at Arab Health Exhibition and Congress



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ACHIEVING ZERO HARM:

It is a Marathon, Not A Sprint!

By Brigitta U Mueller MD, MHCM, CPHQ, CPPS, FAAP, Vice President for Medical Affairs and Chief Safety Officer, Johns Hopkins All Children's Hospital, Professor of Pediatrics, Johns Hopkins University School of Medicine, Maryland, U.S.

The journey to high reliability, safe and high-quality care is ongoing in hospitals around the world. The goal is to eliminate all preventable harm that occurs while patients are under our care. Progress has been made but too many children and adults are still being harmed in our facilities.

Background

As has been known for almost two decades, healthcare is not as safe as it should and could be. Although patient safety is only one of the six domains of quality of care defined by the Institute of Medicine (IOM [now the National Academy of Medicine]), it is undoubtedly one of the most important. Since the publication of the 1999 IOM report, "To Err Is Human," there have been dramatic increases in research, standards, collaborative efforts, education, and measures focused on patient safety. However, despite increased awareness, harm to patients is still common and has not shown a significant decline. At least one out of 10 hospitalised patients is being hurt by us and at least half of these events are preventable. In paediatrics it may be even worse: errors still affect as many as one third of all hospitalised children and an unknown number of children in ambulatory settings.

Seven principles are being used to diminish harm and achieve high reliability in the daily performance of any organisation, including hospitals. They include:

Preoccupation with failure: Real time awareness of failures, achieved by daily monitoring of processes, reporting of near

misses, and an enhanced sensitivity to processes that could potentially fail before they actually do.

Reluctance to simplify: The first, obvious explanation for a failure may not be the right one, and it is rarely a single issue that leads to the error.

Sensitivity to operations: Leaders and staff are constantly aware of how processes and systems affect the organisation. Any process that does not work is highlighted and modified in real time. Transparency is a valuable tool to increase sensitivity to operations.

Commitment to resilience: Failures and especially near-miss situations are considered learning opportunities. High reliability organisations are constantly learning, improving, and testing new ways of operating.

Deference to expertise: This includes taking advantage of the different levels and areas of expertise that team members contribute, and the recognition that the most senior person is often not the most knowledgeable.

Deliberate leadership practices and organisational commitment are needed to establish a culture of safety and foster the journey to high reliability. Although no single intervention will suffice, the importance of leadership presence and support has been emphasised by many organisations, including the Joint Commission. The commitment to zero harm has to come from the top leaders in an organisation and permeate through both clinical and non-clinical areas. Involvement of the Board of Governors is crucial but requires a well-informed Board familiar enough with the issues of hospital-

acquired conditions (HACs) to be able to set certain expectations. Management of the hospital, from the CEO to frontline staff, have to be trained to recognise their role in eliminating harm and commit to a culture of constant vigilance and willingness to improve. It is important to realise that zero harm does not mean zero errors and that it is instead essential to create a culture that supports the principles of a highly reliable organisation as described above.

Organisations can introduce Executive Safety Rounds to increase awareness of safety concerns among executives. This provides an opportunity for frontline staff to share safety concerns that affect either the delivery of care or their personal safety, and for executives, if possible, to provide solutions. The Executive Safety Rounding team at our hospital is comprised of an executive leader (such as the Chief Patient Safety Officer), other executives or senior clinical or non-clinical leaders, a member from the Patient Safety and Quality team, and ad hoc members (residents, Patient Family Advisory Committee or Hospital Board members, etc). The one hour rounds can either occur on different days of the week and at different times, including evenings and early mornings, or on a fixed schedule. Ideally, it would include both clinical and non-clinical areas, both within the hospital as well as in outpatient settings.

Another way to raise awareness about safety issues is a daily, organisation-wide, short (15 minutes) safety call or meeting where different areas report out about any safety issues that occurred during the ►

last 24 hours or any concerns regarding the next 24 hours. This should include clinical and non-clinical areas, such as facilities, information services and security. Issues discussed can range from census numbers to staff shortages or equipment problems, but could also include weather alerts, reminders about participation in organisation-wide initiatives, such as the annual influenza immunisation campaign and many more.

Peter Drucker, a leader in management principles, supposedly said, "If you can't measure it, you can't improve it". To know whether we make progress in our culture of safety, and even more importantly, where we have opportunities for improvement, it is helpful to deploy a standardised safety culture survey at least every 18-24 months. An example of a freely available tool is the survey created by the Agency for Healthcare Research and Quality (<https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/hospital/index.html>).

Another important step is the creation of a dashboard with established benchmarks that are updated regularly. This dashboard needs to be prominently displayed and the results discussed at staff as well as Board meetings. A list of items to be addressed can also be created locally. Comprehensive Unit-based Safety Programs (CUSP) teams are comprised of multidisciplinary frontline staff who concentrate on solving safety concerns that occur at the local level. An executive member of the team can help overcome any logistical or administrative hurdles. This concept has been successfully introduced around the world.

Children's hospitals have some unique challenges due to the wide range of weights and ages of their patients. Paediatric patients can be harmed in different ways. Medication errors are the most common adverse event in children, in part due to the necessary weight and age adjustments for dosing. Errors can happen at any time during the process of prescribing or administration, and they can occur both in the hospital and the ambulatory setting, including in the child's home. An additional source of error can be introduced when substitute medications need to be used due to drug shortages, a relatively common problem both in industrialised and developing countries. Diagnostic errors or a delay in diagnosis may be caused by a failure to order indicated tests, the use of inappropriate or outmoded



tests or therapy, or a failure to act on results of monitoring or testing, or they may occur because of the age of the child and the inability of the young child to verbalise complaints. Therapeutic errors can, like in adults, occur due to the failure to adhere to guidelines, staff fatigue, or interruptions during critical actions.

However, what has received the most attention are infectious complications, especially surgical site infections, catheter-associated blood stream infections (CLABSIs) and catheter-associated urinary tract infections (CAUTIs). Many of them have successfully been targeted with standardisation of care. Interventions such as strict adherence to hand hygiene, asepsis during catheter insertion, adherence to a maintenance bundle and the use of an appropriate dressing, have drastically decreased the incidence of CLABSIs and CAUTIs. Networks, such as Solutions for Patient Safety (<https://www.solutionsforpatientsafety.org/>) provide an opportunity to learn from peers and to share experiences and best practices. Some organisations have been able to maintain zero infections for months and even years, an achievement that previously was thought to be impossible.

As we have learned over the years, zero harm can only be achieved and maintained with constant vigilance. New staff has to be trained and current staff practices must be monitored on a regular basis, since deviations in practice (for example, shortcuts) tend to creep into routine tasks. For example, when we asked each of our nurses to demonstrate their techniques of caring for a central venous line we realised that,

although everyone had been properly trained, a wide variability in practice had become established, possibly increasing the risk for infections. A periodic retraining in proper techniques may help avoid such situations.

Finally, we cannot underestimate the value of including families in our patient safety efforts. For example, if a family helps make sure that all healthcare providers and other staff (registration, food services, etc.) as well as visitors adhere to good hand hygiene procedures, they help us protect our patients and keep us all accountable.

We still have a long way to go, but we have developed many different tools to help us achieve our goal of zero harm. **AH**

References available on request.



Dr. Mueller will be speaking on 'The Journey to Zero Harm: Example of a Children's Hospital' at the Quality Management Conference on January 30, at the Arab Health Exhibition and Congress

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Moving from KPI TO HDI

By Nashat Nafouri, PhD, Chair, Healthcare Interest Group, Executive Officer, Saudi Quality Council

At first impression, the reader might think the title is a rhyming poem for a song or a science fiction movie, but in fact, it is a true reflection of how the Key Performance Indicators (KPIs) at the work place impact positively or negatively the Human Development Index (HDI) in quality of life. The purpose of my article is to first explore the maturity of quality from just being a static idea to continually pumping quality as blood in the veins of all healthcare services over the last two decades to improve outcomes. Furthermore, the article aims to define the current crucial role of KPI in driving the workforce performance enhancement, the HDI as global indicator of developed countries and how both are correlated in fostering better outcomes at the workplace, creating a healthy and productive work environment, increasing employees' effectiveness and efficiency, and balancing between work, personal necessities and community prosperity.

A few years ago, I highlighted competitive marketing, high insurance rates, patients' rights and knowledge, shortage of resources, information technology evolution, biotechnology and the high cost of risk management as the new challenges in healthcare industry, which were the driving forces behind quality and quality costs' emergence during that period.

Over two decades, healthcare leaders focused their efforts on improving quality through accreditation as an approach to improve healthcare services and outcomes

but gave trivial attention to the value behind dissecting the quality application and its costs. Therefore, there are tremendous number of lessons learned from adopting different modules of accreditations and their re-accreditation cycles, which helped the healthcare industry to re-invent itself, and advance the quality deployment from basic Quality Control (QC) to Continuous Quality Improvement (CQI) and finally, the organisational culture.

Healthcare has never been an easy science due to many factors, and also because it deals with human bodies and biological systems, which could alter suddenly or over years. For example, after the completion of the human genome project, doctors and researchers have only recently started to understand the genetics behind different syndromes and diseases, which used to be mysterious such as Alzheimer's, autism, and metabolic disorders and they diagnose them properly with the aid of molecular biology testing. Nevertheless, many innovations are still in the pipeline, such as liquid samples testing for solid tumours. Even though it is promising to view and treat diseases at cellular level like stem cell applications, drugs interactions and their side effects still remain major challenges in the effectiveness of treatment plans.

In addition, with all these breakthroughs and technological leaps, medical and scientific associations are currently releasing different revolutionary guidelines on theories that have been practiced for decades in managing chronic diseases like diabetes and cholesterol, lipedema and heart diseases, amongst others.

On the other hand, the human body is a very complicated system, which can be affected by the surrounding environment. Its reaction and response to outside biological systems like emerging microorganisms is unpredictable. In my opinion, it would be a true horror movie if humanity gets hit by a superbug whether it is bacteria, fungi, biofilm or virus. Therefore, it would be very difficult to standardise the treatment efficacy from region to region, but the global community could standardise the approach to risk management of infectious diseases and its spread.

As the human body is continually changing, it is imperative that we should adopt lean thinking, evidence-based medicine, and agile processes for healthcare services rather than a robust standardised practice.

Several measures have been taken to improve the outcome of healthcare systems in the Middle East region including the health determinants model introduced in 2006 by the Organization for Economic Cooperation and Development (OECD), where public health is seen as the cornerstone with three main components of health protection, health promotion and diseases prevention that are key to drive a healthy lifestyle.

This is the integrated care model where the patient is the centre of care and all services from primary care to specialised services establish the sphere of the care system around the patient.

This is a paradigm shift from the industrial age medicine where the ►

cost of primary care was discouraged to the information age healthcare where individual's self-care costs are highly encouraged. This maturation was accompanied by progressive fast-based improvement of accrediting bodies by transforming standards into a culture that focuses on patient safety and has ultimately paved the road for the emergence of the "Just Culture" and high reliable organisation (HRO) concept. It is insane to keep the accreditation tool rolling and rolling, cycle after cycle, and expecting different results to satisfy patients, communities and other stakeholders. In my opinion, the healthcare industry has just recovered from the accreditation fever, which lasted for many years. It is clear now that human touch is vital and crucial in the healing process. Most importantly, quality should be embedded in all healthcare workers' practice to apply different kinds of quality tools in their daily work to make informative decisions such as flow charting, 80/20 rule, root-cause-analysis (RCA), six sigma, balance score cards, Plan/DO/Check/Act (PDCA) cycle, etc. Along with the industry re-invention, the acceleration of digital technology – similar to the human genome discoveries – has helped in creating better healthcare outcomes and in 2020, disease prevention will be the prime focus.

Indeed, in keeping with the tenets of the new knowledge economy, healthcare will utilise the innovation in smart applications and Artificial Intelligence. By that time, quality will move from its transitional phase as static standards become more dynamic with digital monitoring of processes and will be reflected in the form of KPI and Key Business Indicators (KBI) in making daily strategic decisions. Leaders have now started monitoring KPIs on a daily basis and are relying on dashboards in making informative decisions. In the era of KPIs, leaders understood that a five-year period is required to reach international levels for an organisation of 500 or fewer employees and there is need for comparison on a larger scale than accreditation to attract new customers and investors, increase market share, and promote travel medicine. Hence, a global benchmarking based on KPIs became the framework of modern healthcare services.

To widen the scope of comparison of the healthcare industry in the Middle East region with other parts of the world or other industries regionally, the need for a unique

evaluation model became evident. The European Foundation of Quality Management (EFQM) excellence model is a well-established and tested model based on eight excellence concepts that helped many manufacturing and service industries in Europe by evaluating organisations in meeting stakeholders' needs with tangible results, and was adopted by leaders in the Gulf Region in the mid-nineties. In September 1997, His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, ordered the establishment of the Dubai Government Excellence Program, the first integrated programme for governmental excellence in the world, to be the driving force behind the development of the public sector in Dubai and enabled it to provide distinctive services for all customers and beneficiaries. After Dubai's initiatives, many quality governing bodies in the Middle East started launching excellence awards with the primary aim of improving quality and excellence culture in different industries including healthcare such as Abu Dhabi Government Excellence Award as a mandatory programme, King Abdullah Quality Award in Jordan, King Abdulaziz Quality Award in Saudi Arabia, among others.

Excellence awards completely changed the bulk game from just meeting accreditation requirements to a strategic enterprise where the vision, mission, values, goals and objectives have defined KPIs with set targets, directional trends, and benchmarks to provide measurable and sustainable results. The majority of excellence models have five enablers' criteria and four results criteria. The enablers' criteria include leadership, strategy, people, partnerships and resources and processes while results criteria include people results, customer results, society results and business results. Effective and efficient enablers will lead to world-class results in excellent organisations and will increase the learning, innovation and creativity in organisations.

Spirit of Excellence

For many years, accreditation and re-accreditation drained healthcare organisations' budgets in order to meet the accrediting bodies' requirements. The costs and expenses of accreditation used to be a huge burden while accreditation cost by the definition of quality cost is just part of the appraisal costs. In excellent organisations, the large portion

of quality cost would be spent on prevention costs. This concept was missed or abused during the accreditation fever era simply because financial dimension is not an integral part of any accreditation. Nowadays, leaders plan their organisations' finance efficiently using the excellence model, with well-defined KPIs to improve the quality with special attention to cost analysis and reduction.

The spirit of all excellence models and the most important criterion that create excellent culture is people's criteria. People can either make an organisation or break it. From this point of view, healthcare is not the most attractive work environment for people for many reasons. Human capital was ranked the number one global challenge in the Conference Board CEO Challenge Survey Report Findings in 2013. Stress was the first reason of why physicians, nurses, and other healthcare workers leave the healthcare industry (Watson Wyatt and ASHHRA in their Work Attitudes Research in 2008-2009). In the same research, base pay, length of commute, work/life balance, promotion opportunity, and trust/confidence in management were the top five ranked reasons among healthcare workers as well. In healthcare, despite these reasons, customers expect care givers to provide kindness, empathy, patience and warmth.

On the other hand, management expects workers to deliver the same state of care before, during and after accreditation with the same energy, enthusiasm, commitment, and cost constraint without considering work environment improvement. Of course, accreditation was instrumental in making medical errors reduction as top priority on each leadership agenda. Initially, medical errors were a maze that fired back on care providers until "To Err Is Human: Building a Safer Health System" report was issued in November 1999 by the U.S. Institute of Medicine that resulted in increased awareness of U.S. medical errors. Hospital Acquired Infections (HAI), infection prevention and control programmes and medications management in hospitals benefited tremendously from this report in demonstrating how infections can be reduced and costs can be saved from wrong medications, not like other complicated medical errors. That's because it is much easier to utilise quality tools in these two fields.

Over decades, leadership in healthcare utilised data and other models like the

Swiss Cheese Model and Failure Mode Effect Analysis (FMEA) to reduce medical errors until it was realised that improving patient safety does not only mean reducing medical errors, but also reducing patient harm, empowering healthcare providers, fixing broken processes and improving work environment. Meanwhile, a common understanding of the impact of healthcare providers' performance was introduced by the Institute of Health Improvement (IHI). It lists limitations in performance based on human psychology like fear, fatigue, frustration, illness etc., and limitations that are inherent in the work environment like distraction, noise, clutter, too many handoffs, heat, unnatural workflow, etc.

The down side of accreditation on healthcare providers' performance was in creating an environment of reckless behaviour where the energy deteriorates after obtaining the accreditation and heats-up again when approaching the re-accreditation cycle. So, the norm became to stack paper as sets of evidence provided by the quality department rather than a true reflection of streamlined processes owned by every individual providing a service in healthcare. This scenario lasted for many years until today despite the fact that the accrediting bodies have changed the strategy of assessment by looking at data analyses and its utilisation in improving service delivery and patient safety by competent healthcare providers.

But with the organisational excellence driven by governments to improve outcomes of the public sector and privatisation in the horizon, investing in the human capital development is now the number one priority in both the public and private healthcare sectors. Excellent performance is the goal and KPIs are the measures used to reward good outcomes. Excellence models differ from



Dr. Nafouri will be speaking on 'Moving from Key Performance Indicators to Human Development Index' at the Quality Management Conference on January 31, at the Arab Health Exhibition and Congress

accreditation by focusing on people capabilities, engagement, development, and empowerment from business blue print. It is an integral part of the organisational strategy with clear cascading of vision, mission, values and goals to balanced individual smart objectives that lead to clear career pathway, build organisational loyalty, foster productive and healthy work environment and finally achieve a set of KPIs and KBIs. Hence, when hiring an employee, leaders of excellent organisations nowadays would assess if he/she fits in the organisation culture along with the qualifications and if he/she has the right set of skills and whether or not the organisation has a clear career pathway for the hired employee.

In 2020, future workforce candidates of Generation Next need to acquire 10 top skills

as per *Future of Jobs Report* of the World Economic Forum that include complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, negotiation, and cognitive flexibility, in addition to newly emerged specialised skills in healthcare like structured communication and team building. All these changes will be the components of a "Just Culture" and "Organisational Excellence" deployment in healthcare that will help achieve sustainable results for people, society, environment and business.

By doing this, there will be a paradigm shift in healthcare from retrospective review to prospective expectations in services delivery; and from evaluation by appraisal to proven deliverables driven by competent workforce. When this stage is reached, then an index – as a composite of indicators that produces a single calculation – could be ranked and compared globally as part of HDI programme goals run by the United Nations Development Program (UNDP). Leadership of those excellent organisations who adopt the excellence model philosophy can easily demonstrate their organisations' contribution to the national economy since HDI is the best known composite index of social and economic well-being of a country.

In conclusion, I believe that the success of healthcare organisations in the next 10 to 20 years will be dependent on measures that enable a culture of trust and empowerment that allows healthcare professionals to maximise their full potential through filling and solving talent gaps, and by creating a systematic approach to innovation throughout the organisation in order to create distinctive value for stakeholders. Eventually, healthcare will be moving from KPI to HDI. **AH**

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Ensure Engagement to ENHANCE EXCELLENCE

By Dennis Joseph, MSW, M Phil (HHSM), CPHQ, Director of Quality, Royale Hayat Hospital, Kuwait

The care for patients has shifted from a home setting to a more sophisticated super specialty hospital setting since the turn of the last century. As the family doctor was fully aware of the conditions and ailments, treatment at home was comfortable in a way for patients and their families. However, there are innumerable advantages both for patients and their relatives with the development of hospitals as many an ailment, which need intervention of specialists is available under one roof. Technological advancement in medicine has revolutionised the diagnosis, treatment and patient care. The network technology has added another dimension to partnerships, communication and accessibility of specialists across locations.

The hospital setting, as we know, brings together patients, their families, doctors of various specialties, nurses, pharmacists, support staff like technicians, dieticians, physiotherapists and others. Insurance companies and Third Party Administrators (TPAs) nowadays play an important role in decision making too. Keeping this in view, there is a need to enhance engagement of all involved in the process for an effective healthcare delivery system. The patients and their families' engagement could be enhanced using the 4P's - Person, Problem, Place and Process, a framework frequently used in professional social work.

- 1. Person:** A patient who approaches a hospital with expectation that the care giver would resolve the health problem. The patient is unique, a product of nature and nurture. The care givers have to take into account the patient in his entirety to plan out the engagement process to personalise the treatment and recuperation process.
- 2. Problem:** The patient comes with a problem or ailment and this could be physical or may have many overtones of psychological or emotional stress. Their individual perception of the problem could vary as each individual is unique.
- 3. Place:** The place or the environment where the treatment or services are rendered may vary between organisations and the programmes.
- 4. Process:** The process involves Study, Assessment, Intervention, Discharge and Evaluation or Follow-up. It gives an impression that these steps are to be performed in sequence but these steps are woven in and out, one process paralleling another.

All these four components are almost common both to healthcare delivery and for social case work. But with reference to the engagement process, there are some major differences which are examined here under:

The Difference

Generally counselling is done by a single

trained professional who knows how to use the principles and components wisely whereas in a healthcare setting, it is a whole team of professionals along with less experienced proletarians that include the frontline staff. Professionals such as doctors and nurses are experts in their own domain like medicine and nursing. Though they are trained in their own specialties, many lack required skills in using the 4Ps efficiently, especially when it comes to crisis management, whereas, most of the frontline staff doesn't have any formal specialised coaching on utilising the 4Ps. It is important that the entire care delivery team, both professionals and frontline staff, be proficient in using the above four components and casework principles wisely for engaging patient and their families to enhance quality of care. It's a big challenge to train people to use these elements and get the intended results.

Challenges

Patient Engagement means providers and patients are working together to improve health delivery system. When we deliberate based on this definition, all the care givers have an important role in engaging patients and their families in a broad range of activities. The requisite ambience needs to be created and the care givers should realise that the process is a dynamic activity and involvement in safety is the ►

Care givers are always familiar in using their own vocabulary that's incomprehensible for most of the patients and their relatives and this situation is not conducive for seeking clarification.

right of a client. Organisations also vary significantly depending on the structure, access, services and the programmes. Some are public, while others are private, profit centred, charity organisations, primary care, tertiary and/or super specialty hospitals. All these organisational differences also adds to the problem of the client.

Care givers are always familiar in using their own vocabulary that's incomprehensible for most of the patients and their relatives and this situation is not conducive for seeking clarification. Moreover, in order to save time, some of the care givers utilise this as an opportunity that compromises patient engagement. Leadership of various healthcare organisations, mostly private profit centred hospitals influence professionals to achieve specific targets that conflicts with patient objectives. Fear of losing a customer is another roadblock for the service providers. In few instances, we come across situations wherein, care givers develop a feeling that patients are hostile and ungrateful. Some of the care givers also have reservations about the patient's capacity to contribute. In addition to the above challenges, time constraints and dearth of informal opportunities for detailed discussion compromises effort in building trust between core care giver and the client.

The concept of continual improvement theory applies in patient engagement. Patient engagement is continuous and it is an important factor to maintain momentum while all efforts are in place to improve for the long-term success of an organisation. The more we try to increase patient engagement, the better our patients will be prepared to ask right questions. The support staff plays an important role in improving patient engagement and it is the responsibility of the core service provider to introduce and empower his colleagues so as to build confidence amongst patients for better outcome.

Employees are the main source of inspiration and strength of any organisation and its most valuable assets. Respect for people and continuous improvement should be embedded in the organisational culture.

Creative ideas of frontline staff should also be taken seriously and implemented to improve wellness at the workplace. Leaders have to provide them with world-class working conditions and opportunity for them to grow and excel. Ensure a work environment where trust is foremost.

Common Tools for Engagement

Nowadays, since the healthcare organisations give much attention to patient engagement, many IT vendors have started specialising in patient engagement technology. Biometric wireless devices such as wireless scales and glucometers communicate the data through EMR. Many applications help patients to manage their medications and access their records for better outcome. Some of the IT vendors have developed medication adherence tools to remind patients to take their medications on time. Most of the hospitals have started using SMS appointment reminders and of course, social networks are useful for patient education and as an engagement tool.

All these systems, both mobile and fixed, are prone to various types of attacks and it is important to ensure confidentiality and security of pertinent protected health information. This is another major challenge for the organisation. Patient portals and eloquent information leaflets developed and shared by various agencies, checklists and informed consent forms are few tools that help the patients and their families to raise relevant questions for clarification.

Benefits

We all agree that patient engagement is beneficial for the patient, clinician, and healthcare organisation and to the society at large. It helps to deliver more detailed and comprehensive care, better and easier communication and improves customer satisfaction. It helps to increase efficient service delivery and improves healthcare outcome as there will be more clarity in decision making. In addition, it reduces cost to the patient and increases revenue for the organisation as there will be enhanced continuity of care. The

highly engaged patients are more likely to take preventive measures, will have regular health check-ups and participate in immunisation programmes. It is more likely that people will start eating healthy foods, exercise regularly and avoid risks such as smoking.

Conclusion

All these tools will help to improve patient experience, compliance to healthcare management strategies and provide better outcome of care and add value by making it more personal, convenient and interactive. While these tools and techniques enhance the ability of the service providers to interact with patients, real patient engagement requires a shared understanding and an open mind for including patients' needs, expectations and beliefs. This is required in each encounter from the 'point of first contact' till discharge and subsequent follow up and it requires an empowered team of specialists who are proficient in using the 4Ps. ^{AH}

References available on request.



Joseph will be speaking on 'Ensure Engagement to Enhance Excellence' at the Quality Management Conference on January 30, at Arab Health Exhibition and Congress

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My experience with the Swanson implants started almost 30 years ago, followed by the move to use the NeuFlex prosthesis later on. I have recorded over a 18-year period, 81 cases of MCPJ silicone implants in 48 patients, with an improvement of the ulnar drift to almost neutral or less than 5°.



DEVELOPMENT AND ADVANCES IN JOINT REPLACEMENT OF THE HAND

By Dr. Lucia Heras, Consultant Wrist & Hand Surgeon, Burjeel Hospital, Dubai, UAE

The need of having a more functional hand stimulated the development of silicone implants for small joint arthroplasty in 1962. Silicone implants were studied extensively in laboratory tests, animal experiments and long-term human retrievals to determine the local and systemic host responses while a number of different designs of the double-stemmed hinged finger joint implants were evaluated in a flex-test machine, and after extensive studies, the implant midsection was volarly hollowed out to accept a redistribution of compression forces generated in the volarly reinforced base of the distal stem during flexion. This distributing-load flexible hinge design was tested to 600 million flexion repetitions without change, having the least resistance to flex-load forces, and offering adequate stability to prevent vertical buckling.

This silicone double stemmed hinges were first used by Swanson for metacarpophalangeal joint (MCPJ) reconstruction in 1964 and then in 1965, were developed for the Proximal Interphalangeal Joint (PIPJ).

Bone response to this kind of arthroplasty with encapsulation of the implant has enhanced implant stability, eliminating the need for permanent fixation, improving bone tolerance, the distribution of weight forces and prolongs the life of the device. Although these kinds of implants have provided a means of treatment for arthritic joints, the limits of range of motion and stability they produce have gradually reduced their indication, living space to the new developed implants.

Silicone arthroplasty presented some complications during the following years. In

1985, came the first report of the occurrence of synovitis, a reaction to the silicone implants, occurring when the wear debris particles accumulate in the synovial tissue producing a reactive synovitis, called silicone synovitis, which produce lytic lesions in the surrounding bones. Swanson determined that the synovitis was influenced by mechanical factors, implant type and silicone composition. It was noted around overload articulations, when the implant was oversized or misaligned, when there was joint instability, excessive motion or overuse.

It was also reported that silicone implants were submitted to sharp bony edges and shearing forces that eventually would fracture the implant. Despite the above, the rate of complications is clearly low making those implants to remain the U.S. FDA (Food and Drug Administration) benchmark against which all other finger joint arthroplasties are judged.

Due to the advancements in fingers joint replacement, the silicone implants have been left as the treatment of choice for patients suffering from Rheumatoid Arthritis, Inflammatory Arthritis and severe degenerative destruction of the joints, mainly because of the limited range of motion and the less demand on the patients. Good control of the rheumatic disease by the rheumatologist is paramount to achieving a greater longevity of the implant, and to prevent recurrence of ulnar drift.

The surgical technique is quite simple, keeping in mind that the size of the implant is always given by the proximal phalanx in MCPJ and for the middle phalanx in the PIPJ; and that excessive shortening in the MC head resection of the middle and ring fingers will

alter the MC arch and impair the function of the hand and diminish grip strength.

The NeuFlex MCPJ silicone implants came to the market in 1999 trying to improve upon Swanson's implants, reduce their complications and improve results. This implant has a 30° pre-bend in flexion and a hinged design to mimic the normal centre of rotation of the MCPJ, decreasing stress of the material and improving overall functional arc and ROM (range of motion); also minimising abrasion and wear debris from forming.

My experience with the Swanson implants started almost 30 years ago, followed by the move to use the NeuFlex prosthesis later on. I have recorded over a 18-year period, 81 cases of MCPJ silicone implants in 48 patients, with an improvement of the ulnar drift to almost neutral or less than 5°. The extension deficit that presents the patients with the disease improved after surgery to only 5° or 10°, associated with a good grip strength and a more functional and cosmetic hand.

But every pathology has their own characteristics. In all the inflammatory arthropathies we know that most of the joints will be affected that is why we are not forcing to recover a strong hand. But in post-traumatic arthritis or degenerative arthritis, one or maybe two joints are only involved, while the others are completely normal. This brings us to the situation where the silicone implant we are using is less indicated due to the resulting reduced range of function. With this problem in mind and looking at the good results of the knees and hips arthroplasties, the idea of having an artificial joint that can be anchor to the ►



Rheumatoid Arthritis



NeuFlex Silicone Replacement



Post Silicone Implants Replacement



Surface Replacement Arthroplasty



SRA in the PIP joint

bone using cement or cementless technique developed and the term 'osteointegration' began to be applied to the arthroplasties for small joints.

Many short-lived designs have been introduced aiming to improve long-lasting stability and range of motion. In 1997, Linscheid developed at the Mayo Clinic a surface replacement (SR) concept with a meta-polyethylene device where both parts of the prosthesis were cemented, producing a very good improvement in the range of motion. This implant has the advantage of minimal bone resection, with accurate restoration of the centre of rotation and more reliable restoration of tendon movements in the joint, and due to the clear disadvantage of using cement, which makes revision procedures difficult, an uncemented version came later to the market.

The two pieces' unrestrained prosthesis use a chromium-cobalt proximal component and an ultra-high molecular weight polyethylene (UHMWPE) in the distal component. It needs a minimal bone resection with preservation of the collateral ligaments, providing a more stable joint, particularly to imposed lateral forces. The great articular congruency adds a better distribution of the compressive loads assisting for the great joint stability. The stems are rectangular to maximise rotational stability and are slightly curved to match the curvature of the medullary canal.

The kinematic of those implants in the PIPJ has been studied, showing a similar movement to that of the normal joint, with a maximum 5° of angular displacement and 9° of rotation movement during passive flexion and extension motion.

For all the above, perichondral resurfacing arthroplasty (SRA) has been proposed for young or middle adults with post-traumatic or degenerative arthrosis, with functioning collateral ligaments or reparable. Those patients are more active and need to recover a good range of joint motion. These results have been proven in several papers confirming also a pain relief of 70-90 per cent.

But disadvantages have also been reported such as the higher risk of dislocation or subluxation compared to silicone implants. Tendon balancing and ligament functioning are extremely important to prevent this happening. Meanwhile, the difficulty of revision due to the cement fixation in the first implants had been resolved with new stems that are coated to

encourage the osteointegration.

SRA are technically more demanding and much less forgiving than silicone joint replacement.

During my service in the UK, I did 23 MCPJ replacements in 11 patients followed by SRA. I had two cases of lucency in the phalangeal component, without symptoms. 19 had no pain and two had minor discomfort. Their arch of position went from 27° pre-surgery to 60° post-surgery and the disability score improved from 70 per cent disability to 9 per cent after surgery.

Pyrocarbon was developed in the 1960s from a collaboration between CEA (French Commission for Atomic Energy) and General Atomic (U.S.) and was for nuclear applications, as a coating for nuclear fuel. Pyrolytic carbon is a synthetic material formed by the pyrolysis of a hydrocarbon gas at approximately 1300 °C. In 1969, this material was successfully used to make components of artificial heart valves, and since then it has shown exceptional reliability.

The mechanical properties of this material has the nearest Young's modulus (modulus of elasticity) similar to cortical bone, does not cause adverse reaction to surrounding tissues, and has no evidence of wear or debris production and excellent bone-implant incorporation. Pyrolytic carbon finger joint arthroplasty was introduced in 1979, and their use for carpal implants developed in the 1990s. But it was not until 2001 that the EEC authorised the use of the PIP prosthesis, designed by J. Stanley (Wrightington Hospital, UK) and R. Beckenbaugh (Mayo Clinic, Rochester, U.S.).

The results of these implants show an improvement in the range of motion, relief of pain, adequate biological fixation and only few complications.

For the last 20 years, I have been using more Pyrocarbon implants, 17 altogether, than the metallic ones, with the same indications, but providing a better range of motion, less complications and better survival rate, not seeing bone loosening in five years of follow ups.

Similar implants have also been developed for the trapezio-metacarpal joint (TMCJ), and since 1973, when Caffiniere presented his first model, there has been a countless number of implants to deal with the osteoarthritis (OA) affecting that joint.

My own experience had been mainly with the Avanta SR, which in my opinion reproduces better the anatomy of that joint. In the UK, I did 43 thumbs in 34 patients in stage II and

Ill of Eaton, mainly females, mean age of 56 years, with a survival rate after five years of 93 per cent and producing a good function of the hand, recovering strength, grip and pinch function in all the cases. Only three cases presented bone reabsorption without clinical correlation and only four complained of unspecific pain, which were classified as implant failure. But despite some good results provided by this arthroplasty, years later, the company withdrew the implant from the market.

In the following years, and due to the implementation of the pyrolytic implants, I have started using those type of prosthesis, hemiarthroplasties or pyrodisk with similar results in improving the range of motion, pain control and grip strength. Complications of dislocation has also improved with those pyrolytic implants.

In conclusion, the overall results of the arthroplasties of the hands have proved to be good enough to recommend these implants for the treatment of stiffness, pain and lack of functions affecting the hand. They are technically demanding, so the experience of the surgeon is of paramount importance to achieve the best results. Thankfully, the recent interest of the industrial companies in hand pathology and the need to develop joint replacements have improved the implants available in the market in recent years, but still they are not able to match the success of large joint arthroplasties. Fingers provide a more challenging mechanical problem than that of the large joints, but results are encouraging and continuing to improve with further investigations. ^{AH}



Dr. Heras will be speaking on 'Development and Advance in Joint Replacement of the Hand' at the Orthopaedics Conference on January 29, at Arab Health Exhibition and Congress



Radiography with SRA in the PIPJs



Pyrocarbon Implant



Pyrolytic Carbon Implant PIPJ



Radiography PIP Pyrocarbon Implant



Range of Motion after Pyrocarbon Implants in both ring fingers (Rt & Lt hands)



Avanta SR for OA TMC joint



ROM after bilateral SR arthroplasty of the thumbs



Pyrodisk implant



Pyrocarbon Hemiarthroplasty and Pyrodisk



ROM of the above patient

THE USE OF STEM CELLS IN ORTHOPAEDICS

By Prof Dr. Med Philip Schoettle, MD, PHD, Medical Director, Knee and Hip Institute Munich, Germany, and stem cell therapy surgeon and orthopaedic specialist at Okyanos Center for Regenerative Medicine, Freeport, Bahamas

Like most classically trained orthopaedists, a decade ago I was highly sceptical of stem cells and their therapeutic value. Today, as a treating physician at the Knee and Hip Institute in Munich, Germany, and at the Okyanos Center for Regenerative Medicine in Freeport, Bahamas, I'm a passionate believer. For friends, family and patients with knee problems due to tissue and cartilage issues, I recommend stem cell treatments well before a knee replacement, provided their condition hasn't progressed to bone-on-bone damage.

But not all stem cell treatments are equal. The right types of cells in the right potency affect clinical outcomes. Expert physicians who can properly deliver the cells are critical and carefully matching the patient's condition to the proper therapeutic is essential. These factors determine whether I treat a patient with orthopaedic surgery, a combination of scoping or surgery with adjunctive stem cell treatments, or stem cell treatments alone.

Stem Cell Sources

There are multiple sources of adult stem cells. The most commonly thought of is bone marrow. We've done bone marrow transplants for 50 years, using the stem cells from bone marrow and transplanting them into the recipient. Another source is adipose, or fat tissue, recognised in the last 20 years as a very rich source of stem cells.

However, as we age bone marrow becomes fibrotic and fatty. So, we end up with fewer stem cells as we get older. At baseline there are few therapeutic cells for tissue repair in bone marrow, in contrast to fat, which maintains its stem cell population and is a much richer source of therapeutic cells – including mesenchymal stem cells, which are really the conductor or the regulator of the stem cell repair. So, fat turns out to be a very rich supply of stem cells,



which is maintained throughout our life and has been shown by multiple groups to be very effective in tissue repair.

Adult stem cells have multiple functions and come in different types, but ultimately what they do is lead to healing. Mesenchymal stem cells (MSC) activate the bone marrow system and other stem cells to start repairing tissue. Mesenchymal stem cells are known as the conductor of the repair process. Endothelial progenitor cells are the foundation of building new blood vessels. They can inhibit the immune system and be anti-inflammatory, and they can activate other stem cells in the body and force them to start repairing tissue.

Beyond MSCs: SVF and its Benefits

Stromal vascular fraction, or SVF, is a mixture of stem cells that exist in our adipose, or fat, tissue. SVF contains mesenchymal stem cells and endothelial progenitor cells as well as endothelial cells. As we age, we don't lose mesenchymal stem cell function from fat as we do from bone marrow. There are multiple

forms of SVF that vary in potency and usability. At Okyanos, we use enzyme-derived SVF because studies have shown that it is the most potent form of SVF. It produces a very rich mixture of stem cells that can be delivered two ways: by injection into joints and organs that have been injured, and by IV to activate the endogenous stem cell system and induce a better repair for the patient.

SVF is also an autologous treatment, because the patient's own cells are returned to them – released from the fat – and delivered by injection directly to the area in need as well as intravenously to help activate the body's own endogenous system. Other clinics that use fat-derived stem cells often only deliver the mesenchymal fat-derived stem cells, not the SVF. These mesenchymal stem cells have been cultured, leading to changes in the stem cells that can adversely affect their ability to induce tissue repair. Studies have suggested that delivering the mixture of the SVF is better than delivering any single stem cell type.

At Okyanos, the most common conditions

that patients present with are orthopaedic. The adult stem cell treatments can be given as an adjunct to surgical treatment or as a primary therapy. We perform liposuction and isolate the SVF with an enzyme. Then, we directly inject the patient's cells into the joint space. Finally, the patient receives an IV infusion of stem cells, again, to get the bone in a healing state.

Currently, the Tissue Genesis Icellator is the best point-of-care system for processing enzyme-derived SVF with a safe and sterile single-use cartridge. Designed and made in the U.S., based on research by the U.S. Department of Defense and NASA, the Icellator is approved for use in Japan, South Korea and the Bahamas, all regulated medical jurisdictions. It is also being used in multiple FDA cleared trials in the U.S., but is not yet approved for clinical use there or in Europe. Using SVF processed by the Icellator delivers the greatest number and best mixture of cells, at the highest potency, as the cells are freed from the fat matrix.

The combination of mesenchymal stem cells and endothelial progenitor cells can decrease inflammation, induce stem cells to be recruited to the joint space, and help nourish the cartilage by bringing blood supply. The goal of microfracture surgery, which is quite popular, is to get stem cells out of the bone marrow space and into the joint space to promote repair. By delivering stem cells directly to the joint, we create the same conditions for healing, without causing more harm. The added IV infusion activates bone marrow that might sit right at the end of the bone near the joint to encourage stem cell support of that tissue.

Improving Osteoarthritis

In addition to treating knees, shoulders, hips and other joints, adult stem cell therapy can really improve or prevent severe osteoarthritis by either regrowing cartilage or decreasing inflammation of bone edema. With early treatment, we can preserve and enhance patient function through prevention of the progression or repair of the loss of cartilage, and the severe pain that accompanies bone-on-bone damage. When treating people later, our goal is to preserve or enhance patient function through the regrowth of cartilage or decrease the bone inflammation and edema such that the patient gets relief and can return to

activities of daily living.

The benefits last quite some time, months to years at this point. We're seeing patients with significant visual analogue scale scores – meaning less pain, more activity, and more motion.

The goal at Okyanos for treating any condition is an enhancement in quality of life. We want patients to go back to the tennis court, back to the golf course, back to being fully active with restored joint function.

A Promising Future

Today, I'm an orthopaedic surgeon who loves what I do, but my whole thinking has turned around. Instead of focusing on surgical options, I think about what can be done with high potency SVF. Now I discuss with my patients how we can achieve natural healing and regeneration through stem cell therapy and avoid surgery.

Stem cells are the future in treating orthopaedics. Regenerative medicine has value in many more fields as well, but with orthopaedics, outcomes are measurable. Someone not able to walk without pain and can walk afterwards is a quantifiable success. Radiographic tools, such as MRIs and x-rays, show the reconstructive changes stem cells can have on injury or degeneration. Much of the pain caused by inflammation in orthopaedics is reduced by stem cells. I see stem cell treatments growing in importance, as improvements in SVF therapy, rich cell yields and precision delivery continue to speed patient healing. **AH**

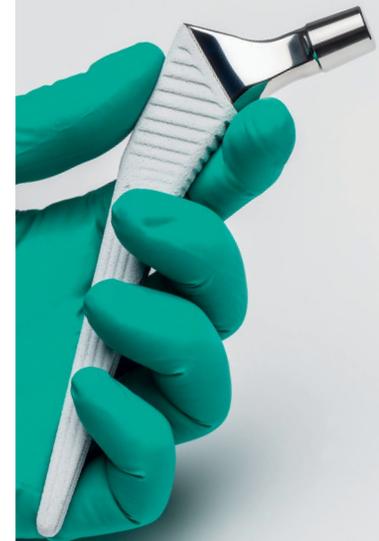


Prof Dr. Schoettle will be speaking on 'Partial Replacement Around the Knee Using Mini Implants' at the Orthopaedics Conference on January 30, at Arab Health Exhibition and Congress

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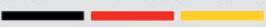


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SMOKELESS TOBACCO:

A Public Health Challenge Across Asia

By Javid Ahmad Khan, Professor, Section of Pulmonology and Critical Care Medicine and Ayesha Butt, Medical Student, The Aga Khan University, Karachi, Pakistan

A major cause of concern is the fact that while smoking rates are falling, unfortunately the use of SLT continues to increase.

Smokeless tobacco (SLT) is a mammoth public health issue, the risks and perils of which have been condoned over the years, despite its many hazards and rampant widespread use. More than 300 million adults in 70 countries use smokeless tobacco. 89 per cent of these users are in South-East Asia. Low- and middle-income countries are home to more than 250 million adult SLT users and in a few countries like India and Bangladesh, SLT use is very high and surpasses the prevalence of smoking. A major cause of concern is the fact that while smoking rates are falling, unfortunately the use of SLT continues to increase. In countries like UAE, SLT use is very common because of the largely immigrant population. The plethora of various different SLT products available, their greater social acceptability and perception of being minimally harmful and lack of regulation of SLT, add to the complexity and gravity of the issue.

SLT is associated with the development of a myriad of cancers in the human body, including cancers of mouth, nasal cavity, lungs, trachea, pancreas, liver and oesophagus. Tobacco-specific nitrosamines, which form during the growing, curing, fermenting, and ageing of tobacco, are one of the major culprits in this regard. Additional substances found in SLT with carcinogenic potential include: radioactive element (polonium-210) found in tobacco fertiliser, polynuclear aromatic hydrocarbons formed when tobacco is

cured with heat and deleterious metals (arsenic, beryllium, cadmium, chromium, cobalt, lead, nickel, mercury). Studies have shown that more than 50 per cent of oral cancers in India and Sudan are attributable to smokeless tobacco products, whereas about 4 per cent of oral cancers in American men and 20 per cent of oesophageal and pancreatic cancers in Swedish men can be linked to SLT use. Epidemiological data from the U.S. and Asia show a raised risk of oral cancer (overall relative risk 2.6 [95 per cent CI 1.3-5.2]). Risks of oesophageal cancer (1.6 [1.1-2.3]) and pancreatic cancer (1.6 [1.1-2.2]) have also increased, as shown in northern European studies. One-third of all cancers in Bangladesh, India, Pakistan and Sri Lanka are associated with SLT use. Nine case-control studies from India and one from Pakistan on cancers of the oral cavity, have demonstrated relative risks of oral cancer for men who were current chewers of *paan* with tobacco compared to non-chewers varied from 1.8 (95 per cent CI: 1.2-2.7) to 5.8 (95 per cent CI: 3.6-9.5) compared to 30.4 (95 per cent CI: 12.6-73.4) to 45.9 (95 per cent CI: 25.0-84.1) in women. In addition, a study from Pakistan showed that the risk in people who had ever been chewers of *paan* with tobacco developing oral cancer was 8.4 times (95 per cent CI: 2.3-30.6). In an analysis of three case-control studies from India on oesophageal cancer, significant odds ratios for tobacco chewers varied from 2.1 to 3.2.

Oral mucosal lesions, leukoplakia and periodontal disease are corollaries ►



of SLT use, as are fatal ischaemic heart disease, type 2 diabetes and fatal stroke. 75 per cent of the *paan masala* chewers were found to develop oral submucous fibrosis within 4.5 years and quid chewers in about 9.5 years. A study showed that chewing of betel quid with tobacco for 15–30 minutes leads to significant increments in heart rate and blood pressure. As they contain nicotine, it is unsurprising that SLT products also induce dependence, tolerance and withdrawal symptoms upon cessation of use, much like cigarettes.

SLT products also lead to stillbirth, pre-term birth and low birth weight. A nearly threefold increase in stillbirths and a 100–400 g decrease in birth weight, in offspring of women who used SLT during pregnancy was noted in studies from India.

In South East Asia, SLT use is more widespread than cigarette smoking and is increasing with time. The Global Youth Tobacco Survey (GYTS) delineated an increase in the prevalence of current SLT use among 13–15-year-olds in Bhutan (from 7.4 per cent in 2004 to 21.6 per cent in 2013), Nepal (from

6.1 per cent in 2007 to 16.2 per cent in 2011), Myanmar (6.5 per cent to 9.8 per cent from 2004– 2011). GATS-2010 in India revealed that 35 per cent of adults in India used tobacco. Among them, 21 per cent adults used only SLT, 9 per cent only used smoking tobacco and 5 per cent used smoking tobacco as well as SLT. 33 per cent men and 18 per cent women consumed SLT compared to 24 per cent men and 3 per cent women who smoke cigarettes. Generally, the prevalence of SLT use was higher in rural areas than in urban areas. Similarly, SLT use was more pronounced among the low socioeconomic strata and less educated adults. The majority of immigrant workers in the Middle East are from India, Pakistan, Bangladesh, Sri Lanka and Nepal, where SLT use is very common.

An important facet in the SLT issue is the fact that while public health and medical professionals have campaigned vehemently against smoking for decades, SLT tends to be ignored. This is exhibited in GATS 2010 in India, by the fact that only 34 per cent of SLT users were asked about SLT use by a healthcare professional in the 12 months prior to survey

and only 27 per cent received advice to quit, in contrast to 54 per cent of smokers who were asked in the same period if they smoked and 46 per cent were advised cessation.

In the developed world, SLT product innovations such as portion pouches, dissolvable tobacco, unique flavourings, and varying nicotine levels have been introduced by manufacturers in a bid to attract more customers. They have also marketed new SLT products to smokers as alternatives to cigarettes in circumstances which do not permit smoking. These marketing ploys may adversely impact public health by promoting tobacco use, even in those who have not used it previously and discouraging cessation. In 2016, US\$759.3 million was spent on advertising and promotion of smokeless tobacco products compared to US\$684.9 million in 2015.

Types of smokeless tobacco include chewing tobacco (loose leaf, plug, or twist and may come in flavours), snuff (moist, dry, or in packets) and dissolvables (lozenges, sticks, strips, orbs). Smokeless tobacco products that contain areca nut

are commonly used in countries in South Asia, and in migrant populations from these countries. Various forms of SLT are used in South Asia. Unprocessed tobacco is the cheapest form used. *Kaddipudi* are cheap 'powdered sticks' of raw tobacco stalks and petioles, used in Karnataka. A commercial mixture of tobacco, lime and spices is *zarda*. It is typically flavoured with cardamom and saffron and often chewed in betel quid, and is popular in north India, Pakistan and Bangladesh. *Pattiwala* is sun-dried, flaked tobacco with or without lime, used mainly in Maharashtra and several north Indian states. *Mawa*, popular among teenagers especially in Gujarat, contains thin shavings of areca nut with some sun-dried tobacco and slaked lime. *Gutka*, a dry preparation commercialised since 1975, containing areca nut, slaked lime, catechu, condiments and powdered tobacco, was originally available custom-mixed from *paan* vendors. For the last couple of decades, *gutka* has been available under several brand names. A similarly packaged mixture without tobacco, often with an identical brand name, is called *paan masala*. These products have become very popular especially among teenagers and young adults in many states of India and in Pakistan. *Naswar* or *Niswar*, used widely in Afghanistan and Pakistan, is a mixture of powdered tobacco, slaked lime, and indigo and can be homemade or available commercially. In Pakistan, *naswar* is tobacco flavoured with cardamom and menthol. *Nass*, a mixture used in Pakistan, Iran and the Central Asian Republics contains local tobacco, sometimes partially cured, ash, cotton or sesame oil and in some areas, lime. It is placed under the tongue or in the lower labial groove.

The Way Forward

As part of an interventional study in India, brief advice on tobacco cessation was offered to tuberculosis patients, in the Revised National TB Control Program (RNTCP), who were also tobacco (including SLT) users. Brief advice on tobacco cessation takes less than three minutes and consists of five A's: asking if the patient uses tobacco in any form; advice on quitting tobacco; assessing readiness to quit tobacco use; assisting with counselling and appropriate treatment; and arranging for follow up. After six months had elapsed, 67.3 per cent of patients had quit tobacco. In a similar initiative in

Bangladesh, people were advised to quit tobacco during hypertension screening visits. Consequently, the prevalence of SLT astoundingly dropped from 33.2 per cent to 0.4 per cent. This demonstrates the utility of simple, cost effective interventions, which can be integrated into existing health infrastructures and frameworks.

Another educational intervention, in Karnataka, India, was carried out by specially trained primary health centre (PHC) workers, who used films, exhibits and pictures to delineate the injurious effects of tobacco. The quit rates in men and women in the intervention cohort were 26.5 per cent and 36.7 per cent, respectively, compared to 1.1 per cent and 1.5 per cent in a control cohort.

Educating school children about the perils of tobacco proved to be an effective measure in Goa, India, when students in 46 villages were trained to communicate anti-tobacco information to their parents and to the community. 1.5 years later, 8.9 per cent men and 11 per cent women had quit tobacco use.

Mass media interventions are also extremely effective methods of disseminating health education and dissuading people from using SLT. In 1990, educational information about the use of tobacco was broadcast on All India Radio. Consequently, in Karnataka, nearly 6 per cent of tobacco users reported quitting the habit, as did 4.3 per cent in Goa. In addition, about one-third of tobacco users intended to quit and another third had reduced their consumption.

An approach called CATCH has been propagated to deal with SLT.

- Customise and adopt global best practices of SLT cessation after adequately modifying them to account for unique regional factors
- Acquire resources by exerting pressure on legislators for greater allocation of funds and by fundraising
- Train health professionals by developing national technical guidelines, conducting training modules and incorporating SLT cessation in medical, dental, nursing school curricula
- Create an enabling environment by aggressively marketing SLT cessation services and increasing taxation on SLT products
- Harness support from all stakeholders including the community, academia, legislators, health professionals.

Initiatives at an international level should also be undertaken. Addressing Smokeless Tobacco and building Research Capacity in South Asia (ASTRA), an international group, comprising experts from six UK universities and five institutions from Bangladesh, Pakistan and India, aims to carry out policy research and develop interventions to address the problems caused by the use of smokeless tobacco in South Asia. ASTRA will evaluate how effectively are the policies recommended by the Framework Convention on Tobacco Control (WHO-FCTC) being applied for ST in low- and middle-income countries (LMICs). The group will also train research teams in these countries to carry out impactful SLT research.

Smokeless tobacco use is a colossal public health issue particularly in South Asia. However, it remains largely ignored despite its many deleterious ramifications and high prevalence. Lack of awareness among the general public about SLT being harmful and the normalisation of its use – as a habit in prevalence since ages in this region, further complicate the problem. However, it is of paramount importance that efforts are made on national, institutional, community and individual levels to discourage SLT use and help people quit. **AH**

References available on request.



Dr. Khan will be speaking on the 'Role of Health Professionals in Tobacco Control: An Eastern Mediterranean Perspective' on January 31 at the Public Health Conference, at Arab Health Exhibition and Congress

Instead of trying to manage numerous diseases and symptoms in a disjointed fashion, several countries are placing increasing emphasis on interventions that optimise older people's physical and mental capacities over their life course.



INTEGRATED CARE APPROACHES

for Older People

Abstracted by Dr. Nabil Kronfol, President, Lebanese HealthCare Management Association; Professor: Health Policy and Management; American University of Beirut, Lebanon

In 2015, the World Health Organization (WHO) published the first world report on ageing and health. This was followed in 2016 by the World Health Assembly's adoption of a global strategy and plan of action on ageing and health. Both documents reflect a new conceptual model of healthy ageing that is built around the functional ability of older people rather than around the absence of disease. At the same time, the United Nations adopted the 2030 Agenda for Sustainable Development.

These documents call for major reforms to health and long-term care systems and for the prioritising of interventions that optimise older people's physical and mental capacities over their life course.

As people age, their health issues tend to become more chronic and complex and older people can develop complex health states (frailty, increased risk of falls). If not properly managed, these conditions can lead to polypharmacy, hospitalisation and death. Providing care for older people is also increasingly complex with the involvement of many types of health workers. Healthcare services to the older population will need to serve people with a high and stable level of intrinsic capacity, those with a declining capacity and those whose capacity has deteriorated and thus require additional support.

Instead of trying to manage numerous diseases and symptoms in a disjointed fashion, several countries are placing increasing emphasis on interventions that optimise older people's physical and mental capacities over their life course. This requires greater integration within the health system and between health and social services to provide a coordinated service. Evidence suggests that this integration leads to better health outcomes at the same or even lower cost.

At the level of clinical care comprehensive assessments are recommended in order to optimise the functional ability of the seniors. This requires supportive policy, plans and regulatory frameworks, workforce development, improved communication technologies; and pooled and bundled payments (with incentives if necessary).

Emphasis ought to be on the older person's physical and mental capacity and the starting point for, coordinated health interventions.

WHO's approach hinges on the premise that care can be integrated at: (i) the macro level (i.e. at the policy or sector level); (ii) the meso level (i.e. at the organisational or professional level); or (iii) the micro level (i.e. at the clinical or interventional level). In addition, it is also older person-centred, aimed at individuals with unique needs and preferences, as members of a family and a community.

The framework proposes five interdependent strategies that must be implemented to enable health services to become more people-centred and integrated: (i) engaging and empowering people and communities; (ii) strengthening governance and accountability; (iii) reorienting the model of care; (iv) coordinating services within and across sectors; and (v) creating an enabling environment.

There is also a lack of consensus on what constitutes a positive outcome for older people. Traditionally, healthcare research has used indicators of disease, disability, longevity, patient and provider satisfaction, healthcare utilisation, hospitalisation, institutionalisation and cost. In contrast, the main aim of integrated care for older people is not to manage disease or prolong life but is, instead, to optimise older people's intrinsic capacity over their life course and, hence, ensure healthy ageing.

A different set of outcome indicators is needed – indicators that reflect intrinsic capacity, functional ability, quality of life and the attainment of goals defined by the older person. Finally, only a few easily accessible, policy guidance and implementation tools exist.

Requirements for Integrated Care

Achieving the goals of WHO's global strategy and plan of action on ageing and health requires political commitment to integrated healthcare for older people, the development of coherent health systems policy, and normative guidance on the implementation and evaluation of integrated care both nationally and internationally.

To achieve best outcomes for older people, one should organise care around the concerns and priorities of older people themselves – and integrate the assets, which can contribute to healthy ageing (strengths of the older person, family care, support from local resources).

A comprehensive approach is needed to understand the complex factors contributing to the older adults needs and to integrate care around the specific priorities and goals of the older person. Personalised approaches in care emphasise the empowerment of the older persons and their families to participate in making decisions about their health.

An essential strategy to attain integrated, people-centred health services is to build strong primary care-based systems due to their outreach to the wider population of older adults in the community. This approach involves not just multidisciplinary health professionals but a range of other formal and informal caregivers. The gold standard in assessment of older people is comprehensive geriatric assessment.

In many people's lives there will come a ►

stage when they experience a significant loss of mental or physical capacity, particularly in old age. The functional ability of the older persons is determined not just by an individual's capacities, but also by the environments they inhabit and the care and support that is available to them.

Long-Term Care

The term "long-term care" describes the full range of efforts, all directed to ensure the best possible trajectories of an individual's capacity and functional ability over time.

WHO defines long-term care as "all activities undertaken by others to ensure that people with, or at risk of, a significant ongoing loss of capacity can maintain a level of functional ability consistent with their basic rights, fundamental freedoms and human dignity."

"Long-Term Care is About People, Not About Services"

An effective system of long-term care will also ensure that all caregivers are adequately trained and supported. Educational curricula need to be tailored to ensure graduates have the skills and understanding necessary to fill their role, and continuing professional development will be important if professional

caregivers are to maintain them. Many paid caregivers have received little training and an effective system of long-term care can ensure general standards in the paid workforce and might establish accreditation mechanisms to ensure staff and care providers develop and maintain appropriate competencies. Moreover, since most care is provided by family caregivers, a core element of any system must be to ensure they receive adequate training, are supplemented where necessary with professional support and have access to services such as respite care.

WHO (2017) has identified three global actions that can facilitate the development of long-term-care systems:

- a. Building understanding and commitment to developing long-term-care systems.
- b. Mapping the current situation in long-term-care provision
- c. Providing guidance and technical assistance for countries at all levels to meet the needs of adults with significant losses of capacity.

Acknowledgments

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and from the symposium of the Global Alliance for Musculo-skeletal Health on "The Importance of Musculo-skeletal health for Healthy Ageing".^{AH}

References available on request.



Dr. Kronfol speaks on 'Elderly Populations in the Arab World: A Public Health Approach?' at the Public Health Conference on January 30, at the Arab Health Exhibition and Congress



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SURGICAL ETHICS

In the Era of Technical Advancements

By Prof Ali Al Dameh, Associate Professor, General Surgery and Thoracic and Laparoscopic Surgery - Consultant Surgeon, Emirates Speciality Hospital, Dubai Healthcare City (DHCC), Dubai

Why do surgical ethics matter? The short answer is that surgery is not just a purely technical discipline. Technical mastery is absolutely necessary, but it is not sufficient in and of itself to bring complete benefit or comfort to our patients.

Surgical Ethics (SE) is part of the core of surgical professionalism and as such significantly impacts the everyday life of surgeons and the care they provide to their patients. As Charles Bosk noted in *Forgive and Remember* (The University of Chicago Press, 1979), “when the patient of an internist dies, the natural question his colleagues ask is “What happened?”, while when the patient of a surgeon dies his colleagues ask, “What did you do?”. By the nature of their craft and beliefs about it, the surgeon is more accountable than other physicians and they also have much more to account for.”

The central question to surgeons has changed. It is not just “What can we do for this patient?”, but today’s question is, “What should we do for this patient?” And this question is the challenge of SE.

The encounter between a patient and their surgeon is unique for several reasons. The surgeon inflicts pain upon a patient for the patient’s own good. An operative intervention is irreducibly personal, such that the decisions about and performance of operations are inseparable from the idiosyncrasies of the individual surgeon. Furthermore, there is a chasm of knowledge between the patient and surgeon that is difficult to cross. Hence, training in the discipline of surgery includes the inculcation of certain virtues and practices to safeguard against abuses of this relationship and to make sure that the best interests of the patient are prioritised. The stories in this issue are

evidence that in contemporary practice this is not quite enough, as surgeons reflect on instances, they felt were ethically challenging. Common themes include the difficulty in communicating surgical uncertainty, patient-surgeon relationships, ethical issues in surgical training, and the impact of the technological imperative on caring for dying patients.

Ethical challenges in surgery include crafting an adequate informed consent process for patients who are often distressed and anxious about making decisions with serious health and personal consequences, working with family members serving as surrogate decision makers for patients who lack the capacity to take part in the informed consent process, and responding to requests from patients or family members for futile surgical intervention.

Additionally, the work of surgeons generally encompasses such things as: the provision of palliative surgical management for patients in

the end-stages of terminal illnesses; protecting patients from incompetent surgeons and other healthcare professionals; recruiting one's own patients for surgical clinical trials; obtaining informed consent for the involvement of trainees in surgical procedures; responsibly managing conflicts of interest and conflicts of commitment; engaging in serendipitous and planned innovation; running a practice on a sound business basis; dealing honestly with private and public payers; protecting the integrity of clinical judgment and practice from intrusions by managers of healthcare organisations and payers; and helping to shape healthcare policy that is evidence-based and responsive to the increasing costs of surgical care. The ethical issues that arise for surgeons are, therefore, many and varied.

Tools of Ethical Analysis

Surgical ethics uses the tools of ethical analysis and argument to provide practical guidance to surgeons. Ethical analysis requires one to become clear about clinically relevant and applicable concepts and use them with consistent meaning. Ethical argument requires one to use clearly formulated ideas to formulate reasons that together support a conclusion that should then guide clinical judgment, decision making, and behaviour. The discipline and clinical value of ethical reasoning in surgery, as in other clinical specialties, comes from following arguments where they take one. Submitting to the discipline of ethical reasoning gives one's clinical ethical judgments intellectual and moral authority that they lack when they emanate from mere opinion, "gut" feeling, or the arbitrary exercise of power by those with institutional authority to wield power.

The history of medical ethics provides clinically relevant and applicable ideas and reveals how surgeons have made contributions to the repository of our concepts of clinical ethics. British surgeons, for example, pioneered consent processes as early as the 17th century, when they fashioned contracts without patients for operations. On the other hand, 19th century surgeons in the U.S. transformed this rudimentary notion of informed consent into the more clinically sophisticated version with which surgeons are now familiar. From a historical perspective, the commonly held view that common law invented informed consent in the early 20th century and imposed it on reluctant surgeons becomes suspect.

Perhaps common law simply codified ethical best practices that had already been brought to considerable ethical and clinical sophistication by practising surgeons in clinical practice. Recent astonishing advances in medical technology have opened up new frontiers and created options for surgical treatment that have often led to vigorous debate about what constitutes right and wrong. What is achievable has to be limited by what is acceptable.

I believe that the primary challenge for each of us in the future is to become a complete surgeon. For a complete surgeon, technical expertise is necessary but not sufficient. The complete surgeon must be an excellent technician and even more importantly a great doctor that is, someone who can communicate well with patients and who is adept at engendering trust.

Increasingly, in the future, surgeons will have to withstand the temptation to become purely technicians because if we allow ourselves to be purely technicians, we will cease to be true physicians. We should never let that happen. We should never let anyone push us to be purely technicians. If anyone says, "We will work up all the patients, work up all the pre-ops, and see all post-ops. You can just operate all day, every day," we should withstand the temptation to go along. In an environment in which Relative Value Units (RVUs) are becoming the measure of achievement and where the focus on finances seems ever present, we must withstand the temptation to become pure revenue-generating technicians.

Another essential challenge for surgeons will be to ensure that informed consent for surgery continues to be a meaningful exchange. Surgeons today face the challenge of overcoming the impediments to the surgeon-patient relationship and engendering the patient's trust. Only by becoming adept at engendering the trust of our patients can we achieve success as surgeons. This is perhaps something on which we do not focus enough in our training programmes, but it will be increasingly critical to succeed in a career in surgery. We must make a concerted effort to train our medical students and residents to become good communicators and give them tools to engender trust.

Apart from the challenges to the surgeon-patient relationship, I think the central question in surgery has changed. The central question for surgeons in the past was, "What can we do for this patient?" This was the central question asked for centuries when the therapeutic options that surgeons could offer their patients were quite limited.

In contrast, as the options for what we can offer even critically ill patients has expanded, the question today, and increasingly in the future will be, "What should we do for this patient?" This is a very different question. This question of what "should" we do for a patient is really a question of surgical ethics. To answer what should be done, surgeons must take into account not only the surgical problem at hand, but also the patient's goals and values. "What should be done?" always requires us to attend to the ethical dimension of care in order to provide an answer. **AH**



Prof Ali Al Dameh is the co-chair of the Surgery Conference at Arab Health Exhibition and Congress

Progress in the Management of Acute Cholecystitis and the Difficult Cholecystectomy

By Danny Mou, MD, Resident, General Surgery, Harvard Medical School CRICO Scholar in Quality and Safety, Brigham and Women's Hospital; Tomas Tesfasilassie, Medical Student, University of California, San Francisco, School of Medicine, and Stanley W. Ashley, MD, Senior Surgeon, Brigham and Women's Hospital, Frank Sawyer Professor of Surgery, Harvard Medical School

The management of acute cholecystitis (AC) continues to evolve. When possible, laparoscopic cholecystectomy (LC), introduced nearly three decades ago, is the treatment of choice. Early in the disease course, LC is a relatively simple procedure. However, as the disease evolves, the operation becomes increasingly difficult and can require truly advanced laparoscopic skills and may be most appropriately performed at specialised centres.

Today, nearly a quarter million cholecystectomies are performed for acute cholecystitis each year in the U.S. About 85 per cent are started laparoscopically although around 10 per cent of these are converted to open cholecystectomy because of technical difficulties. Open cholecystectomy

is associated with a 1.3-fold increase in operative morbidity.

Although we continue to make progress in managing this relatively common disease, several important questions remain unanswered. A recent consensus conference on preventing bile duct injury (BDI), organised under the auspices of the Society of American Gastrointestinal Endoscopic Surgeons (SAGES), and endorsed by the Society for Surgery of the Alimentary Tract and the American and International Hepato-Pancreato-Biliary Associations, assessed our progress and developed, when possible, consensus guidelines or recommended further study of unresolved issues.

Although these recommendations have not yet been finalised, the areas of discussion are informative. ►



Establishing the Diagnosis and Grading the Severity of Cholecystitis

Establishing the diagnosis and the severity of the cholecystitis was one area of discussion. In particular, we still have no objective diagnostic or grading system that, at least in the U.S., accurately establishes the diagnosis or predicts the difficult cholecystectomy when alternative treatment options should be considered.

Ideally, based on the characteristics of the disease at presentation, management decisions would be tailored to the needs of the patient. A number of algorithms have been devised to accomplish this; perhaps most widely known is the Tokyo Guidelines, which were first developed in 2007 and subsequently revised in 2013 and 2018. These provide treatment criteria for diagnosis (No diagnosis, Suspected, Definitive) and establish the AC severity (Grade I mild, Grade II moderate, and Grade III severe). Primary drivers of higher grade include the presence of organ dysfunction, increased local inflammation, elevated white blood cell count, longer duration of symptoms, and the

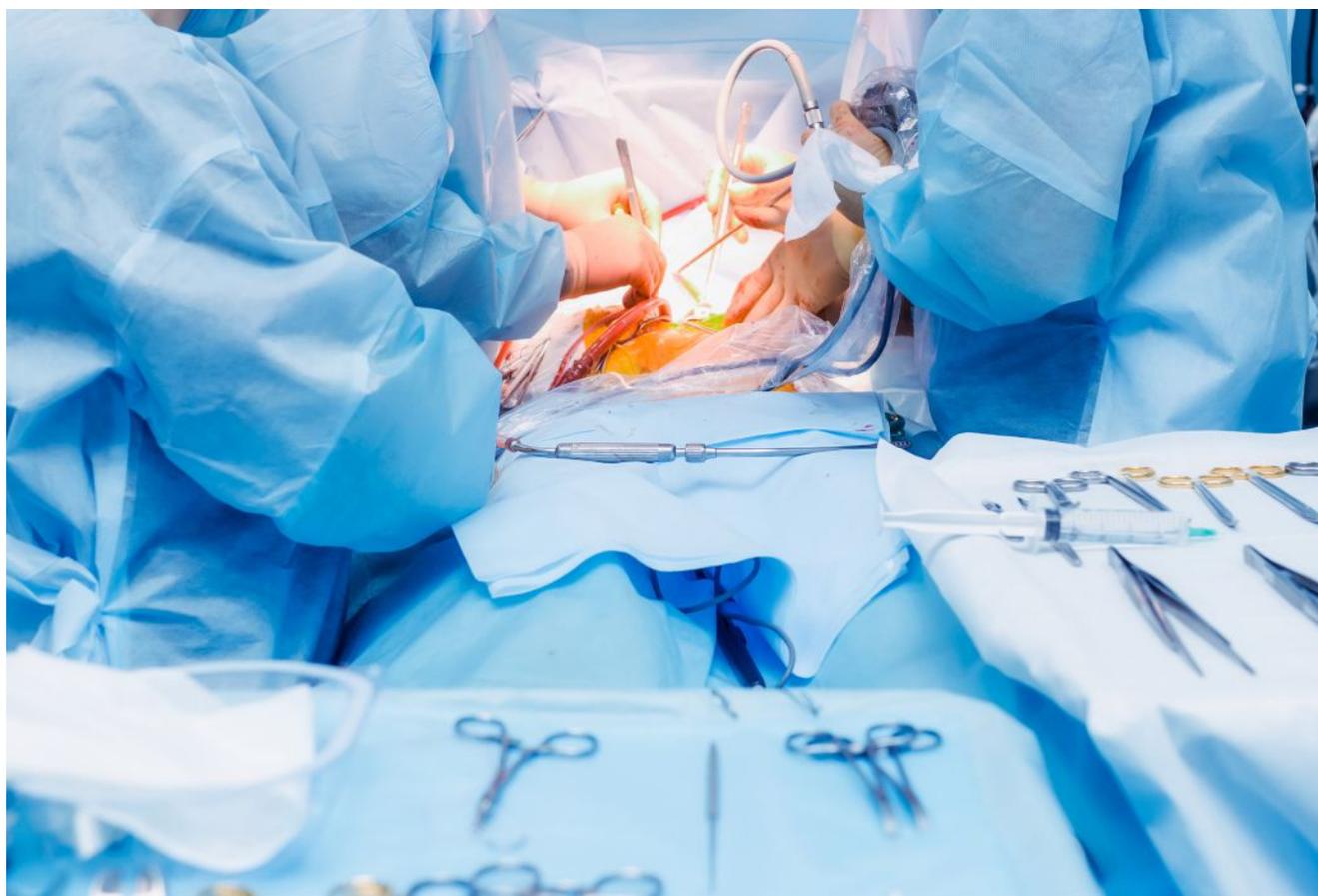
presence of a palpable, tender gallbladder. The 2018 version incorporates the Charlson Comorbidity Index and American Society of Anesthesiologists Physical Status Classification into the grading to distinguish between candidates for immediate LC, conservative management, and percutaneous drainage.

While these criteria have been validated in Japan and provide a framework to emulate, they have not proved as useful in the U.S. For example, one recent study from the University of Arizona analysed a three-year prospective database of 857 patients with suspected AC. Comparing Tokyo Guideline Criteria with the gallbladder pathology, they found that 45 per cent of the patients with severe local inflammation, including gangrenous cholecystitis, did not meet the Tokyo criteria for diagnosis. The overall sensitivity of the Tokyo Guidelines for cholecystitis was only 53.4 per cent. These results suggest that we need a set of diagnostic and grading criteria that is validated for the specific population being treated.

Operation versus Conservative Therapy

Another area of discussion at the Consensus Conference was the role of conservative therapy with antibiotics. With time from the onset of illness, the inflammatory process increases, creating an adhesive mass that can present a formidable challenge to approach with the laparoscope and even using open techniques. There is data to suggest that, with time after the onset of illness, the morbidity, mortality, and cost of LC all increase.

It has been the standard to operate early if the patient presents within 72 hours but, if the disease has progressed longer, to treat the patient with intravenous antibiotics and allow the inflammatory process to subside, the surgery should be delayed for at least four to six weeks. Multiple randomised trials and meta-analyses have suggested that, comparing these approaches, early surgery is associated with a shorter overall hospitalisation and hospital cost and nearly 20 per cent of patients who are managed conservatively develop persistent or recurrent symptoms prior to surgical intervention. There do not appear to be differences between the ►



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It has been the standard to operate early if the patient presents within 72 hours but, if the disease has progressed longer, to treat the patient with intravenous antibiotics and allow the inflammatory process to subside, the surgery should be delayed for at least four to six weeks.

approaches in conversion rate to open cholecystectomy or morbidity and mortality including BDI. At least one randomised trial examined outcomes for patients with symptom onset of greater than 72 hours and found that, compared with conservative therapy, LC was associated with significantly lower overall morbidity, hospital stay and cost with no significant differences in conversion rates or in the incidence of BDI.

This issue deserves further study and perhaps a rethinking of the traditional 72-hour cut-off for proceeding with LC.

Role of Percutaneous Cholecystostomy

The appropriate use of percutaneous cholecystostomy (PC) is another area that needs better definition. In patients with severe disease undergoing PC, the acute symptoms and inflammatory signs resolve in most patients although gangrenous cholecystitis is a contraindication and the drain must usually be left in place until cholecystectomy. LC after percutaneous cholecystostomy is still a more difficult procedure with high conversion rates. The general consensus has been that PC is best reserved for high risk elderly and critically ill patients in whom PC has been suggested to reduce the morbidity and mortality of LC.

However, recent data have raised questions about the wisdom of such an approach. For example, a review of Medicare data from 1996-2010 in patients with cholecystitis and organ failure found that patients who underwent PC were less likely to ever undergo cholecystectomy and had higher readmission and mortality rates than propensity matched patients undergoing LC. Likewise, a randomised trial of LC versus PC from the Netherlands in patients with APACHE II scores of greater than 7 was abandoned after patients undergoing PC were found to have higher morbidity, need for reintervention, and recurrence rates.

Again, the role of PC deserves further study and perhaps should only be reserved for patients who are not candidates for LC.

The Difficult Cholecystectomy

The major focus of the Consensus Conference was the difficult cholecystectomy. Operation in this group of patients is associated with the need for conversion to open operation and the highest risk of BDI. For example, a recent prospective multicentre study from Belgium found that 11.4 per cent of patients required conversion and, in this group, there were biliary complications in 13.7 per cent.

The known risk factors that portend a complicated operation include those criteria defined by Grade II of the Tokyo Guidelines: symptoms of greater than 72 to 96 hours, a WBC greater than 18,000/mm³, and/or a palpable or gangrenous gallbladder. However, it has also been shown that severe pathology may be encountered in the absence of such findings.

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) has developed a six step Safe Cholecystectomy Program that includes: 1) achieving the critical view of safety (CVS), 2) recognising aberrant anatomy, 3) performing an intra-operative time out before clipping or cutting ductal structures, 4) liberal use of intraoperative cholangiogram (IOC), 5) having bail-out options, and 6) asking for help in difficult cases.

Most critical is to achieve the CVS, which is defined by three criteria: 1) the hepatocystic triangle is cleared of fat and fibrous tissue, 2) the lower one third of the gallbladder is separated from the liver to expose the cystic plate, and 3) two and only two structures should be seen entering the gallbladder. When the CVS is not achieved, there is a danger of BDI; however, there seems to be some misunderstanding of the criteria among surgeons. For example, in one recent study from the Netherlands, when surgical videos of cases with complications were reviewed in detail, although operative notes indicated that the CVS was achieved in 80 per cent, video review suggested that it was achieved in only 10.8 per cent.

If the inflammation is so significant that further dissection is deemed inappropriate, there are other options. IOC can be pursued to delineate the biliary anatomy; the use of

infrared fluorescence is being evaluated in this setting. If this does not sufficiently define the anatomy, conversion to an open procedure can be pursued. Thoughtful consideration is needed to judge if the exposure of an open approach will significantly facilitate the dissection.

All surgeons should be familiar with bailout options when the CVS cannot be achieved. Although removing the gallbladder from the top down has been employed, this may also be associated with significant risk. If only the dome of the GB can be safely exposed, operative cholecystostomy may be pursued. If the hepatocystic triangle cannot be safely dissected, the surgeon can pursue a subtotal fenestrating cholecystectomy, leaving the posterior wall on the liver. At least 2cm of GB neck is preserved and any impacted stones can be removed. The neck can be either left open (fenestrating) or oversewn (reconstituting). A drain is left in the gallbladder fossa.

Conclusions

The surgical treatment of AC is complex and nuanced. Astute clinical judgment is required to make subtle decisions regarding both the type of surgical intervention and the timing of that intervention.

The surgeon who commits to a LC should be aware of the various techniques and options for abandoning the original procedure. SAGES has recently developed a set of Safe Cholecystectomy Web-Based Educational Modules that should become a resource not only for surgeons in training but for all practitioners caring for patients with AC. The final recommendations from the Consensus Conference should be a significant addition to our armamentarium. ^{AH}

References available on request.

Dr. Ashley will be presenting 'Timing it to Perfection: Cholecystectomy in Acute Cholecystitis' on January 28, at the Arab Health Exhibition and Congress



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SURGERY IN A PILL

Potential New Treatment for Type 2 Diabetes

By Ali Tavakkoli, MD, Minimally Invasive and Bariatric Surgeon, Chief, Division of General and GI Surgery, Co-Director of the Center for Weight Management and Metabolic Surgery Brigham and Women's Hospital, Boston, Massachusetts, U.S., Associate Professor of Surgery, Harvard Medical School

The obesity epidemic is driving a parallel epidemic in type 2 diabetes that now affects more than 400 million people worldwide. The prevalence of diabetes is particularly high in the Middle East, where close to 20 per cent of the population has type 2 diabetes. Multiple randomised clinical studies have now shown that bariatric operations, namely sleeve gastrectomy and gastric bypass surgery, are the best available treatment for obese type 2 diabetics, with many patients experiencing diabetes remission and coming off their diabetic medications.

This has created significant interest in the field of metabolic surgery, where surgeries such as gastric bypass (GBP) are performed with a primary focus of helping patients improve their type 2 diabetes. Despite the clear benefits of surgery – improvement in diabetes, weight loss, reduction in cancer risk, and extended life expectancy – uptake of surgery amongst patients who qualify remains low. Furthermore, many diabetic patients do not fulfil the current surgical criteria and therefore continue to struggle with their diabetes, a chronic disabling disease that is one of the most common causes of blindness, renal failure, and limb amputation worldwide. There has therefore been significant interest in trying to understand the mechanisms of diabetes resolution after GBP, with the goal of developing less invasive alternatives.

During gastric bypass, the surgeon creates a small pouch at the top of the stomach to reduce the capacity for food intake. The small intestine is then reconstructed, and the new stomach pouch is connected to the lower section of the small intestine. During digestion, food now bypasses most of the stomach and the first part of the intestine, modulating the amount of nutrients, including glucose, and calories that are absorbed. Interestingly, in most patients, the return to normal insulin levels occurs just a few days after surgery, long before significant weight loss takes place.

A team at Brigham and Women's Hospital (BWH) in Boston, Massachusetts, U.S., has been studying the underlying mechanisms responsible for this rapid improvement in diabetes, with the goal of developing novel drugs, devices, and less invasive surgical procedures that can replicate the metabolic benefits of surgery.

The team, led by the author, in collaboration with Yuhun Lee, PhD, a materials scientist at BWH, and Jeffrey Karp, PhD, a Professor of Medicine at Harvard Medical School and a biomedical engineer and researcher at BWH, recently presented the results of work they've done on developing a sticky, gut-coating powder that provides a barrier on the first part of the intestine and mimics the effect of gastric bypass surgery in a non-invasive way. The team hopes that the new compound named

LuCI (for Luminal Coating of the Intestine), by delivering medication directly to the upper GI tract, may one day be offered in pill form as an alternative option to surgery.

LuCI is able to coat healthy tissue and form a transient physical barrier on the luminal, or inside, surface of the intestine so that nutrients, including sugar, are not absorbed. Bypassing the upper part of the gastrointestinal (GI) tract appears to be integral to the anti-diabetic effects of gastric bypass surgery. By emulating a critical aspect of bariatric surgery in a non-invasive way, the research team believes that "Surgery in a Pill" could one day be an alternative to an invasive procedure.

As reported in a paper published in the June 2018 issue of the journal *Nature Materials*, LuCI significantly reduced glucose levels in animals after a meal. One hour after ingesting LuCI, the increase in glucose was lowered by 47 per cent, and this effect completely dissipated within a few hours. Histological analyses showed that the coating had no adverse effect on the lining of the small intestine, and the treatment did not cause the animals to develop diarrhoea or lose weight.

Dr. Tavakkoli will be speaking on 'The Future of Bariatric Surgery: What to Expect in the Next Decade' on January 29, as part of the Gastroenterology Conference and 'Revision of Sleeve Gastrectomy: Options and Results' on January 30, as part of the Surgery Conference, at Arab Health



Additional Therapeutic Value

LuCI has also shown promise as a vehicle for site-specific drug delivery to the GI tract. For example, so-called protein drugs are important in the treatment of patients with inflammatory bowel disease, which affects the lining of the lower intestinal tract, or colon, but delivery is challenging. Oral intestinal-targeted protein drugs need protection from the gastric acid and enzymes in the upper GI tract that can degrade these medications. As part of the team's preclinical animal studies, they tested the ability of LuCI to provide a platform for protein delivery. Using a simple protein, they demonstrated LuCI's promise in performing this function. These results were published in the June 2018 *Nature Materials* article previously referenced.

Given the growing diabetes epidemic, there is an urgent need for safe, non-invasive, and effective treatment. Through bioengineering, the team has replicated the anti-diabetic effects seen in patients who undergo gastric bypass surgery, developing a novel approach that can potentially extend this benefit to a much wider patient population. Dozens of medications are available to treat diabetes, but many patients are unable to achieve

appropriate blood sugar control while on them. The results with LuCI have been very encouraging. LuCI may prove to be a tremendous asset in treating and improving quality of life for many diabetic patients. **AH**

References available on request.



BETTER OUTCOMES FOR COLON AND APPENDICEAL CANCERS

The role of surgery and heated intraperitoneal chemotherapy (HIPEC) in patients with cancers of the colon and appendix

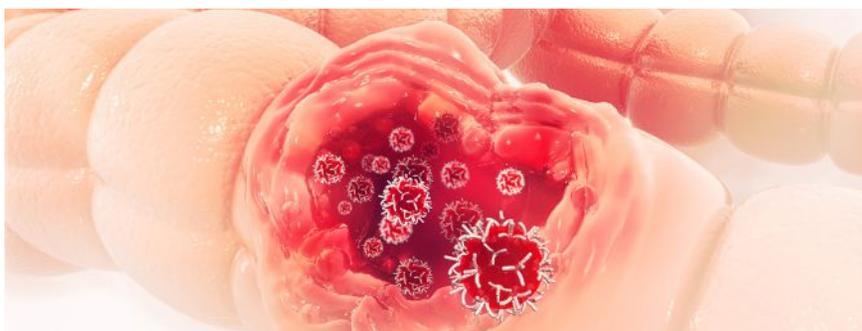
By Nelya Melnitchouk, MD, MSc, Director, Program in Peritoneal Surface Malignancy, HIPEC, Gastrointestinal and General Surgery, Brigham and Women's Hospital, Boston, Massachusetts, U.S., Instructor, Harvard Medical School

When patients with colorectal and appendiceal cancers develop metastatic disease to the peritoneum (the lining of the abdominal cavity), the treatment options are limited, and the survival rate is poor. Data suggest that up to 25 per cent of patients with colorectal cancer (CRC) can develop peritoneal disease. Depending on the type of colorectal or appendiceal cancer, systemic chemotherapy is usually one of the treatment options. Another option, which can be offered to select patients, is cytoreductive surgery either with or without heated intraperitoneal chemotherapy (HIPEC). The goal of this treatment is to improve overall and disease-free survival without detracting from quality of life.

Cytoreductive surgery consists of removing all of the visible disease in the peritoneal cavity, and depending on the location of the disease, could include bowel resection, liver resection, or removal of other organs including the spleen or gallbladder. It is very important to achieve complete cytoreduction, leaving no disease behind. Completeness of cytoreduction is one of the main factors impacting the patient's prognosis after surgery.

Once the resections are complete, and all of the disease visible to the eye is removed, HIPEC treatment is performed using a chemotherapeutic agent that has been heated to 42 degree C, which is infused into the abdomen via catheters. The solution is constantly circulated around the abdominal cavity to ensure all surfaces are exposed for 90 minutes. Both the chemotherapy agent and heat are cytotoxic to any cells that might have been left behind.

There are multiple factors that predict whether cytoreductive surgery could be beneficial. The main factor is the disease



histology/behaviour. Patients with aggressive tumours that display poor differentiation and/or signet cells are less likely to benefit. For those patients who do undergo surgery, as previously stated, completeness of cytoreduction is key and can be judged by the completeness of cytoreduction score. Patients with no or minimal visible disease left behind (score of 0 or 1) have improved survival.

Frequently, laparoscopic exploration is done before the cytoreduction to assess for resectability. This allows assessment using the peritoneal carcinomatosis index (PCI), which is calculated based on the size and distribution of the tumours in the abdominal cavity. A high PCI score carries a worse prognosis and predicts lower likelihood of complete cytoreduction.

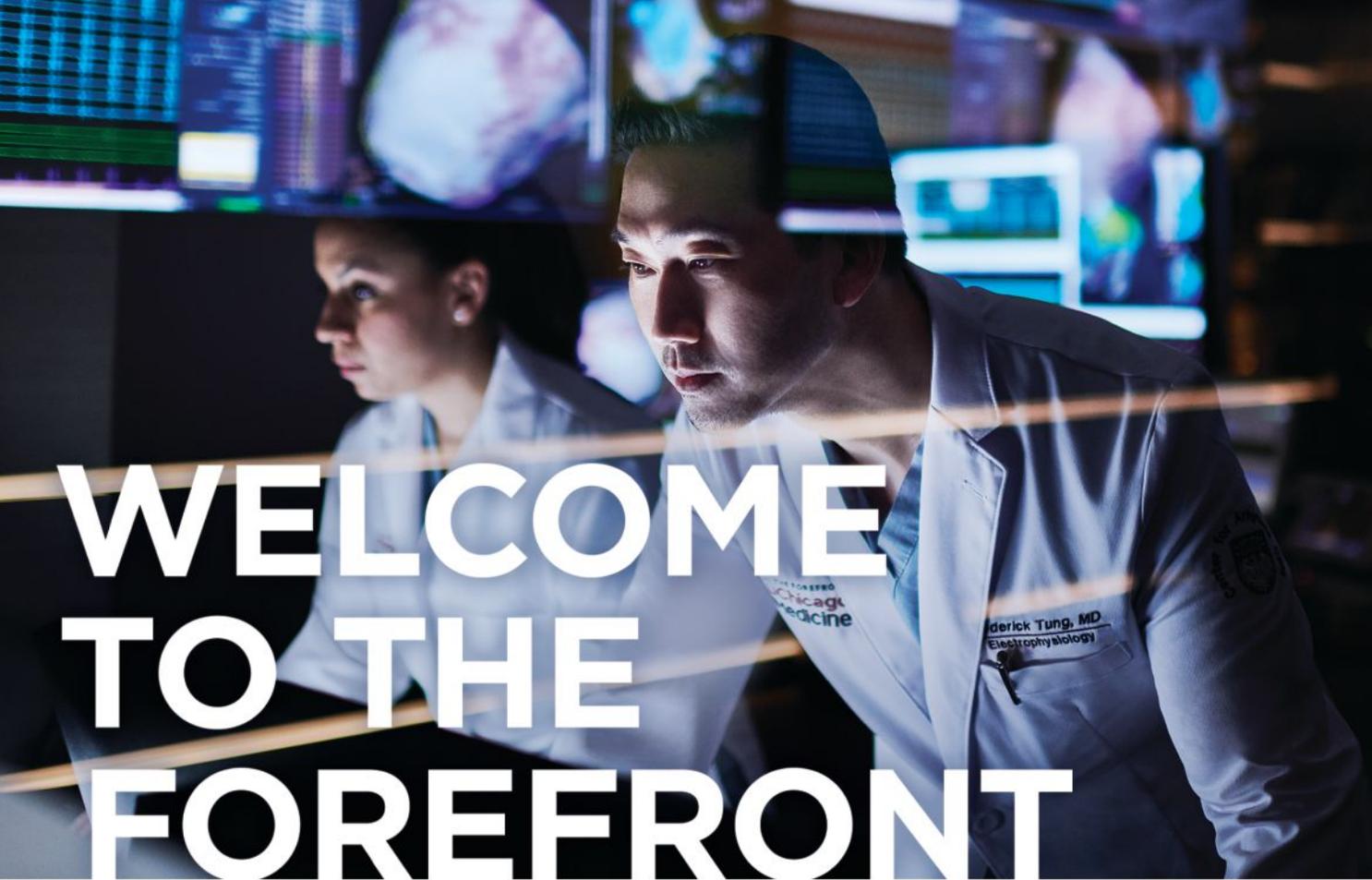
When determining which patients are candidates for this surgery, the patient's performance status should not be underestimated. It has been shown again and again that patients with an Eastern Cooperative Oncology Group (ECOG) performance status under 2 have improved survival after cytoreduction/HIPEC. Preoperative nutrition status is of paramount importance as well, as it correlates to postoperative complications. If the patient is malnourished before the surgery, total parenteral nutrition preoperatively can improve this.

Multidisciplinary tumour board discussions

and recommendations are also extremely important when managing patients with peritoneal metastasis. Review by an expert pathologist is needed to confirm the histology both in appendiceal and colorectal cancer. The disease is often very heterogeneous with no standard algorithms for care. Shared decision-making should be emphasised, and careful counselling of the patient is needed.

At the Program in Peritoneal Malignancy at Brigham and Women's Hospital, every patient is reviewed by a dedicated, multidisciplinary tumour board and the underlying pathology is reviewed by an expert gastrointestinal pathologist. Like many high-volume treatment centres that carry better outcomes, the BWH Program in Peritoneal Malignancy utilises enhanced recovery pathways to minimise the risk of post-surgical complications, improving both survival and quality of life for patients who undergo HIPEC, which is bringing many patients hope for a better prognosis. ^{AH}

Dr. Melnitchouk will be speaking on 'Surgical Management of Ulcerative Colitis in the Era of Biologics' on January 29, as part of the Gastroenterology Conference, at Arab Health Exhibition and Congress



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Innovations in Surgical Management of Gastroesophageal Reflux Disease

By George W. Holcomb III, MD, MBA, Children's Mercy Kansas City, Kansas City, Missouri, U.S.

Gastroesophageal reflux symptoms are common in infancy, childhood, and adolescence. In one study, 2-7 per cent of parents of 3 to 9-year-olds report their child experienced heartburn, epigastric pain or regurgitation within the previous week, whereas 5-8 per cent of adolescents reported similar symptoms. Most children respond well to changes in their diet, as well as medical management for these symptoms.

Gastroesophageal reflux disease, (GERD), is a more serious condition and has an incidence of 1.5 cases per 1,000 person-years in infants, declining until 12 years of age, and then peaking at 16 to 17 years of age (2.26 cases in girls and 1.75 cases in boys per 1,000 person-years in 16- to 17-year-olds). Overall, the childhood prevalence of GERD is estimated at 1.25 to 3.3 per cent, compared with 5 per cent among adults.

GERD can affect a child's growth and development, and can lead to more serious complications, such as vomiting and damage to the oesophagus. At Children's Mercy Kansas City, the Division of Pediatric Gastroenterology is performing cutting-edge research into the pharmacological management of GERD, but some children do not respond well to medical treatment.

In refractory cases, surgery may be the best treatment option. With nearly 20 years of experience in the use of laparoscopic fundoplication for the management of gastrointestinal reflux, the general surgeons

at Children's Mercy have published a number of articles on this technique.

Specifically, the Nissen fundoplication is our preferred operative approach to treating GERD. This procedure was named after Dr. Rudolf Nissen, the surgeon who developed it in the 1950s. Since that time, the surgery has evolved from an open procedure that required large incisions to a laparoscopic, or minimally invasive, procedure.

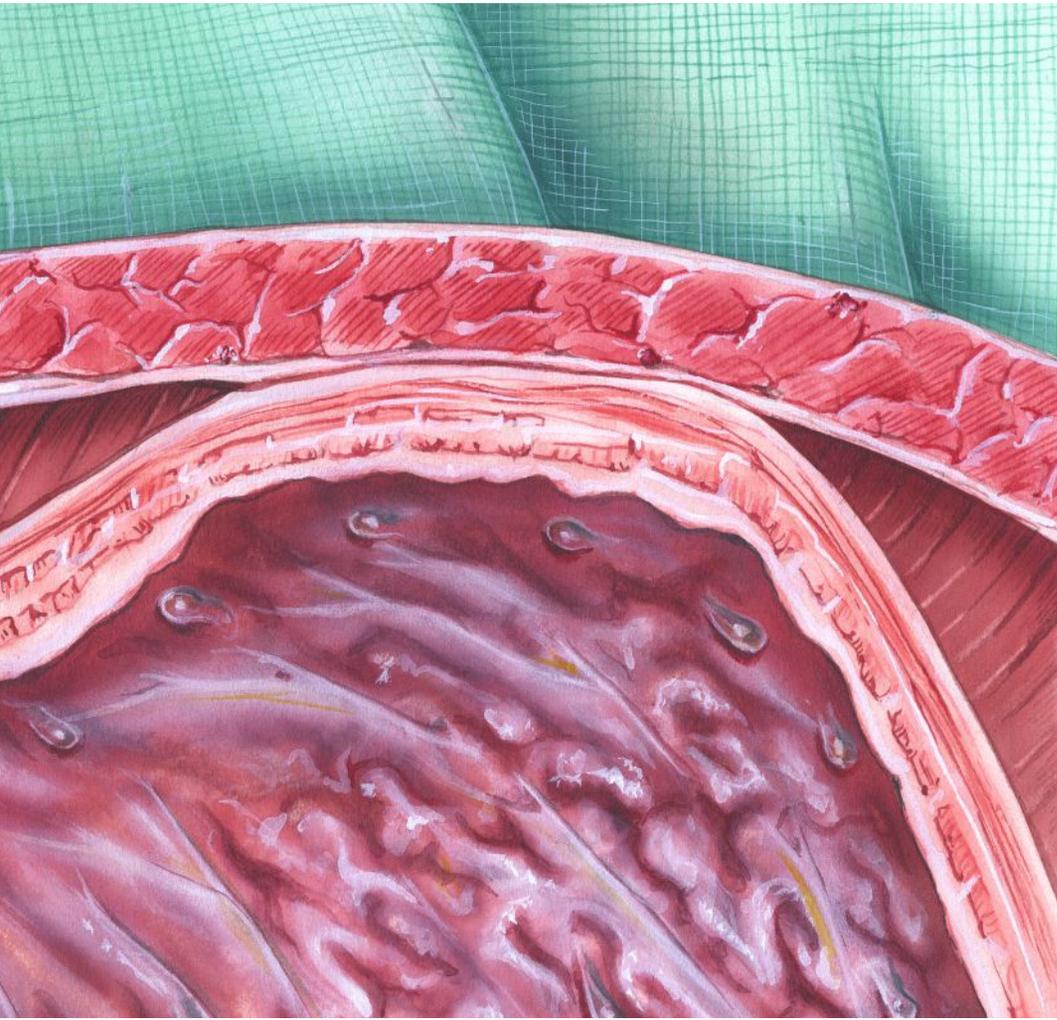
One of the areas of focus among the general surgeons at Children's Mercy is how to prevent transmigration of the fundoplication wrap following performance of a Nissen fundoplication. We have studied this problem carefully and scientifically, initially through a retrospective study, which was followed by two prospective clinical trials evaluating differences in the operative technique.

In the last prospective clinical trial, which was published in the January 2018 issue of the *Journal of Pediatric Surgery*

(53:25-29, 2018), the Children's Mercy surgeons found that limited dissection of the oesophagocrural junction and limited mobilisation of the oesophagus resulted in none of the 120 patients enrolled in the study developing transmigration of the fundoplication wrap in the postoperative period with a median follow-up of four years.

The goal for this, and all, research performed by the Department of General Surgery at Children's Mercy, is to determine the effectiveness and practical application of utilising this specific surgical technique to improve outcomes for patients. This study concluded when minimal pharyngoesophageal dissection is performed, oesophagocrural (EC) sutures offer no advantages and increase operating time. Thus, our surgeons confirm that the pharyngoesophageal membrane should be kept intact, which results in minimal dissection around the gastroesophageal junction.





Paving The Way

The paediatric general surgeons at Children's Mercy Kansas City have been early adopters of minimally invasive technology and techniques. In 1999, Children's Mercy established the Center for Minimally Invasive Surgery, designed to make state-of-the-art minimally invasive surgeries available to paediatric patients across the globe.

Center for Prospective Clinical Trials Investigates Paediatric Surgical Questions

The Center for Prospective Clinical Trials within the Department of Surgery at Children's Mercy Kansas City was established in 2006 to perform randomised studies investigating variables that do not allow the patient's course to vary from normal daily practice. The centre also performs prospective observational studies.

All of the studies performed in the centre

are protocolised care based on evidence and outcomes, which are institution-specific. The hospital's randomised data are exactly what the provider can expect in terms of outcomes for patients they refer for surgery at Children's Mercy. The centre's goal is to address the many questions common to paediatric surgery.

Paediatric Surgical Care

Children's Mercy is one of only 10 centres in the U.S. to be verified as a Level 1 Children's Surgery Center, the highest rating possible from the American College of Surgeons, which has set the highest standard of care in the U.S. By joining this group of Level 1 Children's Surgery Centers, the hospital is contributing to the innovation of paediatric surgery, which impacts the lives of children around the world.

The review process to become verified is rigorous and stringent, including a thorough site visit by an ACS team of surveyors who review the hospital's structure, process,

Dr. Holcomb will present two talks at the Arab Health Exhibition and Congress on January 29. In one of these, he will discuss innovations in the surgical management of GERD. This presentation will occur in the Gastroenterology and Nutrition portion of the Paediatrics Conference. He will also present a talk on how to reduce complications when performing a fundoplication for treatment of children with GERD. This presentation will occur in the Upper GI Surgery Symposium in the Surgery Conference portion of the Congress.

and clinical outcomes. The team, which consists of experienced paediatric surgeons, anaesthesiologists and nurses, visit all areas of the hospital to make sure the people, resources, the culture of safety, and administrative support ensure patients receive the highest level of care.

An important component of providing this level of surgical care is expertise. At Children's Mercy, only experienced paediatric anaesthesiologists care for each child. This ensures the patient has a safe and smooth anaesthetic experience.

In fact, the paediatric anaesthesiologists at Children's Mercy administer anaesthesia for more than 27,000 children each year – that's 74 each day. Most adult hospitals only treat about 200 children each year—less than one a day.

Surgical Expertise

At Children's Mercy, 20,144 surgeries were performed in fiscal year 2018. This team's surgical expertise extends to a number of conditions commonly seen in the paediatric population. These include:

- Center for Pectus Excavatum and Pectus Carinatum, which offers minimally invasive surgery for pectus excavatum, and the largest experience in the U.S. with the dynamic compression device bracing system utilised for pectus carinatum.
- Same-day surgery for non-perforated appendectomy.
- Laparoscopic inguinal hernia repairs performed on an outpatient basis at Children's Mercy Hospital Kansas or at the Children's Mercy Kansas City Adele Hall campus. ^{AH}

References available on request.



Effective Treatment of Craniosynostosis and Deformational Plagiocephaly Improves with Early Diagnosis

Watchful waiting may not be the best option for evaluating abnormal head shape in infants

By Gerald Tuite, M.D., Institute for Brain Protection Sciences, Johns Hopkins All Children's Hospital and George Jallo, M.D., Professor, Department of Neurosurgery, Oncology & Paediatrics, Director, Institute for Brain Protection Sciences, Chief, Division of Neurosurgery, Johns Hopkins All Children's Hospital

Deformational plagiocephaly (DP) and craniosynostosis (CS) are the leading causes of abnormal head shape in infants worldwide. Accurate differentiation of these two entities is important because their treatment is entirely different. Prompt diagnosis is important because recommended treatments for both DP and CS are most effective when started early.

Medical teaching in the 20th century often suggested watchful waiting of abnormal infantile head shapes, with referral to a specialist only if the head shape did not improve during the first year. The advantages of minimally invasive surgical techniques to treat CS encourages providers to change that practice pattern because these techniques are best utilised in young infants, typically between two and six months of age.

Here we describe typical features of DP and CS; we emphasise ways to distinguish them and outline the typical treatment options.

Common Head Shape Anomalies in Infants

Normal infantile head shape can vary widely and is largely influenced by familial tendencies and genetic heritage. In this paper, we describe the most common head shape abnormalities that fall outside cultural norms: deformational plagiocephaly (DP) and craniosynostosis (CS).

DP is now the most common infantile head abnormality. The 1992 "back to sleep" programme resulted in a 40 per cent reduction in sudden infant death syndrome but there has been a concomitant dramatic increase in DP. The prevalence of DP was estimated as low as 5 per cent prior to 1992, but recent studies estimate a 21 per cent to 46 per cent prevalence in infants less than one year of age, depending on the criteria

used to define DP.

CS, which occurs in approximately one in every 2,000 to 2,500 live births, is much less common than DP. Differentiating DP from CS can be difficult for healthcare providers who don't specialise in head shape abnormalities, especially when the deluge of patients with DP overwhelms a healthcare system's ability to adequately assess abnormal head shapes.

Differentiating DP from CS

DP, also referred to as posterior positional plagiocephaly, positional moulding, occipital plagiocephaly or plagiocephaly without synostosis, is usually not present at birth, is often associated with torticollis, and results in a flat posterior skull, with associated anterior displacement of the ipsilateral ear and forehead. CS is typically present at birth, is not usually associated with torticollis, and results in a widely variable but predictable pattern of head shape abnormalities.

Skull x-rays and/or CT scans were previously relied upon to differentiate DP from CS, but the sheer volume of DP patients and concern about radiation exposure in infants and children make these imaging studies impractical CS screening tools for all patients with abnormal head shapes.

Fortunately, patients with CS have a typical appearance, based on the observation of Virchow in the mid-19th century, that skull growth is perpendicular to each cranial suture. Early cranial suture closure therefore leads to predictable head shapes. Multiple suture craniosynostosis also occurs, in the presence or absence of an associated syndrome, with resulting head and face shapes that are characteristic and readily differentiated from DP.

Early closure of midline cranial sutures is differentiated from DP because the resulting head shape is not posteriorly asymmetric, a hallmark of DP. Sagittal craniosynostosis,

by far the most common form of CS, results in a long, narrow head with a shortened biparietal diameter (dolichocephaly) as a result of early closure of the sagittal suture, with compensatory growth of the remaining sutures resulting in frontal and occipital bossing. Early closure of the metopic suture leads to a triangular head shape (trigonocephaly) and close-set eyes (hypotelorism), features also not seen in DP.

CS that results from early closure of the coronal and/or lambdoid sutures is more difficult to differentiate from DP because unilateral closure of one of these sutures leads to an oblong head shape, which can be mistaken for DP. Coronal CS is more easily differentiated from DP because the anterior skull is severely affected, the posterior skull is often relatively spared, and there are associated severe asymmetries of the orbital rim and the nose (tip of the nose deviates away from the affected coronal suture), all features that are quite different from the mild forehead asymmetry typically seen in DP (Figure 1).

Differentiating lambdoid CS from DP is more difficult because early closure of a single lambdoid suture results in flattening of the back of the skull, which can appear similar to DP. However, important morphologic differences can help the clinician differentiate the two entities in most circumstances. Early closure of the lambdoid suture leads to posterior and inferior displacement of the ipsilateral ear, the opposite of the situation in DP. As a result, the head shape, when viewed from the top, is similar to a parallelogram in DP and trapezoidal in lambdoid CS (Figure 2). In addition, the head of a child with lambdoid CS often looks "windswept" when viewed from the front, meaning that the contralateral parietal bone tends to be higher than the affected side. ►

Lambdoid craniosynostosis is quite rare, comprising less than 2 per cent of all cases of CS, resulting in only a small proportion of infants with posterior skull flattening being afflicted with lambdoid CS.

There is a common misconception that early fontanel closure should be used as an indicator of CS. The anterior fontanel does close early in some forms of CS, especially those with multiple suture CS or a genetic syndrome, but the fontanel can close at the typical period of development in infants with CS, even those involving the sagittal suture. Similarly, head circumference measurements are not typically reduced in most patients with simple, single suture CS, which make up the majority of children with CS. In fact, in patients with isolated sagittal CS, which accounts for over half of all patients with CS, the head circumference tends to be larger than average because the skull takes on a long, narrow appearance in order to accommodate the normal underlying brain growth. Ridging along the metopic suture, without the associated trigonicephaly or hypotelorism of metopic CS, is often a normal variation that does not require treatment.

Evaluation and Treatment of Deformational Plagiocephaly

Evaluation of DP

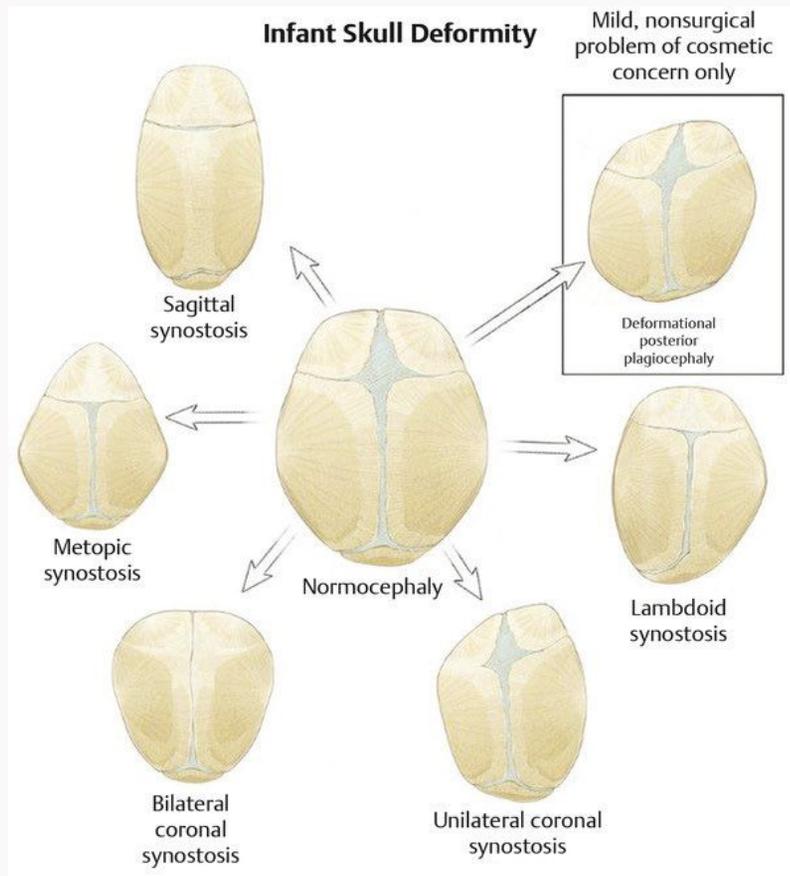
The clinical presentation and appearance of most patients with DP is fairly uniform. The typical child develops unilateral posterior skull flattening within the first two months of life, which progressively worsens and is often associated with anterior displacement of the ear, bossing of the ipsilateral frontal bone, and sometimes facial asymmetry. When examined carefully, many young infants with DP also have associated “wry neck”, with limited range of neck motion or torticollis.

Most infants with DP have otherwise normal examinations, but a careful evaluation to search for other associated conditions should be performed.

Treatment of DP

If recognised early, DP can be effectively treated by keeping the baby’s head from resting on the flattened area as much as possible, by promoting supervised tummy time, and by encouraging neck stretching exercises. With these measures, once babies are able to sit, crawl and walk on their own, their DP has usually improved significantly, with continued rounding of the head

▼ **FIGURE 1:** Skull growth dictated by Virchow’s Law, with skull growth perpendicular to cranial sutures. In CS, head growth is decreased perpendicular to the affected suture, with compensatory overgrowth at other suture, resulting in typical patterns of head growth.



occurring over the ensuing years, resulting in most children having minimal residual deformity by school age.

Skull moulding helmets used to reshape the infant’s head have been used for decades, but their widespread use has been questioned because DP is a condition that will improve with the aforementioned techniques in the majority of patients. Cranial orthotic helmets can certainly remould an infant’s head, a concept that was even appreciated in ancient civilisations, but the necessity of using a helmet for a condition that tends to resolve has been carefully scrutinised recently. A recent prospective trial in the Netherlands, where 84 babies with DP were randomly assigned to receive helmets, showed that there was no improvement in head shape at two years in babies who were treated with helmet therapy compared to those who only had the typical repositioning and exercise treatments that are commonly employed. Like all clinical studies, this study has limitations, including the

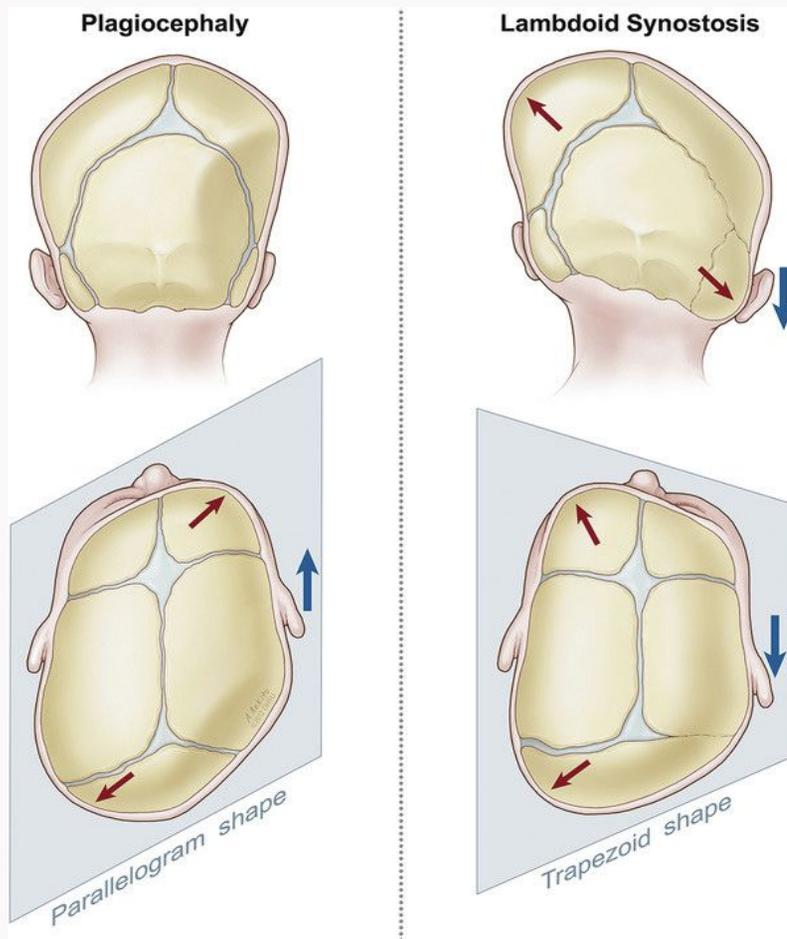
exclusion of babies that have the most severe forms of DP. Until further confirmatory research is completed, we generally recommend helmet therapy only for patients with severe forms of DP or those who have not responded to typical treatment options. Helmet therapy usually lasts three to six months and is best performed between approximately four and 12 months, when the skull has greater malleability and growth potential.

Evaluation and Treatment of Craniosynostosis

Evaluation of CS

CS involving multiple sutures or those forms associated with syndromes result in characteristic patterns of skull and facial deformity that are easily recognised. Patients with these uncommon diagnoses are often recognised shortly after birth and are referred to neurosurgeons, plastic surgeons and other craniofacial surgeons early in life.

▼ **FIGURE 2:** Clinical differentiation of lambdoid craniosynostosis from posterior positional plagiocephaly.



Diagnosing CS is much more common – the single-suture, non-syndromic baby is more nuanced, but a clear understanding of the patterns of presentation allows the primary care provider to recognise most patients with CS. In addition to pattern recognition, palpation of the suture in question can aid in the diagnosis: a prematurely closed cranial suture is immobile and a ridge of bone is often palpable.

If CS is suspected, referral to a neurosurgeon, plastic surgeon or some other craniofacial specialist is recommended before x-rays are performed when such specialists are available, in order to minimise unnecessary radiation exposure in children in whom the specialist can rule out CS by examination. When such specialists are not readily available, a simple skull x-ray series usually secures the diagnosis.

Other radiology studies that don't expose children to radiation have been explored, but none are widely being used as screening

tools at this time. MRI can confirm CS in specialised centres, but it is not recommended as a screening tool at this time. Cranial ultrasound has been shown more promise, but its usefulness is highly dependent on the familiarity of individual technologists and radiologists and is also not widely used as a screening tool at this time.

Treatment of CS

Surgery remains the treatment of choice for CS, but the surgical options have changed and improved in the past 20 years. CS surgery during the second half of the 20th century consisted primarily of extensive open procedures to remove portions of the skull, orbits or face and to reconstruct these structures in an aesthetically pleasing way, while expanding the skull to allow greater intracranial volume. These open operations are generally performed on children between six and 18 months of age, they last many

hours, often required a transfusion and require multiple days of hospitalisation. Results of these procedures are often good, and they remain the mainstay of CS surgical treatment in patients who are not diagnosed early in life.

More recently, minimally invasive techniques have become the treatment of choice for infants with CS in many specialised craniofacial centres worldwide. These techniques involve minimal bone removal in a young infant, typically less than six months of age, with subsequent gradual skull and facial remodelling using helmets or internal springs. Compared to the traditional operations of the late 20th century, these minimally invasive procedures are performed through much smaller incisions, result in minimal blood loss, usually don't require a blood transfusion and typically involve only an overnight hospital stay. These advantages are offset by lack of an immediate improvement in head shape, which often requires many months while the orthotic helmet or spring device slowly changes the child's head and facial shape as the baby grows.

The most commonly performed minimally invasive technique for CS involves the endoscope assisted removal of the affected suture followed by cranial moulding with an orthotic helmet, which is similar to helmets utilised in cases of severe DP. Since its introduction approximately 20 years ago, this technique has been shown to be very effective in treating all types of single suture CS and its application to multiple suture or syndromic cases has also been explored.

Present and future research will further characterise outcome differences for various surgical techniques. At this time, many neurosurgical CS specialists consider minimally invasive techniques the treatment of choice for majority of patients with CS: those with single suture CS who are diagnosed before four to six months of age. Minimally invasive techniques have also shown promising results when applied to patients with syndromic or multiple suture CS, but craniofacial surgical teams still treat these patients, as well as those diagnosed later in life, with traditional open operations. ^{AH}

References available on request.

Dr. Jallo will be speaking on 'Hydrocephalus: Evolution of Treatment from VP Shunts to ETV' on January 29, as part of the Paediatrics Conference, at Arab Health Exhibition and Congress

FIGHTING “FAKE NEWS” IN GI

What physicians can tell families when they ask about hot-button topics in gastroenterology

By Dr. Carlo Dileo, Chief of Gastroenterology, Hepatology and Nutrition at Nationwide Children’s Hospital, and a professor of Paediatrics at The Ohio State University College of Medicine

Physicians Hear Unfounded Worries From Parents All the Time

- PEG 3350 is antifreeze.
- Laxatives are addictive.
- A gluten-free diet helps in sports.
- Proton pump inhibitors give you dementia.

As chief of Gastroenterology, Hepatology and Nutrition at Nationwide Children’s Hospital, and also a professor of Pediatrics at The Ohio State University College of Medicine, I have heard of all these and know that primary care providers have to regularly address those concerns and others like them. It is a combination of factors that leads to these misunderstandings and concerns. Everyone experiences some GI (gastrointestinal) symptoms, so everyone is interested in them. That means they are regularly talked about in the media. Celebrities talk about their diets. Studies can seem to be contradictory.

PEG 3350

PEG 3350, most commonly sold under the name MiraLAX, has garnered recent attention because some parents reported behavioural and other changes after children took the laxative for extended periods. Of particular concern for some parents is ethylene glycol, which is found in MiraLAX and antifreeze.

Ethylene glycol and related compounds are found in drinking water, toothpaste and many foods as well. In my recently published research with fellow authors, we found that children who take PEG 3350 have the same blood levels of those compounds as those who do not take the laxative.

PEG 3350 is also probably the most thoroughly studied medication in paediatric gastroenterology. There have been multiple scientific publications that have shown efficacy and safety of this compound

in fecal disimpaction, clean-out for colonoscopy, and maintenance treatment for constipation in children of different ages. Thus, the current scientific evidence suggests that PEG 3350 should be deemed safe and effective for most children with constipation. But so are other therapies, like Milk of Magnesia (though Milk of Magnesia is not always as palatable) and behavioural interventions, and clinicians can explore or use those as well.

Laxatives

It is a common popular belief that laxatives, especially stimulant laxatives, such as senna and bisacodyl may be harmful when taken for long period of time and that make the patient “dependent” on those medications. No such credible evidence exists. Indeed, there are many children who will need to use laxatives



for long period of time, because of the severity of their constipation, but this is not different than the use of many other medications for several other chronic medical conditions (gastroesophageal reflux, eosinophilic esophagitis, asthma, diabetes and many others). Stimulant laxatives are often needed in children with chronic constipation to provide a more complete rectal emptying and to trigger the urge to defecate, which is often lost in those children who have developed a mega-rectum and who experience frequent fecal incontinence. One could argue that the hesitancy to use enough laxatives, especially stimulant laxatives, is often the reason why constipated children do not overcome their symptoms in the short term. Senna may be irritating for the peri-anal area when used in high doses, but both senna and bisacodyl do not cause permanent colonic damage.

Gluten

Approximately 1 per cent of the population has celiac disease, and a serum tissue transglutaminase antibodies (tTG-IgA) test is all that is needed to help diagnose it. Approximately 0.1 per cent of the population has a wheat allergy, and a serum-specific IgE test can lead to that diagnosis. An unknown, but likely small percentage of the population has non-celiac gluten sensitivity, and a condition for which there is no diagnostic marker. Yet, about six per cent of the population in the U.S. restricts or completely eliminates gluten from the diet. Many celebrities, athletes, and famous individuals have endorsed a gluten-free diet. Grocery stores, libraries and lay publications have material often endorsing the alleged harmful effects of gluten. Yet, the vast majority

of people who avoid gluten do not have a medical reason for going gluten-free. In fact, a gluten-free diet can lead to deficiencies in vitamins and minerals. It may also lead to excessive weight gain if the substitute foods have a higher caloric content.

If patients have potentially gluten-related symptoms, physicians should test for celiac disease or wheat allergy before a patient eliminates gluten from the diet. If there is no medical indication for a gluten-free diet, providers should discourage it. There is also little or no evidence that cutting out gluten has a benefit for athletes (a common reason for the dietary change) or any other health benefits that outweigh possible harms.

Proton Pump Inhibitors

Proton pump Inhibitors are effective at acid suppression and should be used in treatment when there are evidence-based indications for them. They are useful for peptic ulcers, erosive esophagitis, proton pump inhibitor responsive-esophageal eosinophilia, protection from nonsteroidal anti-inflammatory drug-induced lesions and gastrointestinal bleeding.

But the inhibitors are overused. They do not help in many presumed cases of paediatric gastroesophageal reflux disease, especially in infancy, or functional heartburn. Most symptoms attributed to reflux in the first year of life are often due to a dietary protein allergy or to infantile colics and have nothing to do with reflux. Parents may have a further question, however, especially in light of reports that proton pump inhibitors are associated with dementia and other conditions: should they be used at all?

Like every medication, obviously they should be used only when there is convincing evidence that they are necessary. While



Dr. Lorenzo speaks on 'IBS: What Can We Learn From the Paediatric Literature' on January 29 at the Gastroenterology Conference at the Arab Health Exhibition and Congress

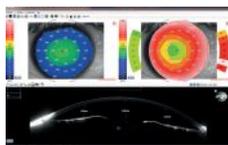
increased risk of dementia myocardial infarction and metabolic problems have not been demonstrated convincingly, an increased risk of enteric infection (especially with *C. difficile*) and respiratory infections does seem likely, based on recent evidence.

The take-home message should be that before prescribing acid suppressive medication, one needs to make sure that they are treating a condition that will benefit from it. Once a proton pump inhibitor has had the desired effect on the condition, there should be an attempt to wean the patient from the medication. The wean should be slow because there could be a rebound gastric hypersecretion, once the medication has been stopped due to the hypergastrinemia induced by the prolonged acid suppression. The continued use of inhibitors is certainly appropriate, however, if the patient benefits from them. ^{AH}

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Description and Analysis of Emergency Department Demands, **CONSTRAINTS AND CONSEQUENCES**

By Dr. C J Mann, OBE, FRCEM, FRCP, FRCA, National Clinical Advisor (AGE), NHS England; Consultant in Emergency Medicine, Taunton & Somerset NHS Foundation Trust, Taunton, UK

Emergency medicine has developed rapidly over the last 50 years with notable successes in developing purpose-built units, training programmes and postgraduate examinations with consequent improvements in the morbidity and mortality outcomes for millions of patients.

However, these departments, systems and processes have developed in a rather piecemeal manner; seldom have single departments, let alone whole systems been built, resourced and managed in an optimal manner. For the few that have, the inevitable increase in attendances and admissions plus advancements in medical science have ensured that even they have become increasingly challenged.

Comparison of the emergency care systems of various countries have been published and the conclusions disseminated widely. Hence it is recognised that the system of emergency care in North America, Australasia, the UK and Ireland is substantially different from that in many mainland European countries. Such comparisons are of value but seldom lead to system changes.

Surprisingly we are often blind to the significant differences within our own systems. In England there are over 180 Emergency Departments operating within 130 hospitals or groups. The scope to better analyse variation between these departments is considerable, yet until recently has not been systematically undertaken. Moreover, such analysis can illuminate key constraints and opportunities, which are more likely to resonate with patients and staff than international comparisons. Such intra-system variations are also more likely to drive improvements by

highlighting unwarranted variation.

In determining how best to use metrics to analyse performance of emergency departments and illuminate comparisons it is essential to avoiding both simplistic reduction and meaningless complexity.

Work undertaken by a number of national bodies in England has identified over 1,000 potential metrics of which 40 appear to be the most discriminatory. For the purposes of this article these metrics are subdivided into four key domains; Demand, Capacity, Flow and Outcomes.

Importantly this is not a standardisation methodology. Indeed, inherent in the analysis is a recognition that often there are good reasons for variations in both demand and outcomes.

ED Demand

To properly appreciate the performance of an emergency department (ED) it is essential to recognise the variation of demand between 'apparently' similar departments. Four metrics in particular are edifying.

- a.** Attendance rate
- b.** Proportion of attendances over 75 years
- c.** Deprivation profile of attendances
- d.** Conversion rate of attendances to admissions

Whilst these are not independent variables they are sufficiently discriminatory for our purpose.

From our data we now know that the attendance rate varies from 16 to 42 per cent of the catchment population per year. This reflects both geographical challenges e.g. distance travelled as well as the availability (or otherwise) of other urgent care services e.g. primary care and treatment centres.

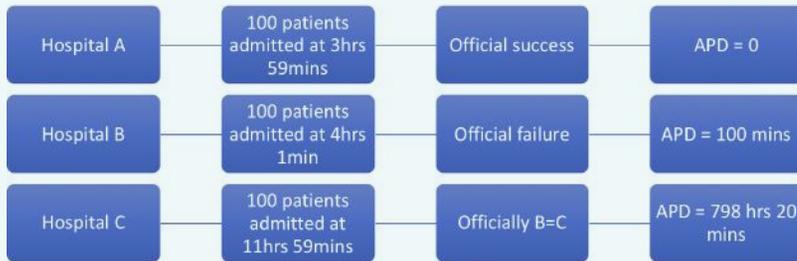
The proportion of patients attending who are aged over 75 varies from 16 to 43 per cent. For many, but not all hospitals, the need to reflect this case load by providing frailty and geriatric services is self-evident yet the data shows the provision of such services is patchy and not obviously aligned always with demand.

Deprivation levels (as measured by the proportion of the catchment population that are in the 20 per cent of the population that is most deprived) varies from less than one per cent to almost 80 per cent. Both the nature of illness/injury and the linkages to social care/public health that are determined by such variation are also self-evident.

Finally, the proportion of attendances to an ED that require an admission varies from 13 to 44 per cent. This will require fundamentally different resource



▼ **FIGURE 1:** Comparison of three hospitals using the APD metric



configurations both of estate and manpower to effectively manage such variation.

Thus, by examining only four variables we are already much better informed of the range of challenges each ED must face. If we are to have a debate around ED performance, we must recognise the very different demands placed upon them even within a single country, region or even city.

ED Capacity

Whereas ED demand is largely without the control of the department or its associated hospital, ED capacity is most obviously not. It is this issue that demonstrates such a high degree of unwarranted variation ie; variation for which there can be no proportionate justification.

Data shows that in England, on average, 1,250 admitted patients must be accommodated for every emergency department majors/resuscitation bay. As such, each of these clinical spaces must manage between three and four admitted patients per day and depending on the conversion rate at least twice as many non-admitted patients also. Simple arithmetic shows that in order to accommodate these patients the average 'time in bay' must be less than three hours.

Remarkably however these numbers and calculations apply only to the statistical mean. Half of all departments will have to manage more patients per bay and in some cases twice as many!

Some departments are simply too physically small to be fit for purpose.

Flow, Exit Block and Implicit Harms

Flow is key to ED performance. The timely assessment, treatment and disposition of each patient is important to both the patient and the healthcare system. Delays and bottlenecks impair experience and outcomes, yet are seen all too often in many EDs in most healthcare systems.

The Four Hour Standard was introduced in the UK in 2004 specifically to provide a key driver to timely flow in the ED. It has achieved notable success and without such a metric, performance and outcomes in the ED would be much worse.

However, two valid criticisms of the Four Hour Standard are of genuine concern. Firstly, it applies to all patients including those with minor illness and injury. This can paradoxically encourage systems to ensure large numbers of patients with minor conditions are managed quickly to offset delays for fewer, more seriously ill patients. Secondly, the standard is binary, anything under 240 mins is a success and over is a failure.

The first criticism is most easily dealt with by referencing the Admitted Patient Breach Rate (APBR) separately – this records the proportion of patients who require admission that breach the Four Hour Standard. As such it refocuses attention on the more seriously ill and injured.

Avoiding the binary nature of the Four Hour Stand is also relatively straightforward using a derived metric – the Aggregated Patient Delay (APD).

This metric summates the accumulated delay beyond four hours from time of arrival for all ED patients requiring admission. It is then expressed as 'hours delay per hundred admitted patients'. A worked example of how this would apply to three different EDs highlights how this metric extends the clinical relevance of any ED time standard (Fig.1).

However, these new metrics are most powerful when plotted as a function of each other. Charting the Admitted Patient Breach Rate vs Aggregated Patient Delay for each ED in England produces a visual and contextual insight into the flow delays experienced by patients.

Those patients attending hospitals whose performance is plotted within the top right quadrant are evidently at much greater risk



Dr. Mann provides the opening keynote 'Not All Emergency Departments are the Same - Lessons Learnt Leading to Improve Outcomes' on January 31 at the Emergency Medicine Conference, at Arab Health Exhibition and Congress

of delay-associated morbidity and mortality than those in the bottom left quadrant. Importantly these metrics are not binary but continuous variables. They resonate with clinicians and managers because they reflect the 'lived-experience' of both staff and patients. Because there is no cut-off threshold every patient counts; as does every hour of delay. Every system can credibly aspire to improve both their relative and absolute position on the APD/APBR chart.

Numerous studies from North America, Australasia and the UK have shown morbidity and mortality consequences of overcrowding in the ED and Exit Block related delays. Hitherto we have lacked a methodology to differentiate performance of various EDs and hospitals in a manner that was reliably proportionate to these harms. This methodology, focusing on patients requiring admission, directly addresses this deficit and importantly can also be applied to any ED in any country.

The use of nationally and locally collected data can provide valuable insights into the demand and capacity profiles of an emergency department. Such data when systematically analysed using clinically referenced benchmarks can better inform redesign, reconfiguration and investment decisions. **AH**



STRATEGIES FOR HOSPITALS DURING MASS CASUALTY EVENTS

By Dr. Hamid Aizaz Chatha, ER Trauma Consultant Physician, Tawam Hospital, Al Ain, UAE

It's not a matter of 'if' but it's a matter of 'when' a mass casualty situation either human-made or natural will happen. This can happen anytime, anywhere in the world. In 2015, for instance, 346 disasters were reported worldwide, having affected 98,580,793 people and with more than 20,000 losing their lives. These events had a huge economic bill of US\$66.5 billion.

The National Emergency Medical Services Information System (NEMSIS; Salt Lake City, Utah, U.S.) defines Mass Casualty Incident (MCI) as "an event which generates more patients at one time than locally available resources can manage using routine procedures or resulting in a number of victims large enough to disrupt the normal course of

emergency and healthcare services and would require additional non-routine assistance".

All the developed countries have reserved a regular annual budget to simulate disaster preparedness activities of the healthcare system. During the last decade, the emergency departments have steadily become busier and crowded; at the same time, MCIs have become frequent and devastating. This current scenario has been recognised as a threat to MCI preparedness. Recent mass casualty incidents all over the world illustrate the unique challenges that such occurrences pose to normal hospital operations. The sudden, unexpected patient surges in case of MCI can overwhelm the hospital resources, staff and space.

Adequate planning at an organisational

level is the key to optimise the response to unexpected events. "Failing to plan is planning to fail" is a particularly relevant aphorism for managing mass casualty incidents. Due to the recent surge in MCIs, governments and healthcare systems have a special focus on preparation for MCI management. But still, in a recent survey conducted by the American College of Emergency Physicians (ACEP), nearly all participants said their "emergency departments are not fully prepared for patient surge capacity in the event of a natural or man-made mass casualty incident".

This review aims to provide the hospitals with an overview of MCI management principles, mainly pre- and post-MCI phases. The best practices of planning and



preparation are evolving and it is important to update current practices to provide a relevant action plan.

Hospital Plan for Mass Casualty Incidents

MCI plan is an agreed set of action plans used to prepare for, respond to and recover from such emergency situations. An MCI plan should be generic enough to be applicable to multiple risks, yet specific enough that each individual in the hospital knows about their roles and responsibilities.

There are three main phases of an MCI plan:

1. Pre-MCI Phase
2. Response to MCI
3. Post MCI Phase

1. Pre-MCI Phase

This phase aims to enhance hospital preparedness during MCI planning.

A. Draft a plan to deal with MCI:

An MCI plan development is needed at all hospital levels to ensure that common goals are set and methods are devised to achieve a favourable outcome in demand-critical circumstances. Developing such a plan requires active participation from the pre-hospital team (EMS), hospital management – both clinical and non-clinical teams. MCI plan should result in a clear definition of the roles and responsibilities of all the professionals involved. Joint Commission International (JCI) recommends

“the hospital develops, maintains, and tests an emergency management programme to respond to emergencies, epidemics, and natural or other disasters that have the potential of occurring within their community”. Therefore, it is very important that the MCI plan of a hospital should detail the process, planning, and policies.

A MCI plan should include:

- Details of MCI committee
- Control and command centre
- Triage and patient management
- How to deal with surge capacity
- Equipment and supplies
- Communication channels within hospital and outside
- Security and staff protection ►

B. Vulnerability and capacity assessment:

The purpose of vulnerability and capacity assessment (VCA) – is to identify hazards or threats and their possible effects on communities, activities or organisations, and their capacity to prevent and respond to MCIs. It is vital that hospitals identify such threats at the local level so that it will allow institutions to prioritise their preparations and this facilitates rapid and relevant response specific for an MCI. However, it is not always possible to discover all the hazards in the community.

C. Training and Education:

Making a policy and an action plan is not enough to deal with MCIs. It is very important that the professionals who are part of the MCI team should be appropriately trained and educated. This can be done in multiple ways. It also involves informing the medical professional of the appropriate responses for different types of emergencies. Training and education strategies may include workshops, tabletop exercises, courses, seminars, self-directed learning, individual tuition exercises, formal education programmes, conferences, and lectures.

D. Monitoring and Evaluation:

Once the planning phase has been formulated, the next step is to devise MCI simulation exercises. MCI exercise is an instrument, which helps to train, assess and improve performance in protection, response, and recovery capabilities in a risk-free environment. The simulation exercise not only help to validate plans, policies and interagency agreements, but also helps to improve communication, clarifying roles, identifying shortcomings in the preparation.

In developed countries, it is common to do regular MCI simulation exercises. It is also common practice that hospitals involve specialised training agencies to execute and evaluate such exercises. It is very important that the objectives of such exercises should be very clear. These specialised agencies after exercise issue an evaluation report, which contains recommendations to improve the process. The idea to have this kind of simulation exercises is to improve MCI preparedness over a period of time. Evaluation reports should be objective, clear, reliable and credible.

Hsu et al., (2004) performed a systematic literature review and concluded that due to the lack of objective data (e.g., the data of hospital responses to actual MCIs are rarely made available to the public), the effectiveness

of MCI drills, as a tool for hospital MCI preparedness is difficult to determine. Verheul et al., (2018) found that researchers have been unable to assess if the members participating in MCI exercises in the Netherlands learn from their participation. There are few other studies, which echoes the same conclusions. Therefore MCI simulation exercises of a hospital, should be validated and have objective tools to measure learning effects.

Another important debate about simulation exercises is that there should be no notice exercises. No notice exercise reduces the element of bias and reflects the true surge capacity and preparedness of an organisation. Hence, it is more useful than a typical planned exercise, which is usually highly choreographed. Planned exercises not only lack realism but also tend to limit the size of the surge.

Wexham et al., (2017) reported that they have conducted a successful no notice exercise that can be used by any hospital to assess its crisis surge capacity in the aftermath of a large-scale MCI. The U.S. Department of Health and Human Services (Washington, DC, U.S.), Office of the Assistant Secretary for Preparedness and Response (ASPR), in conjunction with the Hospital Preparedness Program (HPP), commissioned RAND



Corporation (Santa Monica, California, U.S.) to develop this exercise.

2. Response to MCI:

Hospital response to MCI is the time to put all training and practices into live action by following the policies and guidelines developed in the planning phase.

A. Notification:

Hospitals usually get notified about an incident by pre-hospital agencies and police. However, it is not always possible to anticipate the scale of the incident. Timely and accurate information will help organisations to develop a proportional response.

B. Activation of MCI Plan:

Organisations usually pre-nominate individuals who assess the information about the incident and have authority to activate the MCI plan. There are different levels of activation ranging from standby level up to level 3. Once the MCI plan has been activated, routine activities should be withheld until the MCI plan has been deactivated.

C. Patient Triage & Management:

During MCI, triage at the hospital often leads to bottleneck as too many critical patients compete for limited resources, so it is very important that a senior emergency physician takes this responsibility. Primary triage should be performed on the arrival of patients, in a dedicated area, which is much larger than the usual triage area. The patient should be considered for secondary triage once some interventions have been made or more resources have become available. Tertiary triage is the least familiar triage category to hospital staff; it is usually performed on patients who have received advanced or ongoing interventions. It usually takes place in wards. Emergency room (ER) management should focus on providing resuscitation and stabilising the patients. Patients should be moved from ER once stable enough for definitive or damage control management, which depends upon available resources.

D. Hospital Security:

MCI plan activation leads to security augmentation, which not only restricts staff, patients and public movement but also provides a higher level of staff protection. These kinds of security arrangements are especially important in biological, radiological

and infectious emergencies. Inside the hospital, it is optimal to control entrances electronically whereas, outside the hospital, help from security agency or police should be sorted.

E. Communication:

Communication is of utmost importance for the smooth running of MCI plans. A control and command system should be in place. Relevant additional staff should be informed to come in for help. The organisation can use different means to communicate with the public, other organisations and additional staff for help.

D. Deactivation of MCI Plan:

During an MCI it is important to nominate a person who begins to plan for the recovery phase while the MCI plan is still going on. This planning includes staff support, re-supply, discharge planning, patient transfers and demobilising surplus staff to return the facility to daily operations level once MCI plan is deactivated. MCI plan deactivation is a very important step. The incident commander and supporting staff should only take a decision after proper assessment.

3. Post MCI:

A. MCI Response Review:

Hospitals have a main role in MCI response. Once MCI or a simulation exercise is over it is important to analyse the response. Working of an institution during an MCI differs significantly than the working in a routine environment, which leads to a lot of pressure on the front line workers. Hence it is important that after every such event, a detailed review should be conducted, which will help to learn from both strengths and weakness of an MCI response. Post MCI reviews have the potential to enhance resilience and sensitivity of an organisation.

B. Longer Term Demands:

During an acute MCI, clinical care is focused on resuscitation and damage control. Once the acute patient influx is over, it takes days to weeks for an organisation to return to baseline. All the admitted patients will need further definitive treatments, which have a significant impact on day-to-day operations of the hospital. Hospitals will need to open more operating rooms and ICU beds to deal with the acute influx.

Increased logistic requirement needs to be met for days and should be continuously monitored. After MCI, rehabilitations start early as



Dr. Chatha will be speaking on 'Are We Ready? Hospitals Preparedness and Mass Casualty Events' at the Emergency Medicine Conference on January 30, at Arab Health Exhibition and Congress.

well, which includes medical health professionals including doctors, nurses, physiotherapists and occupational therapists. Depending on the type of incidents, patients may need frequent and long-term follow up, which adds additional work on a continuous basis. Traumatic experiences can lead to mental health issues in patients and families; hence, a continuous support is required to identify the people at risk.

C. Staff Support:

The most important lesson emerged from recent MCIs is the effects of traumatic events on the physical and psychological health of the medical staff. Healthcare staff has been exposed to things they have never seen in the past. Hence, the organisation has to prepare to deal with the aftermath of such events. The medical staff's response to these kinds of incidents are quite different, some will have a quick recovery while others take months to recover and have profound effects on their lives. Therefore, immediate staff support is of extreme importance along with a planned delayed interval response. Staff support is a critical component of medium and long-term post-MCI planning.

MCI provides continuous challenges to healthcare systems. These kind of incidents leads to lots of demand on the system and can create suboptimal conditions. So it very important to learn from national and international incidents and keep updating local MCI plans. ^{AH}

References available on request.

CONTINUOUS AND FLASH GLUCOSE MONITORING:

Effective diabetes management strategies

By Dr. Ahmed El-Laboudi, PhD, CCT (UK), MRCP (Endocrine & Diabetes), MRCP (UK), MB Bch, Consultant Endocrinologist, Imperial College London Diabetes Centre, Abu Dhabi

Glucose monitoring is a core component of a successful management strategy for people with diabetes, especially for those who are insulin-treated. It facilitates intensification of insulin therapy, with a subsequent reduction in diabetes-related complications, while minimising the risk of hypoglycaemia. Since 1971, when the first glucose monitor was used, the most common method of glucose monitoring has been the use of intermittent capillary blood glucose monitoring using standard finger-prick methods. This has revolutionised diabetes management in several ways. It allows patients to immediately detect and treat hyperglycaemic or hypoglycaemic excursions; it facilitates change in patients' lifestyle by demonstrating the effect of lifestyle activities on glycaemia; and it allows therapy adjustment to achieve target HbA1c level in the long-term.

There are many advantages for this method of testing. It is fast, accurate, portable, simple and cost-effective. Devices used for self-monitoring of blood glucose (SMBG) have evolved with many developments allowing for improved accuracy, reduced size, memory function, reduced required blood volume, rapid analysis, ability to test for blood ketones and bolus advisor integration (Smart SMBG).

There is evidence for improvement in glycaemic control with increased frequency

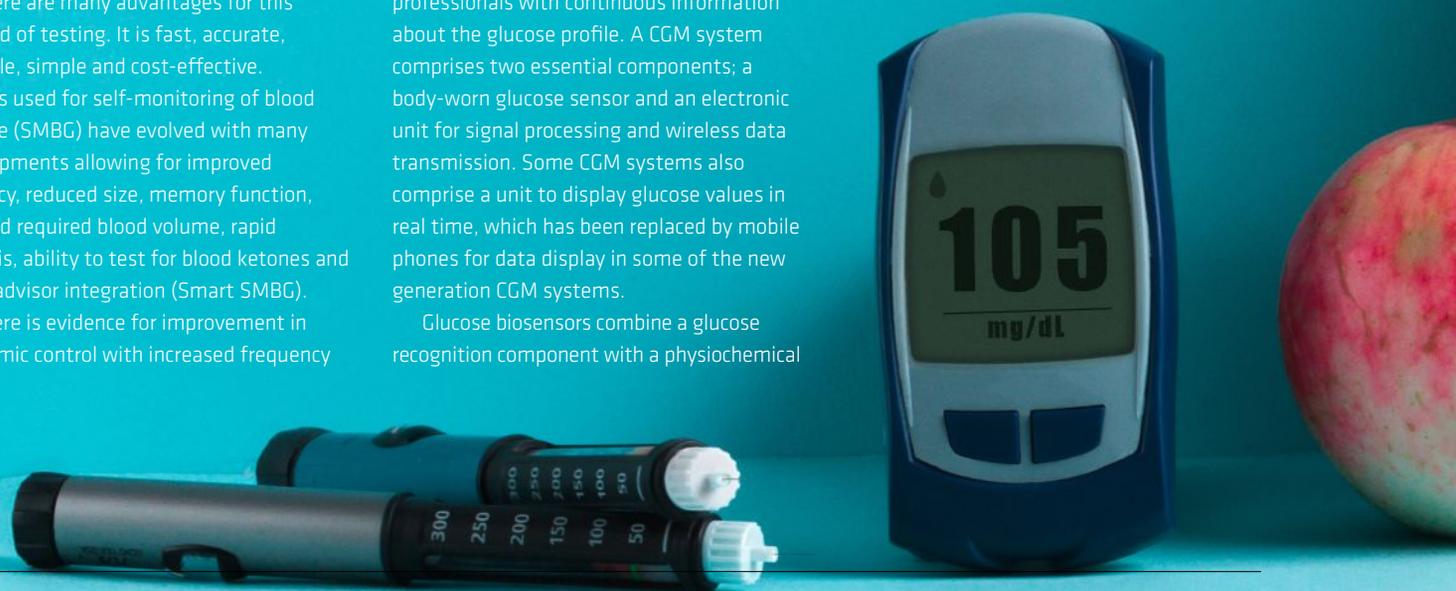
of SMBG in patients with type 1 diabetes. However, SMBG only provides a snapshot of the glucose profile at the point of testing. Therefore, it is missing important information about magnitude, direction, and duration of glycaemic excursions. This can be crucial especially at important times, from glycaemia point of view, when the patient is unable to test like driving, exercise or sleeping. Furthermore, the procedure is invasive and seen by many patients as painful, which can result in reduced compliance with the recommended frequency of monitoring with subsequent negative impact on diabetes control.

Continuous Glucose Monitoring (CGM)

Emergence of CGM technology has addressed an important drawback of SMBG technology by providing patients and healthcare professionals with continuous information about the glucose profile. A CGM system comprises two essential components; a body-worn glucose sensor and an electronic unit for signal processing and wireless data transmission. Some CGM systems also comprise a unit to display glucose values in real time, which has been replaced by mobile phones for data display in some of the new generation CGM systems.

Glucose biosensors combine a glucose recognition component with a physiochemical

detector. They can be classified according to sensing technique, level of invasiveness or target biofluid (blood or interstitial fluid). These systems can either display glucose values in real-time (RT-CGM) or store glucose data for retrospective analysis by healthcare professionals (blinded CGM). Real-time devices display glucose value accompanied by a trend arrow to show direction and magnitude of rate of change. These devices also feature an alarm function when glucose level is outside a pre-determined range or when a hypoglycaemic event is predicted. For instance, FreeStyle Libre Flash Monitoring System (FGM) is a relatively new glucose monitoring system where glucose data can be accessed by actively scanning a reader over the sensor rather than being continuously displayed in real-time. ►





Research evaluating the effectiveness of CGM technology is extensive. It has studied the effect of CGM on several glycaemic outcomes including effect on HbA1c, hypoglycaemia measures and glycaemic variability measures. It has also studied non-glycaemic outcomes including effect on quality of life. The effectiveness of CGM has been evaluated in different settings (ambulatory, inpatient and in intensive therapeutic unit (ITU)) and in different types and subgroups of diabetes.

However, several confounding factors need to be considered while evaluating the CGM evidence. As the CGM is a diagnostic tool, its effectiveness relies on effective translation of the CGM data into an effective therapeutic intervention that will eventually impact the outcome. This effective translation depends on patient's training, skills and compliance. It also depends on the experience of the diabetes team and the level of support provided to patients. Therefore, some of the CGM studies might not only evaluate the use of CGM and its accuracy, but also evaluate factors related to patient and diabetes team interaction with the CGM. Furthermore, CGM cannot be investigated in a double-blind manner. Therefore, the best possible evidence can be obtained from large-scale open-label randomised controlled crossover studies, where subjects act as their own control. Another important factor to consider when evaluating the CGM evidence is the rapid development in CGM technology. The continuous development in CGM sensor fabrication and algorithms used for glucose data analysis has resulted in significant improvement in CGM accuracy. Therefore, studies conducted a few years ago using older generations of CGM systems might have shown different results if they were conducted using newer generations of CGM with enhanced accuracy.

Recent Advances in CGM

Over the last decade, CGM technology has gathered a significant pace. This started in 2008 with the publication of the landmark Juvenile Diabetes Research Foundation CGM study, which demonstrated the value of continuous use of CGM technology in improving glycaemic and reducing HbA1c. However, several limitations affected the uptake of the technology. This was evident from T1D exchange data demonstrating that CGM technology was being used by only 6.5 per cent of people with type 1 diabetes in the

U.S., despite reimbursement, and that among individuals who have used a CGM, two-thirds stopped using it. Some of the important limitations were related to inaccuracy of available CGM systems at the time and the relatively high cost. However, there has been steady improvement in CGM accuracy in recent years with subsequent changes in licensing by regulatory bodies that allowed non-adjuvant use (ability to rely on the system for self-adjustment of insulin doses without the need to confirm with SMBG first).

Improvement in CGM accuracy has also been accompanied by reducing the frequency of sensor calibration or the need for calibration at all. Both Dexcom G6 and Freestyle Libre FGM are factory calibrated and do not require calibration by the patient. Other than reducing a patient's burden by reducing the need for SMBG testing, calibration-less CGM systems avoids errors that can result from calibration using erroneous data from an inaccurate SMBG test.

On the basis of available evidence, RT-CGM has been used therapeutically for further optimisation of subcutaneous continuous insulin pump therapy regimen if the target HbA1c has not been achieved or for patients with recurrent disabling hypoglycaemia, those with hypoglycaemia unawareness or debilitating fear of hypoglycaemia. However, DIAMOND and GOLD randomised controlled studies have recently demonstrated the positive impact of CGM on markers of glycaemia in patients using multiple daily insulin injections. This has challenged the clinical pathway that requires the use of insulin pump therapy before CGM is considered.

Combining the benefits of CGM and those of insulin pump therapy (sensor augmented pump therapy) was evaluated in a number of studies. This has paved the way to closed-loop systems, where an algorithm uses input from CGM data to control insulin delivery via the insulin pump. There has been extensive evidence from research studies showing the positive impact of use of closed-loop systems on glycaemic markers. In 2016, Medtronic received US Food and Drug Administration (FDA) approval for its first hybrid closed loop system (MiniMed® 670G system) in the United States.

Flash Glucose Monitoring (FGM)

Flash glucose monitoring is sometimes regarded as a separate entity from CGM. It differs from RT-CGM in two main aspects. First, it does not have an alarm function (although

this will change with the next generation FreeStyle Libre 2); second, it requires active scanning of the sensor unit by a reader or a cell phone to access glucose data rather than passive display of glucose continuously, which is updated at five-minute intervals.

Existing flash glucose monitoring system has the advantage of good accuracy, factory calibration, a two-week sensor lifetime, good user acceptance and relatively low cost.

The value of FGM has been demonstrated in both type 1 diabetes (The IMPACT study) and in type 2 diabetes (the REPLACE study). While there was minimal change in HbA1c, there was significant reduction in hypoglycaemia and markers of glycaemic variability, and positive impact on patients' reported outcomes.

Future of CGM

Until the dream of developing a cure for type 1 diabetes is realised, diabetes technology and automated insulin delivery represent the best available management strategy for diabetes control and reduce the burden of the disease. This could not have been realised without the development of CGM and the significant advances that have been achieved in this field recently. However, development of an accurate non-invasive affordable CGM system remains an important goal for people with diabetes and a significant challenge for research groups and industry. ^{AH}

References available on request.



Dr. El-Laboudi will be speaking on 'Continuous and Flash Glucose Monitoring' on January 29 at the Diabetes Conference, at Arab Health Exhibition and Congress

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MEDICAL ERRORS:

Prevention is Possible

By Joe Kiani, Founder and Chairman of the Patient Safety Movement Foundation

To err is human, as the Institute of Medicine report stated in 1999, but to not put in place processes that can prevent human errors from becoming fatal is inhumane. Together that's what we need to do. Hospitals need to implement known processes, of which there are more than 30, to avoid killing nearly five million people every year, in our hospitals globally.

What if you had the opportunity to save a life? The life of a loved one, a close friend, or even a stranger? What if I told you it's possible to reach zero preventable deaths in hospitals by 2020 by simply making a commitment to zero and implementing actionable patient safety processes? By making a public commitment to zero, implementing a patient safety focused culture, or even sharing your actions and patient safety processes, you could save not just one life, but thousands. What if I told you the only way to stop preventable patient hospital deaths, the 14th leading cause of death around the world, is if you made patient safety your personal responsibility? The latest estimate is that over 4.8 million people are dying annually; that equates to over 13,000 people dying each day; that's 45 fully loaded 787's crashing every day and killing all of its passengers!

According to Dr. Tedros Ghebreyesus, the Director-General of the World Health

Organization, "the reality is that every year, millions of patients die or are injured because of unsafe and poor-quality healthcare. Adverse events are now estimated to be the 14th leading cause of death and injury globally. That puts patient harm in the same league as tuberculosis and malaria. There are an estimated 421 million hospitalisations in the world every year, and on average, one in 10 of those results in adverse events. This is a frightening statistic. Especially when we know that at least half of adverse events could be prevented."

So, what can we do to prevent medical errors and preventable patient deaths in hospitals?

First, join us in our fight. Our mission at the Patient Safety Movement Foundation is to eliminate preventable deaths in hospitals by 2020. We are an action-oriented organisation. We are proactively collecting commitments from hospital systems, open data pledges from healthcare technology companies, and 'Commitment to Action' letters from key associations, professional organisations, advocacy groups, and non-profits who are also working day in and day out to improve patient safety. We are growing stronger and closer to reaching zero preventable deaths each year, together. I urge you to join us and make a commitment to improve patient safety. It's free. ►

The latest estimate is that over 4.8 million people are dying annually; that equates to over 13,000 people dying each day; that's 45 fully loaded 787's crashing every day and killing all of its passengers!

Second, take action. Research shows that evidence-based processes can be put into place, which prevents medical error and reduces preventable harm. Since I launched the Patient Safety Movement Foundation in 2012, we have teamed up with some of the world's leading medical experts, hospital administrators and patient advocates to share best practices and the latest evidence-based solutions to the leading causes of preventable harm in hospitals. Today, we have 31 Actionable Patient Safety Solutions (APSS) that cover the 16 leading causes of preventable patient death, which include hand hygiene, healthcare-associated infections and more. Close to 5,000 hospitals across 44 countries have implemented these APSS or their own novel solutions to reduce preventable mortality. Last year, between 81,533 and 200,000 lives were saved as a result of these hospitals' patient safety efforts.

We offer the APSS at no cost. They are free to download and are written in a checklist format to allow hospitals to audit their systems and identify areas for improvement. I encourage you to use them or any other evidence-based processes to protect patients and clinicians. The key is to implement processes and learn from them and improve them.

Third, implement a culture of safety and begin tracking cases of preventable harm. For the last six years, we have worked in concert with leading medical experts around the globe to identify the leading causes of preventable patient harm from handoff communications to delayed detection of sepsis. Remarkably, the leading cause of preventable patient deaths is when hospitals lack a culture of safety. In fact, a 2017 review of patient safety in the Arab countries identified that punitive response to error is seen as a serious issue, which needs to be improved. Healthcare professionals in the Arab countries tend to think that a 'culture of blame' still exists that prevents them from reporting incidents.

Studies report that hospital departments where staff have more positive patient safety culture perceptions have fewer adverse events. So, what does a culture of safety look like? A strong safety culture promotes the identification

and reduction of risk as well as the prevention of harm. A poorly defined and implemented culture of safety may often result in concealing errors and therefore a failure to learn from them. According to the Institute of Medicine, "the biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures, but as opportunities to improve the system and prevent harm."

Hospitals like the United States' Parrish Medical Center have seen dramatic improvements as a result of their culture of safety. The hospital is consistently rated "A" by the Leapfrog Group, #1 Safest Hospital by Florida Consumer Reports and won the first-ever five-star Hospital Ranking by the Patient Safety Movement Foundation. At Parrish Medical Center, they have put action behind their culture of safety by continuously tracking and monitoring cases preventable harm. As a result of their measuring and monitoring of preventable harm, they've dramatically reduced preventable harm. For example, they've achieved zero ventilator-related pneumonia in 12 years, one catheter-related UTI in 10 years and one central line-associated bloodstream infection (CLABSI) in the past ten years.

Finally, start now and start somewhere! Hospitals are proving that zero is possible. We're already seeing hospitals getting to zero deaths in certain areas such as healthcare-associated infections. For example, like Parrish Medical Center, Tri-City Medical Center in San Diego, California, recently celebrated seven years of zero central line-associated blood stream infections (CLABSIs) in its neonatal ICU. Intermountain Healthcare System based in Salt Lake City, Utah, hasn't seen a single catheter-associated urinary tract infection in its 160-bed LDS in six months. The common thread is that these and other hospitals remarkable patient safety outcomes are putting systems in place to improve patient safety processes while creating a culture focused on what's best for the patient.

And the positive momentum is growing. On November 15, we partnered with the Dubai Healthcare City Authority for the first conference to present regionally-

relevant patient safety initiatives and models from the UAE's health sector. The Dubai Healthcare City Best Practice Conference 2018 called on hospitals and clinics in the UAE to share their applied patient safety best practices to help advance a culture of safety. The conference drove DHCA's commitment to bring the Patient Safety Movement to the Middle East and reduce the number of preventable deaths in hospitals to zero by 2020.

The conference had three categories - Infection Control and Medication Management; Advancing a Culture of Safety; and, Enhancing a Positive Environment of Care. These categories have been identified as some of the leading patient safety challenges facing hospitals today. DHCA was the first group in the Middle East to make a public commitment through the PSMF to improve their culture of safety. By gathering to focus on patient safety and share best practices at this conference, they set an example for the world that reaching ZERO is possible. For details, log on to <https://www.dhcr.gov.ae/en/DHCC-Best-Practice-Conference>

Zero preventable patient deaths is possible, but it is up to you, not the person on your right or your left, but you. Act now! **AH**

References available on request.



Joe Kiani is the Founder and Chairman of the Patient Safety Movement Foundation.



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Opportunistic Infections in the Immunocompromised Host and Infection Control Challenges

By Dr. Hafiz Ahmad (PhD – AIIMS, PDF- NIH, U.S.), Assistant Professor & Clinical Microbiologist, Department of Medical Microbiology and Immunology, RAK College of Medical Sciences, RAK Medical & Health Sciences University; and Adjunct Clinical Microbiologist, RAK Hospital

The risk of transmission of pathogens and subsequent infection in healthcare facilities is substantial. Pathogens may be transmitted from other patients (cross infection), the hospital personnel, and/or the hospital environment leading to Health Acquired Infections (HAIs). The risk is variable and depends on a patient's immune status, the local prevalence of various pathogens, and the infection control practices and antimicrobial stewardship utilised during hospitalisation. Apart from the well-established pathogens (bacteria/fungi/viruses) causing Ventilator Associated Pneumonia (VAP), Catheter related Blood stream Infections (CRBSI), Urinary Tract Infections and drug resistant Methicillin Resistant Staphylococcus aureus (MRSA), there exist some less established opportunistic pathogens.

Opportunistic Infections

Opportunistic infections (OI) are caused by pathogens of low virulence, which are usually non-pathogenic in a healthy individual. These are bacterial/viral/fungal/parasitic infections contained by immunocompetent hosts which cause progressive disease in immunocompromised patients (Human Immunodeficiency Virus (HIV)/Acquired Immunodeficiency Syndrome (AIDS)) and are often characterised by latency and reactivation.

The Immunocompromised Host

An immunocompromised host is a person who does not have the ability to respond normally to an infection due to an impaired, weakened or defective immune system, predisposing him to infections, often life-threatening, which would not otherwise

occur. This inability to fight infection can be caused by a number of disease conditions: HIV/AIDS, malnutrition, cancer therapy with Immunosuppressive drugs etc.

Epidemiology

According to World Health Organization (WHO), major OIs include: Acquired Immunodeficiency Syndrome (AIDS) caused by HIV, Tuberculosis (TB), Pneumocystis jiroveci pneumonia (PCP), herpes infections, Cytomegalovirus (CMV), candidiasis, cryptococcal meningitis and cerebral toxoplasmosis in different chronology depending on multiple factors.

Immunocompromised patients are at high risk for opportunistic infections. Traditionally, there are infections that arise from endogenous reactivation of latent infections, and nosocomial transmission. Therefore, it is deemed likely that special infection control (IC) interventions are required to prevent transmission in healthcare settings.

Reinfection with pathogenic organisms in new cases of immunocompromised population can occur possibly by means of airborne transmission and nosocomial spread especially with respect to tuberculosis. Most studies support the view that infectious complications in immunocompromised patients are exogenous in origin and more epidemiological studies are needed to define the risk of nosocomial spread and need for better infection control practices to prevent these infections.

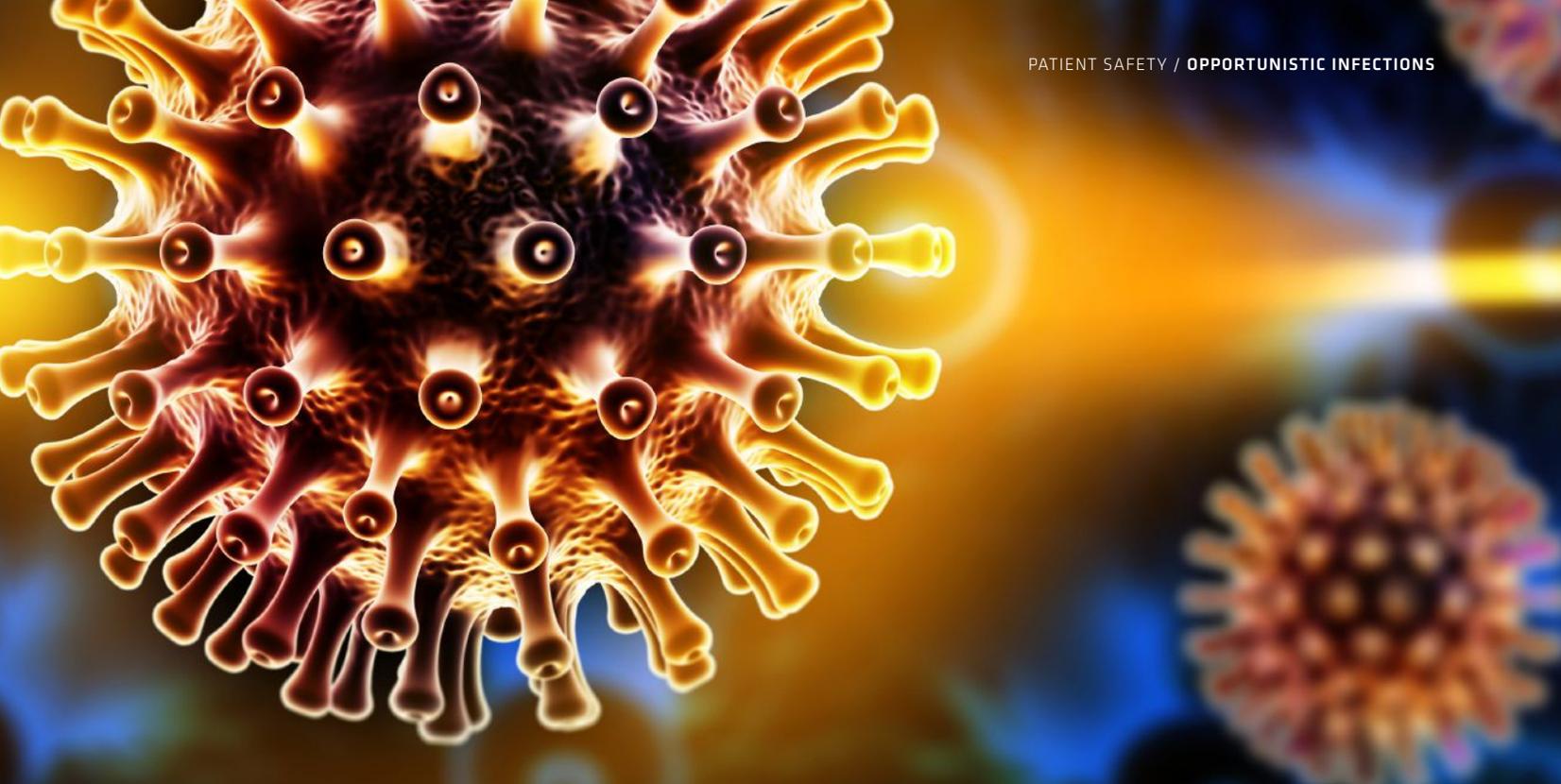
The fact that infectious complications in immunocompromised patients are often predictable and can be prevented, makes infection control practices a very important step in the improvement of the quality of

care provided to the immunocompromised patients. In addition, by reducing infectious morbidity, infection control practices will contribute significantly to cost savings.

Tuberculosis – (Pulmonary TB)

TB is caused by Mycobacterium tuberculosis and is an airborne disease, transmitted from person to person through aerosols route. It is a highly communicable disease that can be spread while talking, sneezing, coughing and shaking hands. The UAE being a cosmopolitan country with a dynamic influx of people from more than 200 nationalities poses a major challenge to the control of tuberculosis. As per 2018 census, of the total 9.54 million UAE population, majority, 8.4 million (88.5 per cent) is constituted by a floating population of expatriates. Immigrants from India, Sri Lanka, Pakistan and Bangladesh are major contributors to this OI. Thankfully, the incidence has been reduced due to stringent visa control measures implemented by the Ministry of Health and Prevention in the UAE.

Although the prevalence of TB in UAE is fairly low, the rising incidence among expatriates poses a major challenge. An increasing number of cultures have confirmed TB and multi-drug-resistance tuberculosis (MDR-TB) among native and expatriate patients, necessitating improved vigilance in case detection, effective



management and prevention of MDR and XDR-TB emergence in the country.

HIV and TB Co-infection - A Major Infection Control Challenge

HIV/TB co-infection is another major challenge especially in MDR-TB cases. Although HIV incidence is very low in UAE and restricted to expatriates and in transits from high prevalence African countries, treatment cost and medical management poses a challenge for the hospital in terms of infection control, patient isolation, clinical management and care.

The incidence of other OIs like CMV, PCP and Herpes, fungal and parasitic infections are very low in the UAE and only rare cases have been reported.

Transplant and Immunosuppressive Therapy

There is a growing number of immunocompromised patients because of the use of intensive therapeutic regimens in patients with cancer and organ transplantation, besides those with HIV infection.

Post-surgery, an organ transplant patient is at his most vulnerable state. The immunosuppressive medications enable them to avoid rejection of the new organ, but at the price of a defenseless immune system. ICU patients, neonates, HIV-positive patients and the elderly - each of these groups are at a

higher risk of infection than the average hospital occupant. It is the infection control staff's duty to assess the risk factors, minimise as many as possible and annihilate infectious organisms that take advantage of the situation.

Improvements in patient survival have been observed in all categories, but the risks of infection related to immunodeficiency continue to be substantial by either resident or environmental bacterial, fungal, viral, and protozoal parasites. Even low-virulence microbes (opportunistic pathogens) may invade, proliferate, and cause disease in the immunodeficient host. Furthermore, newer organisms previously considered as contaminants or harmless colonisers have now emerged as significant human pathogens in the immunocompromised host.

Handwashing, Self-hygiene and Standard Precautions

Hands are the most common vehicle for transmission of organisms. It is estimated that 30-40 per cent of hospital acquired infections are related to contamination of healthcare workers hands. Proper "hand hygiene" along with standard universal precautions likes gloves, gown, mask, shoe and head cover are the single most effective means of preventing the horizontal transmission of infections among hospital patients and health care personnel. Limiting visitation by patient attendants, routine floor cleaning with

disinfectants, cleanliness of the hospital staff and nurses is paramount in infection control.

Adenosine triphosphate (ATP) level and fluorescent markers have been used as surrogates of contamination to assist monitoring of cleaning especially in ICU's for monitoring protective microbial contamination and reducing chances of OIs in immunocompromised patients, but their role in determining surface microbial contamination is controversial. On the other hand, infections like TB are airborne infections and can be only controlled using tight fitting doors and negative pressure isolation ventilations. Protection using N-95 respirator mask should be practiced before entering isolation room.

There is an elemental role of the microbiology laboratory and Infection Control officer in the prevention and control of infections and for providing awareness and training. Direct observation and feedback of cleaning services including an education component ideally can result in change in behaviour and goes a long way in implementation of good infection control practices.

Prevention of infection, prompt diagnosis and treatment remain the cornerstones of management of OIs. The importance of basic infection control measures cannot be over-emphasised. In addition, appropriate prophylactic agents, rapid diagnostic techniques and the early institution of appropriate therapy are essential for good infection control practices. ^{AH}

RADIATION SAFETY CULTURE:

Engagement of Patients and Caregivers

By Auroba Latief Al-Samarrae, MSc., CPHQ; Sr Director of Radiation Safety and Medical Physics (RSMP) Dept.; Corporate Radiation Safety Officer (RSO) / Sr Medical Physicist; Cleveland Clinic Abu Dhabi, UAE

Without doubt, the application of ionizing radiation and radioactive materials in diagnostic, interventional and therapeutic procedures in medicine is beneficial for hundreds of millions of people each year.

Everyday applications of ionizing radiation for diagnosis and treatment help millions of patients all over the world.

A patient-centred culture is defined by caregivers that are engaged to deliver safe, reliable, high-quality care. Organisations that foster a culture committed to safety not only improve quality of care but also deliver better patient and caregiver experiences, and better outcomes.

Safety has been always a top priority goal of successful healthcare systems. It was maintained by assessing the safety culture of the organisation through direct feedback from employees, nurses and physicians to understand the level of organisational focus on safety as well as develop targeted programmes to achieve this goal.

The radiation safety culture in healthcare facilities is an integral component of safety culture programmes in medical settings.

In order to build a radiation safety culture, the workplace behaviour has to be fully understood. This could be maintained by taking some actions to engage caregivers and patients in the Radiation Safety (RS) culture such as:

- Mapping relevant stakeholders in RS culture in medicine and facilitate the cooperation between stakeholders
- Proper education and training are essential to raise awareness of radiation risk and establish a positive attitude towards Radiation Safety
- To accept and believe that radiation is associated with hazard and to handle radiation with cautiousness
- Engagement of leaders and managers for a strong leadership support focusing on RS to provide commitment to the radiation safety programme
- Caregivers responsibilities for safety has



to be clearly defined within the whole organisation (top-down).

- Integrate radiation safety into patient safety procedures/systems
 - Preventing accidental and unintended exposures, strengthening radiation safety culture and promoting reporting and learning systems
 - Proper risk communication with colleagues, patients and society
 - Foster a change in attitude towards RS by establishing training, continuous professional development, awareness sessions as well as education through the following activities: 1) discussions, 2) surveys, 3) organising and hosting stakeholder meetings and workshops, and 4) publishing position papers on key issues
 - Reducing unnecessary radiation exposures to patients and caregivers through justification of medical examinations and optimisation of protection
 - Make the radiation safety culture a high priority when implemented through hospital management and Quality Assurance (QA) systems
 - Assessment of RS programme(s) by internal/external audits to evaluate attitude and level of implementation to identify areas of improvements
 - Local system for reporting and follow-up events, with a no-blame policy. Implement corrective actions to prevent future occurrence of events
 - Developing an effective communication strategy and providing tools to support benefit-risk dialogue for healthcare providers, patients and caregivers
 - Engage the patients with the radiation safety and awareness education
 - Inform the patient about any mistakes or events associated with their procedures if any.
 - Promoting good practices by caregivers and recognising and awarding outstanding works.
 - Assign passionate radiation safety champions to assist and support the radiation safety culture
 - Improving patient safety and achieving consistent performance in patient safety requires adopting a culture and processes that support high reliability.
 - Assessing safety culture at the organisation and work unit-level supports awareness of patient safety issues
 - Evaluates the impact of patient safety interventions and performance over time
 - Encourage accreditation and recertification programmes for health professionals
 - Allocate financial resources to sustain the RS culture in workplace.
- Service providers, institutions clinicians, administrators, and policy makers must work together to improve the quality of healthcare through robust programmes of safety in general and radiation safety in particular. **AH**



UK HEALTHCARE REPORT

UK's healthcare sector is expected to shift its approach to care delivery by adopting efficient and effective models of provision such as personalised care, which will focus on delivering treatments based on the patient's specific needs. Find out more in our detailed report.

UK'S BRAND OF HEALTHCARE TAKES TO THE GLOBAL STAGE

The country is at the forefront of research and innovation across healthcare

By Inga Louisa Stevens, Contributing Writer

As the NHS continues with its 70th birthday celebrations, much of the commentary around the outlook for the UK healthcare sector is centred on the pressures of upholding consistent care quality standards while pushing for greater efficiencies. Economic factors, technological advances, and emerging public health issues have led to rapid changes in the way healthcare has been delivered in the UK throughout 2018 and continuing challenges such as an ageing population and the rising prevalence in chronic conditions are likely to compound this problem.

In response to these challenges, the healthcare sector in the UK is expected to shift its approach to care delivery by adopting more efficient and effective models of care provision such as a personalised care, which will focus on delivering treatment based on the patient's specific needs, preferences and physical condition.



A Focus on Digital Health Technology

Digital healthcare technologies will take centre stage in managing these efficiencies with Deloitte predicting that the UK will account for 7 per cent (£2.9 billion) of the £43 billion global digital health market by 2018.

According to Dr. Indra Joshi, clinical lead for NHS England's digital experience programme, writing in a blog post published on the NHS England website, the most promising market for growth is mobile health with sales of apps and wearables predicted to increase by 35 per cent in the UK by 2018.

"With the increasing value of these markets comes increased focus on the policy around health IT systems and interoperability. This is key to enabling safe and effective data exchange." However, she warns that there is a lack of interoperability with digital health tools such as devices, wearables and integrated apps, which need to be addressed and that in order to address this nationally, "it is clear that a standard of what is 'good' needs to be developed and adopted."

Opportunities and Challenges

In a report titled *What will new technology mean for the NHS and its patients? Four Big Technological Trends*, researchers from the Health Foundation, Institute for Fiscal Studies, The King's Fund and the Nuffield Trust joined forces for the first time, using combined expertise, to shed light on some of the big questions on the NHS. The report focused on four current trends – genomics and precision medicine, remote care, technology-supported self-management, and data and Artificial Intelligence (AI) – and the potential that they have to improve healthcare in the future if they continue to progress.

The authors found that if the trends outlined in the report continue to progress, they have the potential to completely transform healthcare in terms of personalised treatments, improved access to specialist advice, tools and support for patients to become real experts in their health and care; and a data-driven system able to continuously learn and improve. However, it suggests that substantial barriers also exist, which slow the implementation of these new technologies including requiring large changes to both the workforce and workflows.

"While there is no doubt technology offers sizable benefits to the NHS, the NHS needs to be aware of the challenges and opportunity costs that new advances present, as well as the policy questions that need answering in order to make the most of future potential," the report concluded.

Bridging the Skills Gap

According to Health Education England, the health service workforce in the UK, which already stands at 1.4 million, will need to increase by 190,000 by 2027 unless the rise in illness recedes. With the ageing and growing population creating a greater need for care, in order to prevent any more 'brain drain' the UK healthcare service is looking at new approaches to bridge the skills gap, attract new talent and retain existing staff.

As a crucial part of delivering the next steps of the NHS Five Year Forward View, Health Education England is expanding current routes to the frontline and opening innovative new ones to attract the best people into the health service. According to the NHS Five Year Forward View, there is a need to continue to improve productivity and grow frontline workforce, especially in priority areas such as nursing, mental health, urgent and primary care.

The document also described how "achieving this will require more training, more recruitment, better retention and greater return to practice after time out of the workforce. It will also require flexibility as roles and places of work evolve in line with changes to the practice of medicine and the shape of healthcare."

Taking to the Global Stage

According to Healthcare UK managing director Deborah Kobewka, who sat down with *Arab Health Magazine* during Arab Health 2018, the UK's ability to stand out on the global stage in terms of its healthcare capabilities is down to the uniqueness having an excellent healthcare system – the NHS.

"This system has been in development for 70 years, supported by a private sector that works closely with academia to develop cutting-edge technologies that are taking forward healthcare in the UK," she explained. "Over the years, the NHS has amassed huge amounts of data and insights, which we have been able to

leverage and, in combination with very innovative digital capabilities, provide real leading-edge insights into healthcare and use that to improve patient outcome and safety. We are very proud of what we have been able to develop in terms of the NHS."

Last year, at Arab Health, the focus for Healthcare UK was on prevention, quality and innovation, with exceptional applications in the field of digital healthcare. During the trade show, British healthcare technology company Babylon announced an agreement between themselves and THIQAH to provide AI health services to the citizens of the Kingdom of Saudi Arabia (KSA), in association with the KSA Ministry of Health.

Indeed, there remains a significant opportunity for UK businesses and the NHS in healthcare exports across the globe. The NHS will be ready to target up to £7 billion of opportunities a year over the next decade with its world-leading healthcare expertise, thanks to a new government support service.

The Healthcare UK Export Catalyst is set to help the NHS to access global healthcare export opportunities, with worldwide spend in the sector growing at 7 per cent a year. Healthcare UK has already supported NHS organisations to win export business of more than £100 million over the last two years.

The catalyst sets out to boost this further and comes as the result of a pilot with NHS organisations to identify the services that would best suit them as they embark upon their export journey. The service will provide continued support, right through to finding opportunities and winning contracts.

Sir Malcolm Grant, Chairman of NHS England, said in a press release: "In my view, Healthcare UK have done a great job already in raising the profile of UK healthcare services and systems overseas. Their new Export Catalyst service will further enhance the service available to NHS Trusts in developing their export capabilities, so they can reach a wide range of international markets.

"In the next year, the mission will be closely focused on providing a showcase for great British healthcare services, building a strong brand across the globe and realising the amazing export potential of our world-class health system." **AH**



Is the UK the World Leader in

HEALTH TOURISM?

By Annabelle Neame, CEO of Lexihealth Ltd, London, UK

One of the reasons is that the UK boasts a unique blend of internationally acclaimed institutions such as The London Bridge Hospital, BUPA Cromwell, Great Ormond Street, Moorfields, and The Portland, all within easy reach of each other.

International health concierge services are delivering rapid access to the best healthcare in the UK for private patients from around the world and the Middle East.

A “private health tourist” is someone who is prepared to travel beyond the borders of their native country, often with their families and loved ones, in search of the finest medical and healthcare expertise.

The UK continues to attract a large number of overseas patients especially from the Middle East and this is set to rise as we invest more in technology, communication and transport, not to mention healthcare concierge. Increasingly more people are willing to travel from the MENA (Middle East and North Africa) region to be treated by the best doctors and consultants in their fields.

Quality, access and convenience has meant that opportunities, including appointments and same-day diagnosis, rapid response multi-disciplinary review teams (MDT), second opinions and emerging treatments are becoming more and more sought after.

Why is this and what singles out the UK as a centre of excellence in the healthcare market?

One reason is the UK boasts a unique blend of internationally acclaimed institutions such as The London Bridge Hospital, BUPA Cromwell, Great Ormond Street, Moorfields, and The Portland all within easy reach of each other. The country also features the Queen Elizabeth Hospital Birmingham, Centre for Defence Healthcare Engagement, through to the Centre for Endocrinology, Diabetes and Metabolism.

Combine this with enough world-class consultants to populate a town and you have some of the single biggest concentrations of medical practitioners and facilities in the world. This means everything is on your doorstep and there has never been more choice between consultants, hospitals and clinics covering the full range of healthcare services and medical treatments.

In my role as CEO of the Health Concierge Company Lexihealth, I would like to think we have helped to play a part in this.

Health concierge is a relatively new concept in the UK and for “health

tourists” concierge support is a critical addition for navigating the myriad of medical choice on offer and to access the best possible healthcare. With choice comes complexity. So how do you know which specialist is best for you? How can you be certain the hospital or clinic being offered has the highest reputation, or respects your personal or cultural needs? Where do you start? How do you know you are finding your way to the best possible care for you with absolute transparency on pricing?

Less seasoned travellers may target the nearest, often cheapest services: however, those in the know tend to follow a strict list of key requirements.

Dedicated health concierge manages the often-complex healthcare journey, from appointment negotiation to all the administration associated with one’s treatment.

It is about empowering patients by providing unparalleled access to the world of healthcare, ensuring complete transparency, convenience and choice at all times during their journey and removing all of the stress associated with the complexity of navigating the healthcare system. It offers a personalised and co-ordinated quality care with a discreet, bespoke, handheld concierge service throughout. A single point of contact with dedicated patient liaison managers is assigned to each case to organise appointments, screenings and treatments at times and in locations to suit the patient. Health Concierge is about enabling a patient’s best outcome approach by providing transparency, complete independence, trust and quality care. We want to ensure the patient gets from A to B as efficiently as possible having seen the right specialists first time around and with the highest patient satisfaction as the outcome.

I believe the UK leads the way with exceptional clinical governance and the highest medical standards for the benefit of private patients. I am also a firm believer in absolute transparency on treatment costs for healthcare with UK pricing structure meeting the needs for everybody irrespective of domicile or status. For example, at Lexihealth, we are guided by an independent Medical Advisory Committee (MAC) drawn from the world’s leading physicians and these clinicians personally assess and

approve each consultant and specialist service before a single patient is referred.

Another important aspect is offering family-centred holistic care for families and loved ones accompanying the patient. It can be a stressful time and to make the patient journey as easy as possible, the health concierge service can provide day-to-day assistance with any number of lifestyle requests such as renting accommodation, schooling, travel arrangements, booking hotels and restaurants, to organising translators, chauffeurs, city guides and itineraries. No request is ever too small.

Our world is changing at an astonishing rate and healthcare is no different.

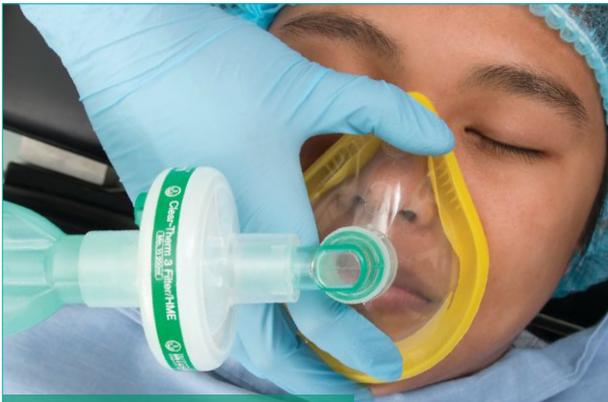
Good healthcare and well-being are the most important matters for each of us and the world is learning more about the extraordinary variety of specialities, treatments and facilities that are available to us in healthcare. Advances in medical research and embracing the power of data science and personalised medicine, has meant that healthcare is getting closer to obtaining a much clearer picture of a person’s future risk disease profile and to tailor preventative treatments to their individual needs.

The UK is a leader in quality evidence-based clinical practice which encompasses the breadth of tertiary level global experience and I have noticed an increase in screening packages among busy individuals who want to maintain their health to the highest standards. The approach is very much now about preventative medicine and one can look at the age profile, demographics, genetics and any family history and then design a screening package that can be undertaken in just 48 hours.

Ultimately, it is about the quality of care and health concierge is about bringing all of these world-class doctors and facilities together to represent the patient in the centre of it all.

New Offering at Arab Health 2019

One of the new projects Lexihealth is involved in is a new international patient offering, which will be launched at Arab Health 2019 by Birmingham’s ►



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Edgbaston Medical Quarter. The new medical concierge package supports patients who choose to be treated in Edgbaston – guiding them through every aspect of their treatment such as choosing the right consultant to finding the best place to stay.

Edgbaston Medical Quarter offers some of the best places to be treated, particularly in oncology, trauma, diabetes and fertility and has become an ideal place for international patients to seek treatment.

Located in the heart of the UK, Birmingham is ethnically diverse with 5.6m population within wider Birmingham. Birmingham International Airport has direct routes to Dubai and other Middle East cities and is only a 10-minute train ride to the centre of the city. Birmingham is also a centre of excellence for healthcare and life sciences, and The Queen Elizabeth Hospital Birmingham is a state-of-the-art facility that recently featured in a *BBC* series focused on its surgical excellence. Its new private wing is due to open this year.

Within walking distance of many of the medical and healthcare providers, accommodation options range from four-star luxury hotels and high-end boutique hotels to more informal arrangements. For longer stays, there are family group sumptuous hotel suites and apartments to choose from.

Edgbaston Medical Quarter offers a wide range of accommodation options, that can be selected to suit the individual patient needs, along with leisure activities. Close to the hotels are world-class art galleries, Edgbaston Cricket Stadium and Birmingham Botanical Gardens. There are 571 parks in the city and it also boasts some of the other finest shopping and entertainment in the UK including the Bull Ring shopping centre featuring a Selfridges department store, theatres, sports arenas, cinemas and more. It is also home to six Michelin starred restaurants and is a one-hour commute to Bicester Village, which specialises in luxury shopping.

Patients choose Edgbaston because of its healthcare excellence, ease of access, value and the fact Edgbaston Medical Quarter's medical facilities sit alongside thriving leisure and lifestyle communities. Friends and family can enjoy award-winning places to eat and a host of arts, leisure and sports facilities. It also is a culturally diverse and welcoming city, with beautiful green open spaces, which are the perfect place to relax and recover. **AH**

To learn more about the package, visit the Edgbaston Medical Quarter stand in the UK Pavilion, hall 7.



Annabelle Neame is the CEO and founding partner of Lexihealth Ltd, a leading, impartial self-pay health concierge service in the UK

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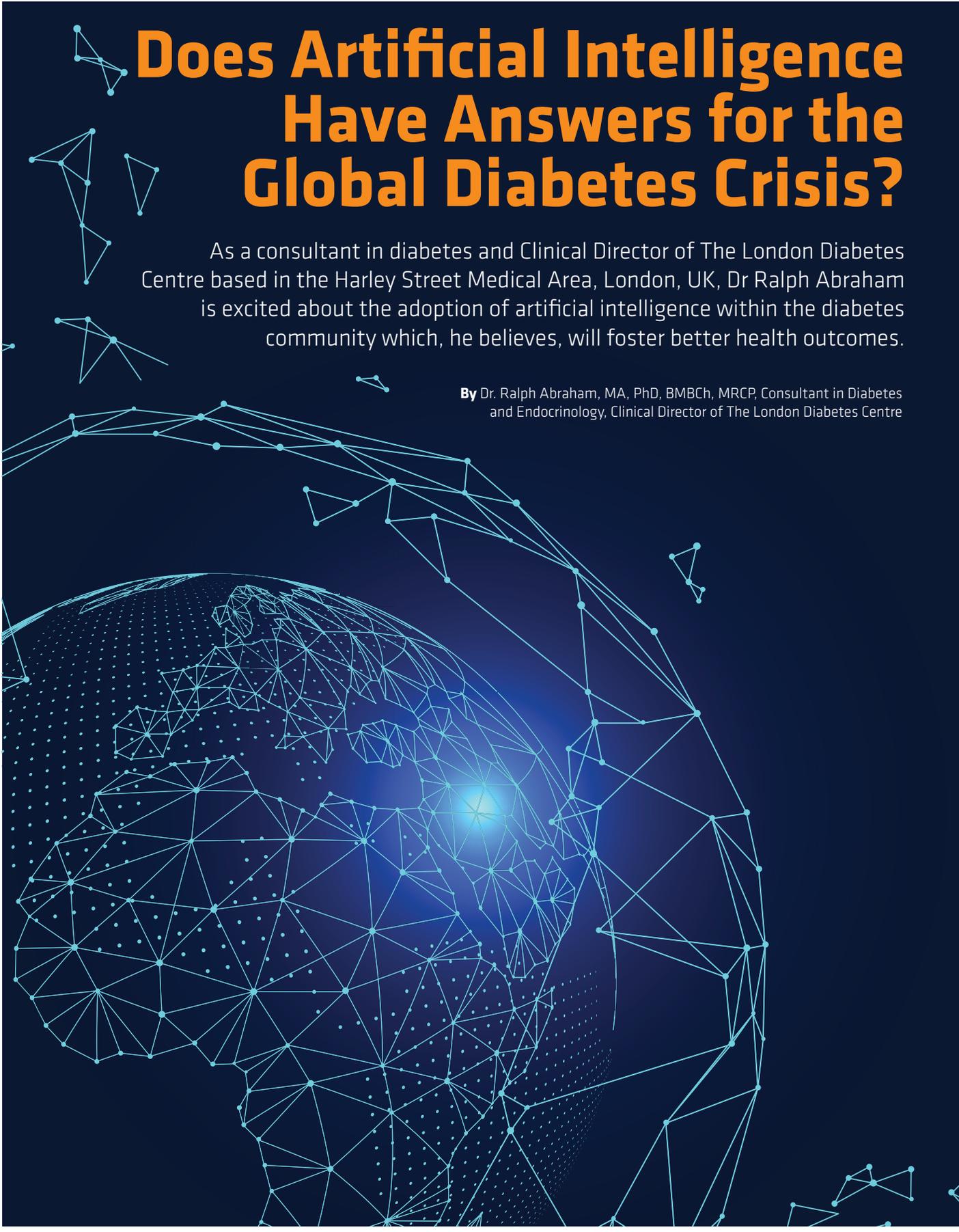


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Does Artificial Intelligence Have Answers for the Global Diabetes Crisis?

As a consultant in diabetes and Clinical Director of The London Diabetes Centre based in the Harley Street Medical Area, London, UK, Dr Ralph Abraham is excited about the adoption of artificial intelligence within the diabetes community which, he believes, will foster better health outcomes.

By Dr. Ralph Abraham, MA, PhD, BMBCh, MRCP, Consultant in Diabetes and Endocrinology, Clinical Director of The London Diabetes Centre

Globally, diabetes is on the increase. The World Health Organization's 'Global Report on Diabetes' published in 2016, estimates that 422 million adults were living with diabetes in 2014, compared to 108 million in 1980.

The global prevalence (age-standardised) of diabetes has nearly doubled since 1980, rising from 4.7 to 8.5 per cent in the adult population. This dramatic rise reflects an increase in associated risk factors such as being obese or overweight.

Over the past decade, diabetes prevalence has risen a lot faster in low and middle-income countries than in high-income countries.

In the Middle East and North Africa region (MENA) region, diabetes is a huge problem and one that is growing rapidly. There are approximately 38.7 million adults aged 20-79 years living with diabetes in 2017. Over two-thirds (67.3 per cent) of adults with diabetes live in urban areas.

According to International Diabetes Federation (IDF), six out of the top 10 countries for highest prevalence of diabetes are in the MENA region – Kuwait (23.1 per cent), Lebanon (19.8 per cent), Saudi Arabia (23.9 per cent), Bahrain (21.9 per cent) and UAE (19 per cent).

Diabetes is a growing and insatiable condition throughout the world, but the greatest and the fastest rise in the number of people with diabetes is in the MENA region, China and India. The disease affects all ages from the very young to the very old and has the greatest impact on health of all conditions, including cancer, as it contributes to blindness, heart attacks and kidney failure.

Diabetes is a chronic disease that occurs either when the pancreas don't produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycaemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels.

The disease can lead to complications in many parts of the body and can increase the overall risk of premature death. Possible complications include blindness, kidney failure, heart attacks, stroke and lower limb amputation. In pregnant women, poorly

controlled diabetes increases the risk of foetal death and other complications.

As Founder of The London Diabetes Centre, I work with a large team of experienced diabetologists specialising in different types of diabetes in children and in adults and using the latest technology with pumps and sensors. We are assisted by an obesity service, which can achieve sustained weight loss, and also have sleep apnoea and fatty liver experts, endocrinologists, ophthalmologists, nephrologists and cardiologists – so that every single aspect of the ramifications of this complex disease can be recognised and treated. We use advanced techniques and modern drug combinations to achieve the best in preventing heart, eye and kidney damage in our patients and have successfully done so for many years.

Globally, I also advise industry and colleagues on best standards of care and conduct lectures on new treatments in diabetes. As an early adopter of new solutions that improve diabetes care, I place the needs of the patient first to get the right solution for the right patient. It is so important that generalised population solutions are not thrust upon patients who may not be able to understand or manage their therapies.

However, the best diabetes care requires regular attendance and support from diabetes educators, monitoring of many disease areas, and considerable expertise and experience. This is going to be increasingly difficult to achieve or afford with the worldwide increase in diabetes numbers.

A report published in *The Lancet* 'Diabetes & Endocrinology' supports this claim. It states that the cost of diabetes worldwide was US\$1.31 trillion, or 1.8 per cent of the global gross domestic product (GDP), in 2015. The study of the global economic burden of diabetes showed that two thirds of these total costs were direct medical costs (US\$857 billion) and one third were indirect costs, such as lost productivity. Extensive treatments for diabetes and complications from the disease account for a lot of these costs, making it one of the most expensive diseases to treat in many parts of the world.

In 2014, 8.5 per cent of adults aged 18 years and older had been diagnosed with diabetes. In 2015, diabetes was the direct cause of 1.6 million deaths and in 2012, high

blood glucose was the cause of another 2.2 million deaths.

It can thus be seen that diabetes is not only a global health problem because of its effect on mortality, morbidity and quality of life, but it is also a major problem for national economies. Out of all conditions, diabetes now creates the largest costs for any healthcare system.

So, What is the Solution?

I believe that diabetes is currently going through a technological revolution with venture funding in 2017 reaching US\$6 billion and investment in high tech companies working in this space now showing a compound annual growth rate of over US\$7 billion.

The driver for change is the improvement in acceptable glucose sensing and the smartphone which, when used together, have been shown to make substantial and significant improvements to diabetes long-term management. Soon we will be able to add continuous ongoing ECG and pO2 measurements to an array of physiological sensors monitoring health.

Wireless technology has led to improvements in the ability to educate and to support people living with this long-term condition. I have witnessed enormous changes and improvements in diabetes care in the 40 years I have practised as a clinical diabetologist in London, but I have never previously experienced the extent and speed of change as seen in the last three years.

With the forthcoming introduction of smart medicine and wearables (e.g. smart insulin pens and medication tracking devices), the scene is set for substantial changes in which diabetes care is offered, giving patients many more options to successfully live and manage their condition.

I believe that there is a substantial and increasing gap between the expertise available in specialist clinics such as The London Diabetes Centre in London, where many patients are seen every year – and the huge numbers of people who need education, technology and resources with which to treat their diabetes.

The key requirement for successful care in diabetes is to help a patient understand that their knowledge and behaviour are integral to any successful strategy. ►

Traditional models of healthcare need to change and we now use the smartphone and social networks to harness these models of affecting a change in a person's approach to chronic disease. This is where Artificial Intelligence will play a part. Already at The London Diabetes Centre, we download glucose test information on all our patients and use email and video to effectively support what we were never able to deliver in the past.

Artificial Intelligence (AI) is a branch of computer science that is increasingly able to contribute to improving care in diabetes because of its ability to handle large amounts of complex data generated by the increased use of glucose sensors and insulin pumps.

AI employs learning techniques that permit computers to learn automatically without human intervention or assistance. Clearly, the health outcome will depend considerably on the quality of the data being processed and its verification in real life application.

Currently, there is an active interest in blood glucose control strategies, blood glucose prediction, insulin bolus calculators and lifestyle and daily support algorithms. Some of the most interesting are those that analyse

and capture glucose-insulin dynamics.

A real-time recurrent learning algorithm that models the blood glucose kinetics of people with Type 1 diabetes would have the ability to predict blood glucose levels and could help abolish two of the most costly and dangerous emergencies – coma that results from too low a blood glucose or that results from too high a blood glucose.

Already we have a small community using open access closed loop pumps, which keep glucose levels within the desirable range and avoid undesirable lows and highs. Along with this are implantable sensors that are going to make these technological wearables more acceptable to patients, and alerts for patients, their doctors and their reimbursement agencies that will help identify inefficiencies so that resources and efforts can be selectively directed for best outcomes. Likely areas for early success will be diagnosing diabetes with wearable sensors and analysing patient phenotypes so that behaviour and outcomes can be predicted. Progress does not occur without its own barriers and these include usability, patient acceptability, real clinical outcome benefit, safety and data privacy

Artificial Intelligence is going to play a greater role in medicine and governments and health agencies will increasingly look to using health data to better allocate resources and to alert and educate users on how they can help themselves. ^{AH}

References available on request.



Dr. Abraham will be speaking on 'Avoiding Diabetic Emergencies Using Technology' on January 30 at the Emergency Medicine Conference, at Arab Health Exhibition and Congress



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Changing the Future of Diabetes Through Research

Article provided by Al Jalila Foundation

Al Jalila Foundation, a global philanthropic organisation founded by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai in November 2012 to position the UAE at the forefront of medical innovation, encourages groundbreaking research through specialist knowledge, expertise and resources across a range of scientific disciplines to support regionally-relevant medical advancements.

With an estimated one in five people diagnosed with diabetes in the UAE, it is evident that there is a critical need to invest in relevant local research and drive awareness on the subject. To date, Al Jalila Foundation has awarded 15 grants dedicated to diabetes research in the UAE.

One recipient of the Jalila Foundation grant for diabetes research is Dima Abdelmannan, MD, Consultant Endocrinologist, DHA, Associate Clinical Dean, Dubai Medical College, whose topic for research is the development of a simple test for the assessment of future type 2 diabetes mellitus (DM) risk in subjects with normal glucose tolerance.

Type 2 diabetes has reached an epidemic proportion in Arab countries including the UAE, where approximately 20 per cent of the adult population has the disease. Prevention of the development of type 2 diabetes mellitus will have enormous impact, not only on public health, but also on healthcare expenditure. Moderate weight loss and pharmacotherapy can significantly prevent/delay diabetes onset in high-risk individuals, meaning that identification of subjects at high risk for future type 2 diabetes mellitus is essential for every diabetes prevention programme.

Dr. Abdelmannan's study will examine the ability of a single administration of dexamethasone in subjects with normal glucose tolerance to determine their future type 2 diabetes mellitus diabetes risk. This simple test will provide a useful tool to be utilised in clinical practice to identify subjects



at increased risk for type 2 diabetes mellitus at the NGT stage.

In an interview, Dr. Abdelmannan discusses her chosen topic of research, the current challenges to overcoming diabetes in the UAE, and speaks on the current gaps in research on diabetes in the UAE and the wider region.

1. Briefly, can you describe your research, and why you chose this particular topic? How does this test differ from what's already available?

Our research study looks at the ability of a simple blood test to identify individuals at high future risk for type 2 DM early while they still have normal glucose tolerance test. The study is unique because unlike most studies, which address the disease or its complications, we are trying to look at very early prevention. Such a simple test will provide a very useful tool to be utilised in clinical practice to identify subjects at increased risk for Type 2 DM and allows much earlier intervention to prevent/delay the onset of T2DM.

2. What, according to you, are the current challenges to overcoming diabetes in the UAE?

Some of the major challenges in overcoming diabetes in the UAE are that despite all the ongoing efforts to increase awareness about the disease, there is a huge gap in

education. Education about pre-diabetes and how to prevent/slow its progression, education about lifestyle interventions, and education about adherence to adopting healthy lifestyle habits and to medications when they commence, are severely lacking across the society.

3. What do you think are traits of the disease which are specific to the UAE?

The traits specific to the UAE (and the Gulf region) are both lifestyle challenges as well as genetic predisposition.

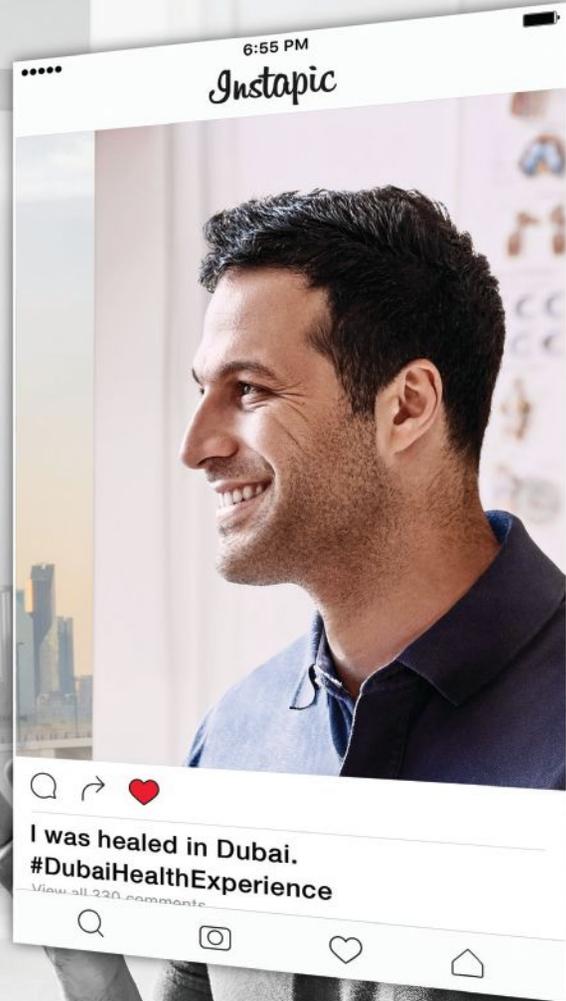
4. What needs to be done on a societal level to overcome the prevalence of diabetes?

Adopting a healthy lifestyle goes a long way to improving the instances of diabetes but spreading this message is also integral to improving statistics. Lifestyle education that combines both the adoption of healthy eating habits and exercise can be considered a powerful tool in combating the high rates of diabetes prevalent in our society. Implementing more diabetic education programmes and efforts to increase awareness about early identification of the disease, its risk factors and complication, are required to overcome the increasing epidemic of diabetes in the UAE and beyond.

I think there should also be more collaboration between entities such as hospitals, universities and researchers, health authorities, schools, etc., to shape the best way forward.

5. What are the current gaps in research on diabetes in the UAE and wider region?

Some of the gaps, I believe, lie in the lack of consolidation of the efforts that are put in this field. There are many attempts that are taking place at different levels – awareness, diagnosis, treatment; however, at the same time, we see too much fragmentation. **AH**



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DUBAI

THE WELLNESS TOURISM HAVEN FOR TODAY'S HEALTH-CONSCIOUS TRAVELLER

Article provided by Dubai Health Authority

Wellness tourism has evolved to become tourism industry's fastest growing sector, recording a 10 per cent growth this year to make it a larger than US\$500 billion market and a rapidly advancing niche within the global tourism economy. This remarkable growth is marked by a profound shift in the way wellness services are being perceived and consumed. Previously seen as luxury or add-on services, they are now being woven into every aspect of daily lives, making them part of work, travel, leisure and healthcare. Capitalising on their increasing popularity, a greater percentage of enormous multi-trillion industries such as real estate, food and beverage and travel are incorporating wellness services into their businesses.

With the awareness on fitness and well-being becoming widespread than ever, different sectors are competing to develop innovative wellness services and packages to meet varied needs of health-conscious customers. Availability of in-room yoga mats and other

advanced fitness facilities in hotels are examples of this growing trend. The demand for wellness services is expected to remain steady in light of the growing focus on stress management.

The current global wellness trends, as identified by the *2018 Global Wellness Trends Report* include transformative wellness travel; the wellness kitchen; an increased focus on health and lifestyle of parents during the six months before they conceive a baby; extreme challenges; treatments and experiences that aim to redefine human limits; efforts to sustain happiness; and the feminist wellness trend built around women empowerment.

Real estate properties that offer recreational and wellness facilities are attracting and catering to the growing demand of discerning customers. Meanwhile, modern workplaces are also creating wellness initiatives to help employees better cope with stressful, hectic work environments and lifestyles that hamper their work and outputs. Companies are embracing the culture of encouraging employees to maintain physical

and mental health and well-being.

Boasting an array of world-class spas, wellness centres and health facilities, Dubai has undoubtedly become a unique travel destination for today's health-conscious traveller. The incorporation of traditional healthcare practices such as Ayurveda, Homeopathy and Yoga that place greater emphasis on preventive health into service offerings has played a significant role in the growth in this niche sector. Several wellness centres across the city have loyal clientele that keep visiting every year. The Medical Tourism Index 2016 ranked Dubai number one in the Arab world and 16th globally, further boosting the emirate's aspirations to attract half a million tourists a year by 2020.

With a range of medical spas and treatment centres, Dubai's appeal to a wider range of audience who are on the lookout for well-being-related treatments of international standards is steadily rising. In response to this, the emirate's wellness services market remains poised to provide visitors with a unique

wellness experience of global standards, with the help of state-of-the-art technology and highly specialised and educated staff. The emirate's capability in health and wellness is further being enhanced through the continuous development of a range of smart technologies such as Artificial Intelligence and other electronic platforms, making Dubai on par with global initiatives which promote digital transformation in tourism.

The UAE wellness and spa travel market, comprising both inbound and domestic travellers, represents roughly 15 per cent of the total tourism market. Authentic Middle Eastern spas, wellness experiences and beauty traditions such as *hammam*, are gaining traction which only signifies the growing importance of this sector.

Wellness tourists to the emirate are also increasingly pursuing various outdoor activities that add value to their travelling experiences and personal well-being. Customers spend on various relaxing and rejuvenating activities such as sauna

therapies, yoga, massages and spas in addition to cosmetic procedures such as anti-ageing therapies. Travellers' quest for options to maintain health and fitness while travelling or while on holidays is shaping the growth of wellness tourism market in the UAE.

DHA's Health Tourism Department's partnership with Emirates Holidays, the tour-operating arm of Emirates Airline, to offer visitors customised health and wellness holidays in Dubai reflects its keenness to boost the market's growth. The Health Tourism Department has accelerated its efforts to support Dubai in its journey to become the most-preferred global health tourism destination and a hub for premier accredited healthcare facilities, in addition to providing a memorable holiday experience to visitors.

Dr. Layla Al Marzouqi, Director of Health Tourism Department at the Dubai Health Authority notes: "Dubai's attractiveness as an ideal leisure and tourism destination has been extending its scope in recent years to include health and wellness as another reason

to visit the emirate. The growing number of visitors experiencing the world-class health and wellness facilities in Dubai attests to the valuable services available in numerous packages the emirate has to offer and we are keen to continue developing this sector to provide excellence and happiness, a lifestyle that is deeply embedded in Dubai's culture."

Vyara Tosheva, Manager of East Crescent Wellness and Spa at the Palm Jumeirah, says: "Our range of signature wellness treatments prioritise healing of mind over healing of body, ensuring long lasting results and wellness. Currently, around 10 per cent of the hotel's guests approach us seeking our services and we are working towards increasing this to minimum 15 per cent next year. Our client base includes UAE residents, nationals and expatriates, with expatriates coming predominantly from Kuwait and Oman. Europeans who come seeking our treatments include mostly French nationals, followed by UK residents. Detox, energy healing, holistic weight loss and holistic anti-ageing are the most sought-after treatments." ^{AH}



UAE IS SET TO BECOME HUB OF
**MEDICAL
TOURISM**

By Jai Verma, Senior Executive Officer and Global Head of B2G at Cigna International

An informal survey recently put the healthcare industry at the top of the key industrial sectors earmarked for growth in the GCC in 2018. Along with the education and F&B sectors, the healthcare industry is set to grow by leaps and bounds primarily because it is not affected by fluctuating oil prices.

Over the last decade, the healthcare industry has emerged as one of the most critical sectors for pursuing economic diversification in the GCC. Governments have started looking at private sector involvement as an alternative to sustain healthcare funding since oil prices started dipping. Public-private partnerships are being promoted, mandatory insurance coverage rolled out and private players being encouraged to set up facilities. The sector is also undergoing a structural shift as a younger, more health-conscious population is seeking preventive care rather than curative care.

Medical tourism is known to be growing across global markets, with estimated annual revenues of US\$50 to US\$65 billion and an annual yearly growth of approximately 15 to 20 per cent. Many countries in Asia like India, Singapore, Thailand, South Korea and China are investing millions of dollars to support the increase in demand for access

to quality care across borders.

Abu Dhabi is already gearing up for the race. The Department of Culture and Tourism – Abu Dhabi (DCT) recently signed a memorandum of understanding with the Medical Tourism Association (MTA), a non-profit organisation that aids healthcare providers and governments in creating successful medical tourist programmes. Both entities will partner to promote Abu Dhabi as a medical tourist destination in markets such as Russia, China and the GCC, with focus on specialty areas like cardiology, oncology and executive screenings. The aim is to become the region's leading medical tourist destination.

The 10-year agreement includes the opening of the MTA's first office in Abu Dhabi, as well as the hosting of the World Medical Tourism and Global Healthcare Congress in Abu Dhabi next year, with hundreds of experts and organisations from more than 100 countries expected to take part.

The emirate had earlier kicked off a major drive to attract more medical tourists this year with a partnership between the Department of Health and the Department of Culture and Tourism. A worldwide marketing campaign is being planned to establish the

city as a centre for medical tourism.

The campaign will highlight specific areas of medical excellence like open-heart surgery and cancer treatment, which are not common in the region. The emirate also plans to add a 'tourism touch', with packages that offer discounts on attractions for families accompanying the patients.

Dubai too is upping the stakes. The medical tourism industry generated more than AED1.4 billion for Dubai in 2016. The city received 326,649 medical tourists, an increase of 9.5 per cent over the previous year. The most popular areas of treatment for medical tourists last year were orthopaedics, dermatology and ophthalmology.

At 37 per cent, Asian medical tourists were the largest segment of visitors. Arab and GCC countries were the second largest market, accounting for 31 per cent of tourists, and visitors from Europe accounted for 15 per cent of the total.

The reason why medical tourism is increasing rapidly is the rising healthcare costs in western countries and the lack of insurance coverage for certain procedures. People are willing to travel to other countries to seek medical, dental, and surgical care that is not available, or they cannot afford at home. ▶

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Global healthcare spending is projected to increase at an annual rate of 4.1 per cent in 2017-2021, up from just 1.3 per cent in 2012-2016.

Ageing Population

By 2030, older persons are projected to account for one in six people globally. The ageing population is estimated to grow by 56 per cent from 901 million to 1.4 billion, which is clearly a growing market. By 2050, the number of people over the age of 80 would reach 434 million, having more than tripled in number since 2015. With these figures, there is obviously an enormous potential market for medical tourism.

Global healthcare spending is projected to increase at an annual rate of 4.1 per cent in 2017-2021, up from just 1.3 per cent in 2012-2016. Ageing and increasing populations, developing market expansion, advances in medical treatments, and rising labour costs are expected to drive spending growth.

Life expectancy is estimated to increase by more than a full year between 2016 and 2021 – from 73 to 74.1 years – bringing the number of people aged over 65 to more than 656 million, or 11.5 per cent of the total population. Much of the gain in life expectancy globally is due to falling infant mortality rates.

According to a 2015 Deloitte report,

healthcare spending growth in North America is projected to rise by an average of 4.6 per cent annually up to 2019, largely driven by expanded insurance coverage in the U.S. under the Affordable Care Act. Canada is projected to see even faster spending growth during the same period – 4.8 per cent annually – reflecting its older population.

The same is true across the world. Take Germany as an example. The gradual ageing of its population – more than 20 per cent is aged 65 or older (behind only Italy and Japan among OECD countries) – is expected to increase demand for treatment of conditions related to old age and for elderly care.

Along with improvement in medical environments and hygiene, Japan has become a country with one of the longest lifespans. However, the rapid improvement in the mortality rate has combined with the decline in birthrate to cause a major skew in the composition of the population, resulting in Japan having the largest population ratio of persons aged 65 years or older in the world. Furthermore, Japan is expected to become the most rapidly ageing society in history, with the

population aged 65 years or older in the Tokyo metropolitan area increasing by 27 per cent in only 10 years from 2010.

However, the healthcare infrastructure in developed countries is not growing in line with the ageing population and this will increase the demand for travel for care. The resulting stress on the social health delivery systems in regions like EU and countries like the U.S., Canada, Japan, UK, China and South Korea will be advantageous for medical tourism hubs like the UAE. Patients with higher disposable income would be able and willing to travel cross border for care.

Gearing Up

The time is ripe for UAE to take the lead in health tourism too. But for this it will have to beef up the existing infrastructure.

However, the UAE has a strong health regulation framework, which has helped ensure quality healthcare, a catalyst for medical tourism. Investment in the medical sector from both the government as well as the private sector is also supporting related economic growth, with the UAE accounting for 26 per cent of total GCC government



health care spend in 2016, according to an Alpen Capital report.

Medical tourism is expected to contribute US\$708 million to the GDP by 2020, with 13 per cent predicted year-on-year revenue growth, according to the Dubai Health Authority (DHA), which is in the process of adding 40 primary healthcare centres and three new hospitals under its 12-year master plan.

Pharmaceuticals and medical equipment are also two of the priority sub-sectors listed under the 2030 Dubai Industrial Strategy, which aims to promote the emirate as a global platform for knowledge-based, sustainable and innovation-focused businesses.

The UAE Ministry of Health plans to have 34 indigenous pharmaceutical manufacturing factories by 2020. The market value of UAE's pharmaceutical industry is projected to go up from AED9.5 billion at present to AED25 billion by 2025.

Innovative Marketing

In April 2016, the Health Tourism Council launched the world's first medical tourism portal, Dubai Health Experience (*dxh.ae*), offering access to a comprehensive menu of health and related services including wellness, cosmetic and dental packages, plus ophthalmology, orthopaedics, physiotherapy and other specialised medical tests.

Forty-five healthcare providers are listed in the portal, which can also be downloaded as an Android app. Over 400 different healthcare packages are on offer. Discounted airfares, visa services and hotel partner recommendations are also a part of the package.

Challenges and Opportunities

International tourism is at an all-time high, with as many as 1.32 billion tourists recorded to have travelled internationally in 2017. These tourists either go on holiday, or for reasons such as relocation and new jobs. This demonstrates a huge opportunity that global health insurance companies can tap in to.

Having said that, the low levels of awareness about the benefits of global health insurance in several emerging markets, which also significantly feed into the medical tourism segment, continues to be a challenge. There needs to be concerted effort to realign the perception of affordability over need-based health services, which can only happen with a consistent and focused effort to educate and inform.

Government's Role

Throughout Europe, Middle East and Asia, the volume of international patients has been growing in the past 15 years, with developing countries gaining a larger market share. Healthcare spending is on the rise across the globe, and governments are increasingly realising the importance of investing in healthcare to drive patients to their country. In the UAE, more and more private players are being encouraged to enter the healthcare sector. These investments are necessary to make the country more attractive for medical tourists. Clearly, countries that focus on building the right quality of care at the right cost and supporting infrastructure will win in this space.

Advantage Middle East

One of the most crucial factors that makes the Middle East an ideal medical tourism hub is its strategic location. The UAE, for example, is only an eight-hour flight away from two-thirds of the world's population. That is part of the reason why the country, and particularly its commercial hub, Dubai, is on track to becoming a global medical tourism destination.

The need to build world-class healthcare is one of the pillars of the National Agenda, and the UAE government is driving massive efforts to ensure seamless collaboration to build an effective healthcare system. This opens a valuable opportunity for global service providers to exchange expertise and capabilities.

From improving healthcare experiences, to raising awareness on effective health coverage and health management, they must seek to address some critical gaps in the region's healthcare sector.

Lifestyle-related Diseases

One of the most significant drivers of growth in medical tourism, apart from an ageing and growing population, is the high incidence of non-communicable diseases. In fact, the high prevalence rates of lifestyle-related conditions such as obesity and diabetes in the GCC suggests that many future medical and wellness tourists may be from neighbouring countries. To meet this demand, we must also focus on developing healthcare experiences that are focused more on wellness, as opposed to a treatment-based approach.

Role of Health Insurance

The healthcare ecosystem is made up of various stakeholders, from providers to regulators and insurance service providers. The development of a successful medical tourism hub is extremely dependent on each of these elements combining their strengths to offer a seamless, integrated healthcare experience. Access to global coverage and local expertise serves to support medical tourism in regional markets. **AH**



Verma has 20 years of experience across multiple industries and countries, including first-hand exposure to new market development in Asia Pacific, Middle East, Africa, Europe and the U.S.

EIGHT DRIVERS

for Medical Tourism in 2019

By Josef Woodman, Founder and CEO, Patients Beyond Borders

Nearly 100 million patients have crossed international borders for medical care since the beginning of this century, and even greater numbers have travelled within their own country for unavailable treatments closer to home. In 2019, more than 20 million patients will continue this practice. These international patients pursue medical care ranging from basic health or dental check-ups to complex, life-saving procedures. While the fundamental drivers—access to quality care and affordability—will remain in place this year, six key trends point to sustained growth in clinical quality and patient experience.

1. Raising the clinical trust bar: A critical mass of international accreditation helps bring universal standards to clinical process and patient safety, offering improved choice to cross-border patients and building increased trust throughout the global healthcare community. The U.S.-based Joint Commission International (JCI) has now accredited more than 1,000 hospitals, up from 87 just 10 years ago, an eye-popping 500 per cent growth. More than one-third are in the Middle East, with UAE topping the list at 188 accredited facilities. China, where rapid healthcare infrastructure development is finally beginning to resolve decades of insufficient patient access, now boasts more than 100 JCI-accredited facilities, and health officials expect that number to double by 2025.

Other international accreditors report brisk business as well, including Temos (Germany), which has awarded nearly 70 hospitals and clinics to date. MTQUA (Thailand), specialising in medical travel certifications, has awarded some 60 facilities since its inception in 2014. Expect to see new and established accreditors—such as AAAHC

and AAAASF—ride the quality train.

2. The rise of the OMA: The success of online travel agencies (OTA's), such as Expedia, Booking.com, TripAdvisor, and Ctrip has paved the way for the parallel healthcare vertical, online medical agencies (OMA's). These third parties facilitate unassisted bookings, enhance the international patient experience with concierge services, and follow a commission-based revenue model. Leading the field is Bangkok-based Medical Departures and its sister company Dental Departures, having logged more than 100,000 bookings and over 42,000 verified patient reviews. CEO Paul McTaggart reports that unassisted bookings have risen by +125 per cent over the past five years, even for complex treatments, an indication of growing patient comfort with the model.

Other online healthcare players on the radar: Quonomedical (Germany), GetDoc (Malaysia), and Practo (India). To date, large U.S.-based OMA's such as ZocDoc (U.S.), HealthGrades (U.S.), and RealSelf (U.S.) have not yet spread their wings into the global healthcare arena. Expect their entry soon.

3. Health insurers not coming to the rescue: I am surprised by the number of healthcare leaders who continue to believe that the insurance industry will eventually embrace medical tourism. In truth, all the large U.S.-based carriers—Cigna, Aetna, Generale, and Allianz—have long since abandoned this perfectly reasonable, workable model, where a high-deductible policy offers travel coverage and other incentives to create a win-win for both patients and health plans. The reason why this is hiding in plain sight: member hospitals and clinics are relentlessly squeezed for greater discounts on

negotiated rates, and have no appetite for the further humiliation of seeing their patients (and margins) exported to far-flung lands.

Even without the participation of big health plans, the marriage of consumers to carriers is inevitable. In the U.S., third-parties such as IndusHealth have made real progress targeting mid-sized self-insured employers. Outside the U.S., Berlin-based Medigo is giving third-party administration a try, focusing initially on the EU market.

4. But hark! Medical tourism is seeing healthy growth: Despite a lack of institutional and corporate support, international healthcare travel is set to grow at 15-20 per cent in 2019. Fuelled by greater access to quality care (see "accreditation" above), consumers in overpriced healthcare economies (such as the U.S., Canada the UK and most of the EU) are aggressively seeking affordable options, while those in rising economies (such as China and Vietnam), are travelling for the best available care without regard to price. International hospitals and clinics, hungry for attractive margins and heightened prestige, are competing aggressively for global patients.

Expect to see even greater growth in regional patient flows, including North America to Mexico and Costa Rica; Australia and New Zealand to Southeast Asia; and EU countries to Eastern Europe.

5. More growth from China: As China struggles to improve healthcare access and resolve issues of extreme air, water and food toxicity, affluent Chinese are seeking cross-border care in record numbers. Medical centres in the U.S., Singapore, Malaysia, and Thailand are seeing a significant rise in the volume of Chinese patients seeking treatment for complex conditions, especially

cancer and respiratory diseases. Middle Eastern destinations such as the UAE are also vying for Chinese patients. In September 2018, Dubai Healthcare City announced a tie-up with a third-party agent to promote its services in Macao.

Ed McCarthy, VP for the Center for International Medicine at the U.S.-based City of Hope National Medical Center, reports growing numbers of adult and paediatric Chinese patients seeking treatment for lung and blood cancers (lymphoma, leukemia) as well as cancers of the gastrointestinal tract, breast, prostate, and brain. Southeast Asia's leading international hospital, Bumrungrad International reports a similar increase in Chinese patients seeking treatment for high-acuity orthopaedic, brain and spine, cancer, liver, and kidney procedures.

In addition to the demand for disease-specific medical care, some 40 million Chinese women are struggling to conceive a child since China's one-child policy was lifted in 2016. While fertility clinics are opening throughout China at a rapid rate, the perception of poor clinical quality and patient services will keep concerned couples travelling for at least the next decade in search of the best outcome and a happy, healthy newborn.

6. It's either mental or dental: It's unavoidable—our bodies generally outlive our teeth. Most of us will eventually require major restorative dentistry, particularly as affluent populations live well into their 80's and beyond. Even as dental health is increasingly and inextricably linked to general health and well-being, complex dental procedures remain overwhelmingly elective (and expensive) for most patients. This lack of coverage ensures market growth, with dental tourism expected to increase at a 30 per cent clip, the highest rate within the medical tourism sector.

7. Millennials on the march: Unlike their moms and dads, young women and men in affluent economies have developed a distrust of doctors, insurers, hospitals, and big pharma. Who can blame them? In parallel, millennials are more open-minded about travel and way more

savvy in using technology to research medical options. Expect to see a larger slice of the medical tourism pie composed of ageing millennials seeking better and less expensive alternatives to the status quo.

Value-oriented millennials are fuelling a rise in "incidental" medical travel, integrating non-invasive procedures into existing travel plans saving hundreds, sometimes thousands on anything from a dental filling to a CT scan or dermal fillers. Popular destinations such as Thailand, Indonesia, Costa Rica, and Mexico will see more spent on health and wellness activities and less on the stereotypical Margaritaville holiday.

8. Telemedicine: Good news and bad for medical travel: From second opinions to patient monitoring, telehealth's ongoing contributions are well-documented. Less discussed are the benefits to medical travel providers and patients, where remote physician-to-physician consultation enables in-country diagnosis and treatment planning. This remote partnership builds in-country medical capacity and helps patients that do need to travel for a procedure better prepare for treatment and access greater support upon their return home.

In Coimbatore, India, Sri Ramakrishna Hospital (SRH) has recently implemented a tele-diagnostics and tele-radiology programme, using technology from Tata's new Gloheal division. Patients and doctors from participating providers in various countries can request diagnoses and second opinions online reducing the costs of travel and logistics. Healthcare professionals are trained on-site or remotely through a partnership with GE Healthcare Asia.

Other regional start-ups in this arena include AlemHealth (Singapore), Cura Healthcare (Saudi Arabia), and eTobb (Lebanon). 



PASSPORT TO QUALITY CARE

Affordable Treatment on Foreign Shores

By Raza Siddiqui, Chief Executive Officer, Arabian Healthcare Group and Executive Director, RAK Hospital, UAE

Today's interconnected world has transformed trade, economy, education, immigration, and our world view. The concept of care too has witnessed transitions and kept pace with the changing times. One of these changes has been the surge in more and more people choosing to leave the comfort of their homes and seeking high-quality and increasingly affordable treatment on foreign shores.

According to estimates by the World Health Organization, between 12-14 million people go abroad to receive medical care each year. Recent reports highlighted that with a collective market share of 45.2 per cent, Thailand and Mexico dominated the medical tourism market in 2017, followed by India with a market share of 15.4 per cent.

This tremendous growth has been witnessed thanks to the amount of money saved by having treatments conducted abroad over the last decade. In fact, medical treatment combined with a luxury vacation has become the latest trend.

Dynamics such as rising aging population worldwide, availability of affordable world-class medical facilities in emerging economies, and high medical insurance costs in developed regions are boosting the demand for medical tourism globally.

International accreditation is another key factor enhancing international medical tourism. Currently, over 600 health facilities in the world are accredited by the U.S. Joint Commission International (JCI), which is growing by 20 per cent each year.

Sun, Sand and Scalpels

Trends in the medical tourism industry have seen healthcare costs running rampant in many Western nations, and this is leaving people to increasingly go to developing countries such as Thailand, India, Singapore, or Costa Rica to seek treatment.

Many medical tourists are people aged between 45-70 and are from places where healthcare costs have exploded in recent years. This includes people from Europe, Australia, Canada, New Zealand, and the U.S. One of the major factors for why people are heading East for treatments is also due to the long waiting time in these countries.

Keeping this in mind, entrepreneurs and investors in the healthcare, tourism, and hospitality markets are today finding significant market opportunity and economic development potential in the medical tourism industry. Innovation within strategic partnerships and collaborations have further reduced costs and captured market share.

The emergence of international communication companies, which act as intermediaries between patients and hospital networks, is making it easier for patients to access information and prices. Furthermore, the high cost of treatment in developed countries is compelling patients to travel to countries with affordable healthcare practices.

A recent report underlined that The Global Medical Tourism Market is expected to reach \$160.8 billion by the end of 2025 and is expected to exhibit a Compound Annual Growth Rate (CAGR) of 14.9 per cent between

2017 and 2025. The growing geriatric population coupled with improving the accessibility of high-quality and low-cost medical services/procedures are likely to augment the market during the forecast period.

The Asia Pacific continues to account for the largest share of around 40 per cent of the global market, whereas, North America was estimated to register the fastest CAGR over the forecast period. Asian countries provide high standards of hospitality and care. Plus, they are always updating to the latest technology and it's a lot cheaper in Asia than other regions.



Raza Siddiqui is Chief Executive Officer, Arabian Healthcare Group and Executive Director, RAK Hospital, UAE

Thailand is projected to remain at the forefront of the market during the forecast period. This can be attributed to the availability of popular treatments such as cosmetic surgery and dental treatment.

India is currently one of the most renowned medical tourism destinations for specialist cardiac surgeries, while Singapore is well-known for expertise in complicated surgical procedures. Malaysia offers some of the world's best medical infrastructure and treatments by highly skilled medical professionals.

Plus, the medical tourism market is witnessing constant growth due to rising advertising and marketing of medical facilities coupled with increasing government investments in healthcare infrastructure. For example, Apollo Hospital, headquartered in Chennai, India, is located in 60 sites across the country and has its own health insurance scheme.

The private sector has been instrumental in creating the concept of "health cities" in places such as Chennai, Bangkok, Kuala Lumpur, and Sao Paulo, and this is gaining traction around the globe. Hospitals in these cities offer many services under one roof and provide a hospitable atmosphere to attract patients from various Western countries.

Specialised Surgeries

Cardiovascular disease is one of the leading causes of death and reportedly causes 17.3 million deaths per year, and the cases are likely to grow beyond 23.6 million by 2030. This trend is projected to drive the medical tourism market during the forecast period.

Also, growing demand for specialised surgeries such as breast augmentation, dermabrasion, and rhinoplasty and better pricing of such cosmetic surgeries will further fuel the growth of the medical tourism market during the forecast period.

One of the latest developments seen in medical tourists is being called the "baby boom" of medical tourism. This includes hopeful parents who are travelling abroad to get IVF treatments and commercial surrogacy in places like Russia or Ukraine.

There has also been the rise in what is being called the "China effect". The Chinese are already the single-largest group of prospective parents travelling abroad that use IVF services to have more children. As China recently relaxed its single-child policy, we can expect this trend to continue to grow

into the future.

Many travellers also opt for LASIK eye surgeries or dental procedures that are not covered under many Western country insurance plans and are exceptionally expensive. By travelling for treatment, patients would generally pay about 30 per cent of what they would in the Western world.

Weight loss surgery also draws many medical tourists as nearly 1/3 of all Americans are now reportedly said to be obese, and only about 10 per cent of their insurance plans cover weight loss surgeries such as lap bands or bariatric surgeries.

Furthermore, some people travel to other countries to receive post-natal care or receive hearing aids or cochlear implants, at a much more affordable cost to them. Medical devices are often cheaper in other countries and this can help the person save a lot of money even after paying for travel expenses.

Emerging Destinations

While Thailand, India, and Malaysia have already become key regions for medical tourists, countries such as UAE, Greece, and Taiwan are becoming new players in the global medical tourism industry. These countries have shown promising growth over the past years in part due to their breath-taking landscapes that patients look forward to during their visit.

The UAE is working aggressively to build expertise in the medical field and emerge as one of the hotspots for medical tourism in the region. To support this initiative, in April 2016, Dubai launched the world's first comprehensive electronic medical tourism portal, Dubai Health Experience (*dxh.ae*), offering access to a comprehensive menu of health and related services including wellness, cosmetic and dental, 'packages', plus ophthalmology, orthopaedics, physiotherapy and other specialised medical tests.

Plus, the UAE has entered into a number of prestigious partnerships to bring in advanced healthcare technologies, practices and standards from the West, and is firmly on its way to becoming the medical tourism hub in the region.

Among the most sought-after institutions by patients flying into the UAE for medical procedures is RAK Hospital, an 80-bed hospital in Ras Al Khaimah. The hospital is accredited by Joint Commission International and Swiss Leading Hospitals and is

managed by Sonnenhof Swiss Health Ltd, a Switzerland-based healthcare company.

It specialises in respiratory medicine, anaesthesiology and intensive care unit, cardiac surgery, internal medicine, podiatry, spine and orthopaedic surgery, pain management clinic, endocrinology, paediatrics and neonatology, urology, surgery, etc. It is well supported by a distinguished team of doctors from different countries. The hospital also recently added a world-class ophthalmology wing and runs a dedicated Diabetes clinic.

RAK Hospital is setting an example for institutes in the region as an epitome of excellence in strengthening UAE's position as a medical hub. Its rising number of patients from abroad is a testimony of the popularity for its procedures and warm hospitality. ^{AH}

Booming Business

- According to Patients Beyond Borders, the flow of patients seeking cross-border treatment options will be the highest in Mexico, while the South and Southeast Asia are expected to dominate the global market in the near future.
- Reportedly, satisfied medical tourists can save from 25 to 75 per cent of the costs. Depending on the type of medical service they require, the savings amount could even reach up to 90 per cent!
- For instance, medical services in Panama cost between 40 per cent and 70 per cent less than in the U.S. or Canada. While in Hungary, you can save from 40 per cent to 50 per cent of the cost in dentistry and cosmetic surgeries.
- For Americans, Mexico continues to be their favourite medical tourism destination, offering from 25 to 35 per cent in medical services savings. The country has nine hospitals certified by JCI.
- On the other hand, in Asia, India provides healthcare services at a cost 20 per cent lower than in the U.S. In Thailand, the cost is 30 per cent less, and Singapore has 13 hospitals accredited by the JCI, with services costing 35 per cent less than in North America.

Mayo Clinic Again Ranked No. 1 Hospital in U.S.

Article provided by Mayo Clinic

Mayo Clinic in Rochester, Minnesota, was again named the best hospital in the U.S. in *U.S. News & World Report's 2018-19 Best Hospitals*. Mayo Clinic also ranked No. 1 in more specialties than any other hospital in the country.

Mayo Clinic has always ranked at or near the top of the annual "Best Hospitals Honor Roll." Mayo Clinic in Arizona, Florida and Minnesota, was also ranked No. 1 within those states.

Mayo Clinic is part of a select group of hospitals recognised on the "Best Hospitals Honor Roll" for "breadth of excellence," according to *U.S. News & World Report*. The honor roll consists of 20 hospitals with the highest combined overall scores in 16 medical and surgical specialties.

Mayo Clinic ranks first, second or third in 11 specialties, including No. 1 rankings in six specialties:

- Diabetes and Endocrinology
- Gastroenterology and Gastrointestinal Surgery

- Geriatrics
- Gynaecology
- Nephrology
- Neurology and Neurosurgery

Mayo Clinic ranked No. 2 in four specialties – Cardiology and Heart Surgery, Orthopaedics, Pulmonology and Urology (two-way tie). It ranked No. 3 in Cancer.

Specialties are measured for various factors, including mortality index, patient safety, nurse staffing and Magnet status (the gold standard in nursing), patient services, technology and reputation. Mayo Clinic staff work to deliver the highest standards of care and transform scientific discoveries into clinical advances that help people everywhere.

"We are humbled and honoured by our ranking with *U.S. News & World Report*," said Gianrico Farrugia, M.D., president and CEO, Mayo Clinic. "We have continuously refined our system of care for more than 150 years. We are always working to deliver

accurate answers as quickly as possible and ensure the best outcomes for our patients."

Mayo Clinic's commitment to quality dates back more than 150 years to when the Mayo brothers invented the team-based approach to medicine – an approach that continuously evolves and improves. Its physicians are salaried to eliminate any financial pressure from patient care decisions. Mayo Clinic's experts work across specialties to provide comprehensive and coordinated care for patients.

"Our top ranking is only possible because of our talented staff," Dr. Farrugia said. "Mayo Clinic's emphasis on collaboration and teamwork allows us to bring the full spectrum of our knowledge and expertise together to focus on the individual needs of each patient."

Mayo Clinic is a global destination for patients with serious and complex conditions. More than 1.3 million people from about 140 countries turn to Mayo Clinic for diagnosis and treatment each year.

"Our primary value is that the needs of the patient come first. We take that value and we embed it in everything we do," Dr. Farrugia said.

Many outside agencies rate quality in healthcare. Mayo Clinic is the only healthcare organisation that consistently ranks among the top providers nationwide regardless of the quality measure used.

MORE INFO

For more information or to make an appointment, visit mayoclinic.org or mayoclinic.org/arabic.



Mayo Clinic Care Network: A Global Collaboration

Article provided by Mayo Clinic

Mayo Clinic is the global authority in medicine and is committed to solving the most serious and complex medical challenges through clinical practice, education and research. For more than 150 years, Mayo Clinic has focused on keeping patients at the centre of care by establishing a model and culture of professional teamwork that has become the industry's gold standard.

Mayo Clinic has a long-standing tradition of sharing medical knowledge and expertise beyond its walls to benefit healthcare providers and their patients. Recognising that most patients prefer to get their healthcare close to home, Mayo took this collaborative spirit a step further with the creation of the Mayo Clinic Care Network in 2011.

The Mayo Clinic Care Network is a multinational network of like-minded, independent healthcare organisations that share a common commitment to improving the delivery of care in their communities through high-quality, data-driven, evidence-based medical care. Today, the care network has grown to include more than 40 health care organisations across the U.S. and in the UAE, Saudi Arabia, China, Korea, Mexico and Singapore.

The Mayo Clinic Care Network delivers a full spectrum of medical knowledge and subspecialty expertise to communities worldwide. Through formal collaboration and knowledge-sharing tools, Mayo Clinic is forging close connections with medical providers, complementing local expertise, enhancing the delivery of care and providing additional peace of mind to providers and patients.

Members of the network can access Mayo-vetted medical information at the



point of care, and easily consult with Mayo specialists on second opinions, in many cases, sparing patients the expense and inconvenience of additional appointments and unnecessary travel. If specialty care is needed, patients can be seen by local providers or referred to Mayo Clinic.

Network members also have access to Mayo Clinic education, experience and subject-matter expertise through an array of services ranging from in-person and virtual conferences to electronic consults and direct phone calls. Every interaction aimed at helping organisations and medical professionals stay current with the latest research and ever-evolving science of healthcare delivery.

For more than a century, patient experiences have helped build Mayo Clinic's brand – making it the most trusted name in healthcare. And because network members enjoy a clinically meaningful relationship

focused on optimising the delivery of healthcare, they have access to a brand that helps differentiate them in the marketplace and define a unique patient service.

Mayo Clinic's approach to healthcare is rooted in the idea that the best care is achieved when experts from a variety of medical specialties work together to focus on the patient. Membership in the Mayo Clinic Care Network extends that experience. Through technology and collaboration, Mayo Clinic delivers a full spectrum of medical expertise to communities around the world.

The Mayo Clinic Care Network is a global network of organisations that share a commitment to improving the delivery of care in their communities. To learn more, visit <https://www.mayoclinic.org/about-mayo-clinic/care-network>.

Baylor St. Luke's Medical Center Offers a New Breath of Life for Transplant Patient

Silviano Trino is breathing a sigh of relief after undergoing a groundbreaking, long-awaited double-lung transplant

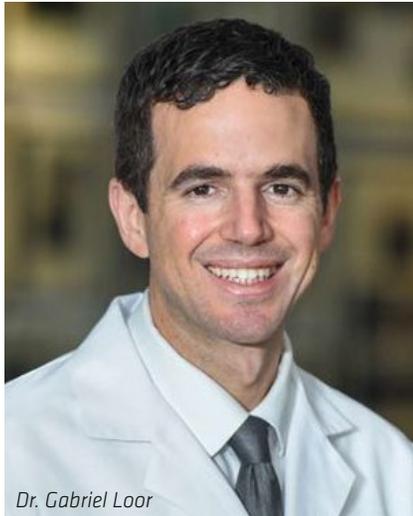
Article provided by Baylor St. Luke's Medical Center

Baylor St. Luke's Medical Center (Baylor St. Luke's) is the first hospital in Texas and third in the U.S. to perform a breathing lung transplant using the Ex Vivo Lung Perfusion (EVLP) procedure with Organ Care System Lung (OCS Lung) technology. This technology is designed to keep donor lungs functioning and "breathing" in human-like conditions from the time of the donor procedure all the way to the transplant surgery.

After being turned away from four medical centres in other parts of the country due to his health, Trino met with Dr. Gabriel Loor, surgical director of the lung transplant programme at Baylor St. Luke's and director of lung transplantation in the Michael E. DeBakey Department of Surgery at Baylor College of Medicine, and his transplant team where it was determined he would be a candidate for the EVLP transplant. Shortly after, Trino and his family made the move from Miami to Houston where they would wait for the call for a viable pair of lungs.

The surgery was performed as part of the EXPAND II OCS trial, for which Baylor St. Luke's is a study site, testing the outcomes of transplanted donor lungs that are transported, preserved, optimised, and monitored on a portable OCS device.

Led by Dr. Loor, the transplant was performed at Baylor St. Luke's using the newest generation of EVLP platforms, Transmedics Organ Care System (OCS), a portable device that maintains the organ in



Dr. Gabriel Loor

its own physiologic state with warm blood perfusion, ventilation, and a sophisticated monitoring system to continually assess the organ in flight. In Trino's case, the donated lungs were flown in to Houston from the Midwest and were kept "breathing" on the OCS Lung machine for a total of 11 hours. The device is the only portable EVLP system in the world and the only one that has undergone a positive U.S. Food and Drug Administration (FDA) panel review in the U.S. as well as two rigorous international clinical trials. The OCS Lung System was officially approved by the FDA on March 23.

The technology has the ability to keep the lung active, healthy, and breathing, which had the same affect on the patient. A short 36 hours following the surgery, Trino was in his

room recovering; 10 days later, he was out of the hospital. Trino is even enjoying being able to sing again – something he hasn't done in years.

With nearly 100,000 people on the waiting list for life-saving organ donations in the U.S., the new technology paves the way for future groundbreaking transplants across the country. Thanks to this revolutionary OCS technology, donor organs are more protected, and transplants are no longer restricted by time or distance. This improves the standard method of organ transplantation and provides the opportunity to widen the potential organ donor pool and help save more lives.

Trino and his family are thankful for the life-saving procedure performed by Dr. Loor and his dedicated team at Baylor St. Luke's. He can now breathe, and sing, easier knowing he has a second chance at life.

The lung transplant programme at Baylor St. Luke's in Houston's renowned Texas Medical Center continually strives to meet the needs of patients through innovative breakthrough research and leading-edge technology and is committed to compassionate quality healthcare that improves and saves lives.

MORE INFO

Contact International Services via email international@stlukeshealth.org, call +1 832 355 3350 or visit StLukesInternational.org Texas Medical Center, Houston, Texas, U.S.

Flashwave Opens New Treatment Options

Article provided by Flashwave

Flashwave® is a new kind of non-invasive therapy based on cellular communication. The combination of technology, diagnostics and application allows fully trained Flashwave users to activate endogenous muscular satellite cells, which opens up completely new treatment options in:

- Musculoskeletal indications
- Aesthetics
- Wound care
- Diabetes and
- Urology

Flashwave is fully CE & MDSAP certified, already clinically proven and used with great success in various countries.

Especially the Flashwave MMC indication

group - Musculoskeletal Management & Correction - has quickly attracted high profile clinical users and clients, as therapy results are immediate and the learning curve for users is swift.

Here are some of the athletes who have been in contact with Flashwave:

- Richie Patterson (weight lifter, three-time Olympian, 3 x gold-medallist at the Commonwealth-Games, holder of multiple national records in New Zealand)
- Cameron McTaggart (junior weightlifter, holder of various national records in New Zealand for U21 athletes)
- Lydia Ko (former #1 LPGA Tour, 2 x major winner)
- Basketball players of Bayern München,

Germany

- Junior Noboa, former Major League Baseball (MLB) player, hitting coach of Dominican Republic National team, current VP Latin America for the Arizona Diamondbacks.

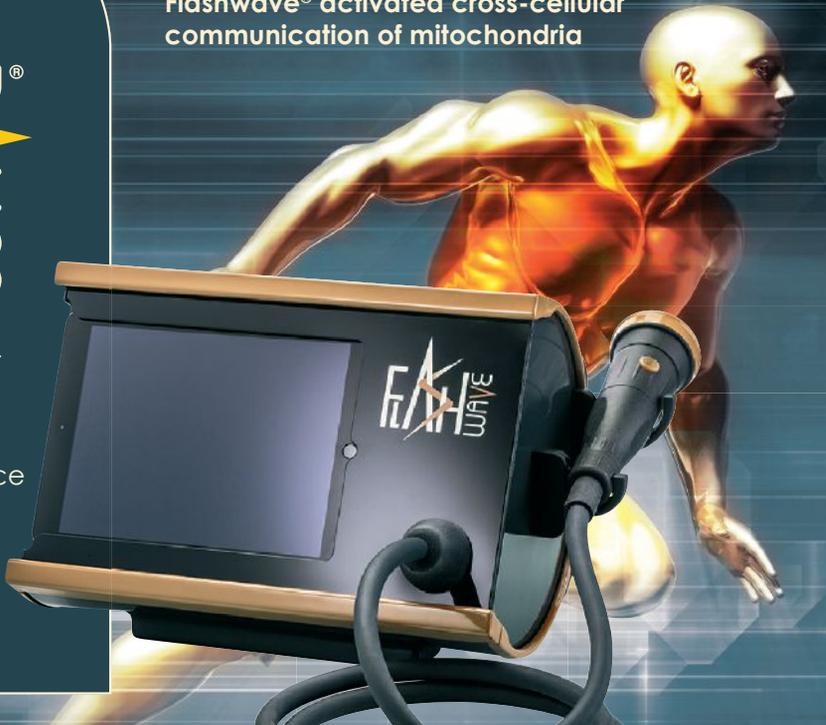




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Revolutionising Medical, Nursing and Dental Education at Cleveland Clinic

New Health Education Campus to open in summer 2019

Article provided by Cleveland Clinic

Anatomy textbooks and cadaver labs will be things of the past when the new Case Western Reserve University Health Education Campus opens at Cleveland Clinic in summer 2019. So will the practice of educating medical, dental and nursing students separately from each other.

The joint venture of Cleveland Clinic and Case Western Reserve University (CWRU) won't be "state-of-the-art," says James Young, MD, Chief Academic Officer at Cleveland Clinic. Rather, it will be "state-of-the-future."

"People often ask, '[How] do we know what the future is?'" says Dr. Young. "My response is, 'Well, if you create the future, you're going to know what it is, so we're creating.'"

The new \$515 million campus will revolutionise how the world views healthcare education, he says.

Designed for Collaboration

The centrepiece of the Health Education Campus, located on Cleveland Clinic's main campus in Cleveland, Ohio, will be the 485,000-square-foot Sheila and Eric Samson Pavilion.

Bright, airy and spacious, the facility will unite students, faculty and staff of four schools: CWRU School of Medicine, Cleveland Clinic Lerner College of Medicine, CWRU School of Dental Medicine and the Frances Payne Bolton School of Nursing at CWRU. All but the Lerner College of Medicine are currently housed on the campus of CWRU, minutes away from Cleveland Clinic.

"We're trying to get the focus away from medical, nursing, dental – the traditional silos of healthcare – and focus on how we can interact in a better way with respect to



professional education," says Dr. Young.

While each school will have a corner of the building, with four stories of learning and administrative spaces, there will be plenty of room for interdisciplinary collaboration – a fundamental of today's healthcare and a principle on which Cleveland Clinic was founded. In the middle of the building will be an indoor courtyard, a hub where students can associate between classes, study alongside each other and dine together. Joint courses and other activities will provide more opportunities for interaction.

By removing the walls between medical, nursing and dental schools, students can collaborate with other healthcare disciplines every day and grow to expect it in their professional practice.

Ready for the Next Innovation

Although the new campus will be ready for its first students next summer, it won't be "finished" by then.

"One of the things we wanted to do with the building was to try to leave as much flexibility for the future of healthcare training as possible," says Chris Connell, Chief Design Officer at Cleveland Clinic. "Nobody quite

knows how healthcare will develop in the future. So, it's very important that education, which is the core of it, is at least as flexible."

The campus will have plenty of space for future technology, starting with cadaverless anatomy labs. Students instead will use virtual and augmented reality tools, allowing them to investigate the human body more thoroughly. With high-tech headsets, laptops and joysticks, students will study organs, blood vessels and other structures from different angles and view bodies in motion – something they couldn't do with cadavers or traditional textbooks. They also will "dissect" holographic images and interact with them in ways never before possible.

This type of education will be as innovative as the high-quality healthcare the world has come to expect from Cleveland Clinic.

"We do not have a model; we have created the model," says Dr. Young.

The 2,200 students that will step onto Cleveland Clinic's campus in 2019 will be the first in a new generation of physicians, dentists, nurses and physician assistants uniquely trained to deliver a new generation of healthcare.

For more information, visit my.clevelandclinic.org.

Richard Wolf Highlights ENDOCAM Logic 4K

IN
THE
KNOW

Article provided by Richard Wolf

Richard Wolf GmbH raises image quality in endoscopy to a new level with pin-sharp 4K resolution technology. The optimally tailored system components ensure image reproduction that matches the natural state of the image, at the same time operates energy efficient, and is ergonomic and compact.

4K entails a resolution of at least 3840 x 2160 pixels and this represents a fourfold increase compared with the existing HD standard. In order to get this pixel power on the road, Richard Wolf with its long tradition of innovation has strategically bundled all of its in-house expertise: telescope, light, signal processing and the latest production technology melded into one system, providing a solution from a single source.

Optical Systems and Light Cables: Optimum Match Guaranteed

The new sharp begins with the completely new telescopes developed in-house for

the rigid 10 millimetre and 5.5-millimetre endoscopes. This generates a homogeneous, illuminated image with sharp margins. Specially doped glass material is used for the lenses to minimise any optical errors.

The transmission of light plays an important role in implementing the new sharp. Light power keeps pace with the increase in resolution. The latest light cables combined with powerful LED light sources are precisely tailored to the requirements of the new camera system and therefore a perfect match for ENDOCAM Logic 4K.

Lower Power Consumption Reduces Development of Heat

The new compact is manifested in the ergonomically shaped camera head with reduced dimensions and weight. Richard Wolf uses a new generative method here in order to manufacture the metallic camera casing utilising a 3D printing process. The result is that the camera head is a comfortable fit in the user's hand and it is also tangibly lighter.

The stainless-steel material can be autoclaved and is ideal for chemical sterilisation procedures. It is therefore classified as sterile and may be used without the need for any additional covers.

Richard Wolf reaches a new level of efficiency as a result of the reduced power consumption in various areas. The LED technology demonstrates significant savings over the previous gas discharge lamps. At the same time, the company has succeeded in using more powerful and very efficient electronic components in the camera head. It consumes around 30 per cent less electricity and this is demonstrated in a significantly lower development of heat.

Precise Image of Reality with Visualisation of the Invisible

The advantages of the system from a single source are displayed throughout the whole image chain and by the handling of the 4K signal that convert to the new authentic. Cables, connectors and controller are consequently designed so that the significantly expanded data volume is free of loss. This increases the fail-safe performance and the faithful visualisation of the original image - very much the new authenticity.

At the same time, Richard Wolf has the experience and the ability to generate additional benefits from the surveyed data. Special visualisation processes improve tissue differentiation, illuminate critical areas of an image, and clearly visualise structures situated in bright but overexposed regions.

Be Flexible and Modular

The ENDOCAM Logic 4K camera controller is designed as a flexible platform that is also capable of handling all application parts of the whole ENDOCAM Logic HD family including HD camera heads, pendular camera heads as well as flexible sensor endoscopes. Furthermore, all available telescopes can be used, which makes it easy to switch to the new standard and start your 4K journey step-by-step.



RAK Hospital: The One-Stop Treatment Destination

Article provided by RAK Hospital

The Emirate of Ras Al Khaimah is located at the north-end of the coast of the UAE, nestled between the Hajjar mountains on the east and the Arabian Gulf on the west and shares mountainous borders with the Sultanate of Oman. Away from the hub and hectic pace of big cities, this beautiful emirate, blessed with breathtaking natural beauty offers you the peace, solitude and privacy you seek while undergoing elective treatment and a bouquet of exciting attractions for your family.

RAK Hospital is a private, tertiary care, multi-specialty hospital under the Arabian Healthcare Group, a joint venture with the Government of Ras Al Khaimah, under the aegis of His Highness Sheikh Saud bin Saqr Al Qassimi. We have received Joint Commission International, U.S.-based hospital accreditation.

The hospital is housed in a sprawling complex, specially designed as a premium healthcare and hospitality destination by U.S.-based Ellerbe Becket of Mayo clinic repute. The building boasts a built-up area of 140,000 sq. ft., across three levels, and the rooms are all premium category, with a capacity of 65 beds.

Following the UAE's lead to bring more medical tourists into the country, RAK Hospital has introduced a number of innovative concepts and surgical procedures at par with the West. Moreover, with a multi-lingual staff and world-known doctors,

the hospital has been quite successful in gaining the trust of medical tourists and is in a confident position to accommodate the increasing number of international patients.

"In line with the country's vision, RAK Hospital has been successfully able to position itself as the foremost healthcare provider for complicated Bone & Joint services, Neurology, Cardiac cases as well as laparoscopic procedures. Our newly introduced non-surgical stem cell treatment for knee and joint issues is also bringing patients from across GCC," said Dr. Raza Siddiqui, CEO of Arabian Healthcare Group and Executive Director of RAK Hospital.

In addition to modern infrastructure, RAK Hospital also has state-of-the-art accident and emergency services, with a 24-hour pharmacy, and an European café serving a diverse range of food and beverages.

At RAK Hospital we believe that our patients are our utmost priority, which is why our 'Premium Healthcare, Premium Hospitality' ethos shines bright through all our services. With us, you can be sure that you are receiving the best in quality in healthcare, treatment, and support.

The hospital is a centre of excellence for:

- Bone and Joint
- Neurosciences

- Cardiology and Cardiac Surgery
- General, GI, Minimal Access and Laparoscopic surgery
- Bariatric Surgeries and Aesthetic treatments

The healthcare institution also boasts of 20 other specialties. Furthermore, RAK Hospital is the first to introduce stem cell therapy for bone and joint problems in UAE.

The hospital is the UAE's healthcare provider of choice serving thousands of local, regional and international patients. Located just 45 minutes away from Dubai International Airport, it is one of the most trusted, and is a one-stop treatment destination for international patients, as it provides premium personalised and compassionate care.



Dr. Raza Siddiqui

INTERNATIONAL PATIENT JOURNEY

1. Get in touch

Contact RAK Hospital international Patient desk by:

- Email: intcare@rakhospital.com, ipc.rakh@gmail.com
- Landline: +971 7207 4444
- Mobile: +971 58 954 7797, +971 55 883 1735
- Fax: +971 7207 4455

2. Send your medical history

To assess your treatment, we encourage you to send us the results of your tests, i.e. Angiography, or echo- cardiogram, MRI, CT Scans or the other documents for further review and evaluation.

3. Online consultation: tailor making treatment plans

- Our doctors start by assessing your medical history and your existing condition and discuss the following:

- The different procedures and the best treatment for you.
- New surgical, minimal invasive techniques, ensuring reduced hospital stay and recovery.
- Regional or general anaesthesia and the lowest infection rates at our hospital.
- Advanced medicines that ensure relief of pain and maximise ability to enjoy an active life.
- Physical therapy programmes for your speedy recovery.
- Making your flight back home pain free and comfortable.

4. Arrange your trip

You can start to arrange your flight tickets. Visa to UAE will be provided by RAK Hospital on submission of your passport copy and recent size photograph.

5. Arrival

RAK Hospital Representative (English speaking) will meet you at Dubai/Abu Dhabi/RAK/Sharjah Airport and transfer you to RAK Hospital.

6. Pre-Op/ Procedure check up

The first examination will take place the next morning (general examination, ECG, echocardiogram, laboratory test, exercise, test).

7. Procedure

You will undergo the required treatments performed by a team of specialist doctors.

8. Post OP

After treatment you will stay the prescribed days of stay in hospital with one attendant (choice).

9. Leave to your country

10. Medical Follow up

Healthier Future With ROHA's Natural Products

Article provided by ROHA

The family-owned company ROHA offers natural and ingredient-rich medicinal products in renowned German quality. Established 1919 in Bremen, Northern Germany, ROHA's high-quality products help people around the world not only to become healthier but also more health-conscious, vital and productive.

During the early 1930's the products branded Bekunis, whose active ingredients came from the indigenous senna plant, dominated ROHA's assortment. Today, Bekunis Herbal Tea is still considered a reliable natural remedy for digestive problems. The same applies to Bekunis Senna Laxative Dragees, which ROHA introduced in many countries worldwide. Over the next few decades, ROHA expanded its portfolio with innovative brands such as Bakanasan, Sanhelios and Re-Load vital. To this day, customers from pharmacies, health

food stores, and drugstores trust the high-grade herbal health products from ROHA.

Market Leader for Propolis Products

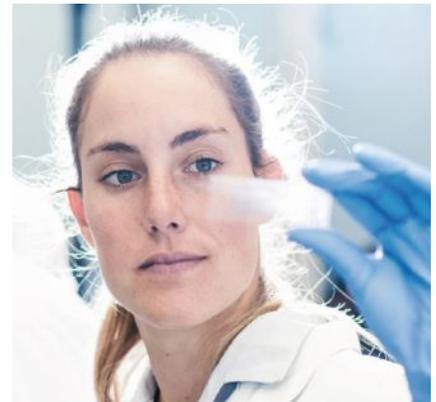
Inspired by the exceptional effects of propolis, a protective resin from bees, ROHA specialises in propolis products. With more than 40 years of experience of processing propolis, ROHA has become the market leader in Germany. In addition to the production of cosmetics and dietary supplements, ROHA holds drug approvals for products with propolis, manufactured under GMP conditions in Germany: Propolis Capsules for supporting immune system and Propolis Throat Lozenges for the throat and the respiratory tract.

beecraft: Just Bee Natural

The new beecraft brand enriches the impressive ROHA range of natural health products. The name beecraft speaks for itself: all of the natural ingredients come from the beehive. The main component is propolis, one of the oldest most-researched remedies in the world. Characteristic are the compounds of so-called phytamines, also known as polyphenols. These occur as bioactive substances in plants and significantly determine the quality of propolis. ROHA refines the newly developed beecraft brand with a standardised propolis mixture from various regions containing at least 30 per cent phytamines. With a unique combination of pure propolis from different areas of the world and the certificate

Certified Phytamines 300+, ROHA ensures a highly diverse yet consistent concentration of health-promoting natural compounds.

The regular procurement of high-quality



propolis is an ever-growing challenge, which is regularly attained by a dedicated ROHA sister company, one of Europe's leading propolis importers. The extensive beecraft product assortment consists of various products for the throat and respiratory tract, immune strength, oral and dental care, and skincare cosmetics.

ROHA is Committed to Bee Health

Concerned about the decline in bee colonies, ROHA cooperates with Mellifera e.V., a German organisation, who since 1985 have devoted themselves to the protection and welfare of bees. Furthermore, ROHA supports research projects each year to combat the threat of the Varroa mite. United in all beecraft products is the distinctive expertise and dedication of the entire ROHA team who treasure the bees unique gift. Ever more ROHA employees train as beekeepers cultivating bee colonies in their free time.

MORE INFO

Visit www.roha1919.com or contact international@roha1919.com.



Global Destination Health - Minnesota Ensures Highest Quality of Care

By Dr. Neeraj Chepuri, MD, Chief Medical Officer, Global Medical Services (GMS)

The way that healthcare is provided to patients in the U.S. is changing at an unprecedented pace. Along with the rapid pace of change in domestic healthcare, Global Destination Health - Minnesota, a Global Medical Services (GMS) company and successor to Minnesota International Medicine (MIM) is quickly adapting the way that healthcare in the United States is delivered to international patients.

These international patients entrust their care to Global Destination Health - Minnesota, so the institution does everything possible to ensure the highest quality of care as well as facilitates the care to make the surroundings comfortable to the international patient and his/her family. Founded in 2011, Global Destination Health - Minnesota serves as the international patient programme for the University of Minnesota Hospitals as well as other, associated hospitals in the Twin Cities of Minneapolis and St. Paul, Minnesota, U.S. These hospitals include Abbott Northwestern Hospital, North Memorial Medical Center, Regions Hospital, Minneapolis Children's Hospital, and Gillette Children's Hospital, to name a few. These affiliated hospitals are world leaders in research and home to advanced treatment options, including:

- Blood and Bone Marrow Transplantation

- Neurology and Neurosurgery
- Cardiology and Cardiac Surgery
- Orthopaedics and Spine
- Rehabilitation
- Pediatric Genetics

The mission of Global Destination Health - Minnesota is to facilitate the process for international patients to receive these advanced therapies by partnering with the highest quality institutions and by orienting the patient to the healthcare process in the U.S. Global Destination Health - Minnesota begins the process when the patient is in the home country. A treatment plan is developed between the patient and individual physician to be caring for the patient and confirmed with the health office with the embassy of the patient's home country. This often includes a transfer of medical records and medical images. Once accepted by all parties, Global Destination Health - Minnesota facilitates the process of arranging for the patient to arrive.

Upon arrival, the patient is greeted and given options for housing. During the visit, transportation to appointments, nursing navigation, and interpreter services are all provided. The goal is to make the patient feel at home while they are receiving their treatment rather than thousands of miles away, as they often are. While it is important for the patient and their family

to feel comfortable and oriented to their surroundings, it is even more important that the highest quality of healthcare is provided to these international patients.

All of the hospitals affiliated with Global Destination Health - Minnesota are accredited by the Joint Commission for U.S. healthcare and all healthcare providers are licensed by the state of Minnesota and have passed all legal requirements. In addition, each of the individual programmes listed above engages in a Continuous Quality Improvement programme that includes conferences and educational meetings to continuously improve the way the care is provided.

The ultimate goal for Global Destination Health - Minnesota is to have satisfied patients and patient's families. Healthcare is a complex undertaking, and while the outcome cannot always be predicted, care can be taken to give every patient the best chance for a positive outcome. At Global Destination Health - Minnesota, this goal is achieved by partnering with the highest quality institutions and pairing that healthcare with the highest level of patient specific and culture specific service. After seven years of servicing patients, doctors, hospitals and the international community, Global Destination Health - Minnesota is very proud to say that it has been largely successful.

VibraVest: Providing Advanced Lung Secretion Clearance While Allowing an Active Lifestyle

Article provided by OxyCare Medical Group

OxyCare Medical Group, a company specializing in oxygen and ventilation technology, has designed this high frequency chest wall oscillation vest. Failure to remove secretion may lead to increased rates of respiratory infection, hospitalization and reduced lung function. With a physician's prescription and guidance, patients can tailor VibraVest treatments to their needs. Multiple settings allow for various treatment settings that serve both adults and children with respiratory diseases or chronic lung conditions.

Treating respiratory diseases with the VibraVest is as simple as putting on a button-up shirt. The patient chooses one of nine possible settings using a handheld control attached to the left side of the vest. A battery pack fixed to the right side of the vest provides power for mobile treatments. We highly recommend an inhalation treatment previously (e. g. with the mobile mesh nebulizer OxyHaler), to moisten the secretion. Moistening facilitates expectoration for the patient.

The VibraVest works with High Frequency Chest Wall Oscillation, short HFCWO. Using small battery-charged motors to vibrate vertically along the chest and back, the VibraVest reduces the secretion's viscosity, helping the patient to mobilize secretion and cough it up. Simultaneously, the product encourages blood circulation and lymph flow. This is achieved without cables, pipes or wire to external devices.

The High Frequency Vibration Vest VibraVest can operate in three different settings:

- During percussing, all motors pulse and knock in recurring rhythms at the torso. Thus, muscle cramps are resolved and blood



circulation and lymph flow are stimulated.

- During vibration, all motors are active. They work in pre-set intensity to oscillate deep muscles and relief pain, additionally to stimulate blood circulation and lymph flow.
- During drainage, all motors work successively. By doing so, lymph flow and depletion of metabolic products are animated and blood circulation is encouraged.

The VibraVest can bring relief and help

deliver a more productive cough in these diseases and conditions:

- Chronic Obstructive Pulmonary Disease (COPD)
- Cystic Fibrosis
- Bronchiectasis
- Emphysema
- Pneumonia
- Muscular Dystrophy
- Amyotrophic lateral sclerosis (ALS)
- Primary Ciliary Dyskinesia (PCD)

Lightweight and non-restrictive, the VibraVest leaves the user fully mobile during treatments. Users can go for a walk in the park, move around the house, or relax in front of the television.

- Without compression on the thorax, unlike other products on the market.
- Treatments can be administered while sitting, standing, or laying down.
- (This is a great feature for patients with ALS or Muscular Dystrophy.)
- The rechargeable battery pack offers several hours of life
- Easy to store and easy to carry; perfect for the respiratory patient who travels.
- Available in six sizes, therefore suitable for children and adults.
- Three modes of oscillation treatment (Drainage, Vibration, Percussion).
- Three adjustable intensity levels (Soft, Medium, Intense), Quiet during operation.
- DC power option allows users to recharge the vest at home or in the car.

The VibraVest is available in USA and Canada under the brand name AffloVest with FDA certification.

For more information, please visit www.oxycare.eu

S@TIS' Traceability Software Packages to Feature at Arab Health 2019

For the fifth year in a row, STEAM France and its French subsidiary S@TIS, with the support of Business France, will be exhibiting at the Arab Health

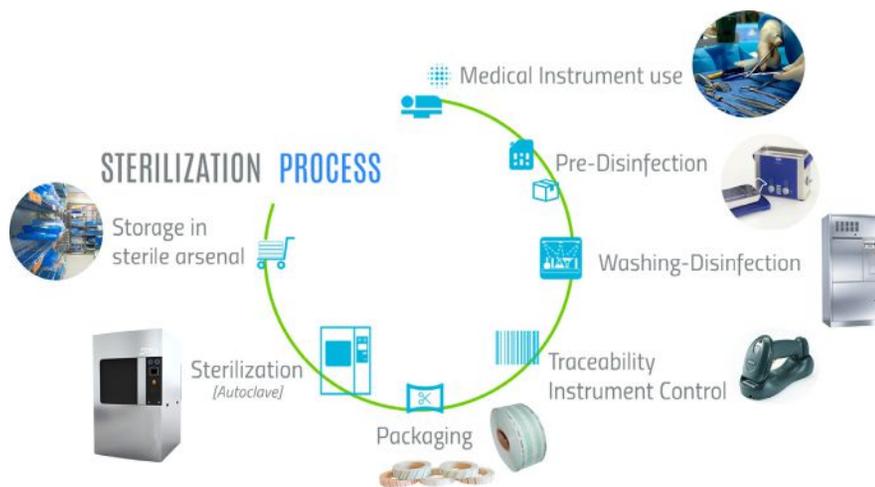
Article provided by Business France

Subsidiary S@TIS in the Limelight

S@TIS will be presenting a software suite composed of multiple complementary modules, compliant with the requirements of international standards, and which enable, real-time and paper-free, monitoring of each stage of the sterilisation process, from the operating room to the sterile arsenal.

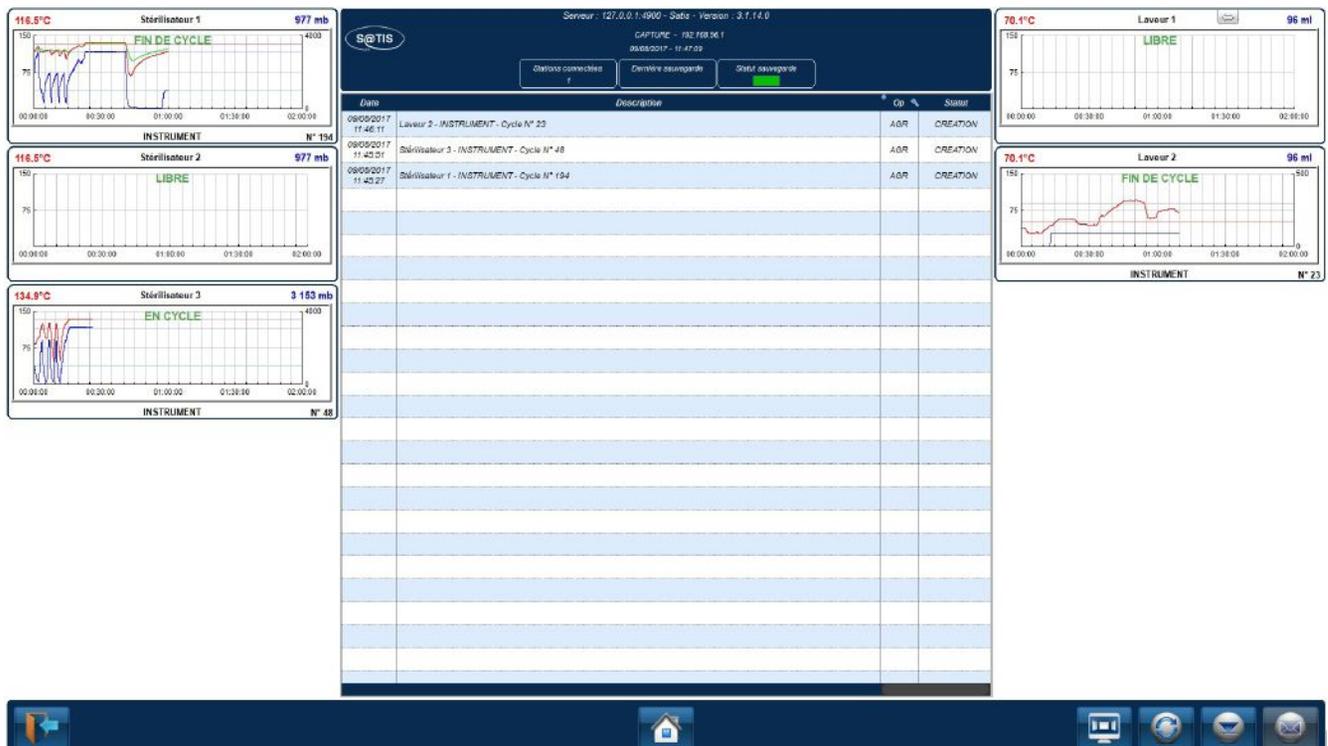
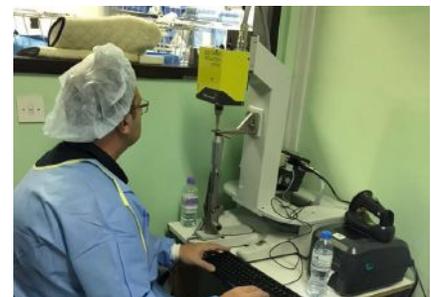
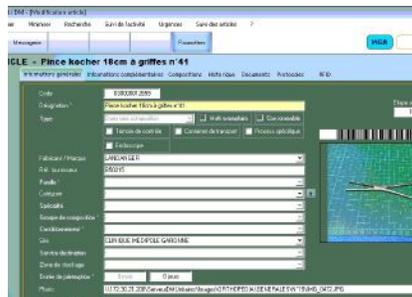
It is intuitive and compatible with all types of equipment (washer-disinfector, autoclave, etc.), no matter the brand or technology. S@TIS software suites for Medical Devices and Supervision System Traceability will facilitate managers' efforts, thanks to an integrated statistical analysis tool, assessing the performance of devices daily and guaranteeing the security of the process – and thus of the patient.

In its 15 years on the market, S@TIS has equipped nearly 250 sites in France. In the Middle East, it has been offering its traceability software for two years, to make the link between the surgical instrument and the patient that much simpler. Its first client was Tawam Hospital in Abu Dhabi. Today, ADI – Abu Dhabi International Medical Services, the local partner of S@TIS is developing a solid commercial network for the future in the Gulf countries, drawing on its geographic presence, experience and skills.



From January 28 to 31 2019, S@TIS will be exhibiting in the France Pavillon at Arab Health - Za'abeel Hall 2 - stand B50 (STEAM France' stand) at the Dubai International Exhibition and Convention Centre, Sheikh Zayed Road Convention Gate, PO Box 9292, Dubai, UAE.

Company contact:
 Michel Muron, S@TIS Customer Accounts Manager | m.muron@satis-fr.eu | Tel: +33660311820



Cook Children's: Ensuring World-Class Pediatric Care

Article provided Cook Children's

Having her baby rushed to the Neonatal Intensive Care Unit (NICU) right after delivery isn't exactly how Holly Dittmar envisioned her daughter's birth. Unfortunately, that's exactly what happened when baby Melody entered the world on August 9, 2016, with extremely low blood pressure and blood sugar.

Melody was immediately taken to a local Level II Neonatal Intensive Care Unit (NICU) in Houston. The medical staff stabilized her sugar level. A pediatric endocrinologist was consulted and after running lab work, it was suspected that Melody had a rare genetic disease called congenital hyperinsulinism (HI). If untreated, HI can result in a coma, brain damage or even death.

The pediatric endocrinologist immediately urged that Melody be sent to Paul Thornton, M.D., medical director of the Endocrine and Diabetes program and Hyperinsulinism Center at Cook Children's, who leads one of the first full-service CHI centers in the U.S. The NICU physicians continued to research and do all they could to help Melody, but then ultimately determined it would be best for her to be transferred to Cook Children's.

The Teddy Bear Transport team picked up Melody and her family in Houston and flew them back to Fort Worth, so Melody could be admitted into Cook Children's Level IV NICU. Melody was placed in a single room suite in the dedicated HI pod, within the NICU. This allowed Melody's parents to stay with her at all times. Here, the family had access to Dr. Thornton, along with a full team of physicians, nurses and specialists, all recognized for their specific expertise in hyperinsulinism.



Melody began making immediate progress at Cook Children's. She switched from tube feeding to bottle and even breastfeeding, so she could learn how to eat while her sugar levels were being maintained intravenously. After undergoing many genetic tests, the results confirmed that Melody had HI and there was a 95 percent chance that the disease was focal, meaning it was limited to one area of her pancreas.

The Dittmars agreed to include Melody in a research study that would permit the surgeon to create a surgical plan involving the investigational drug 18F-DOPA combined with a PET-CT scan. An injected dye, 18F-DOPA would allow doctors to see which area of Melody's pancreas had the most metabolic activity. This would minimize the amount of pancreas removed by identifying the exact location of the pancreatic lesion. Cook Children's was the second in the country to use 18F-DOPA in combination with a PET-CT scan to diagnose focal lesions in children with congenital hyperinsulinism. During this test, it was confirmed that Melody's particular case of HI was indeed limited to one area of her pancreas. This was good news.

John Uffman, M.D., performed a perfect surgery. He removed a lima bean-sized

lesion on the lower part of the pancreas, which required only five percent of Melody's pancreas to be removed. The surgery was so successful that she was taken off the breathing machine once she made it back into her room in the NICU.

Melody soon began to eat and one week later, the Dittmar family left Cook Children's with a fully cured baby.

Melody is now able to regulate her own blood sugar and no longer requires any excess sugar. Overjoyed with the outcome, the Dittmars could not be more thankful to Cook Children's and the HI program for giving their baby girl a chance at life.

"I know that a way was paved for us to arrive at Cook Children's, where experts have spent decades preparing for the day they would save Melody and others with HI. I am eternally grateful for her complete healing and for the peace of mind that I gained when Cook Children's accepted us into their care. Thank you with all of our hearts!", said Holly Dittmar.

MORE INFO

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Phone: +1-682-885-4685

E-mail: international@cookchildrens.org

Biegler: Offering High-Quality Solutions

Article provided by Biegler

Biegler has been successfully involved in the development and production of medical devices and disposables for more than 45 years.

Among the developments in a row of prime instruments are the blood and infusion warmer BW 685/S, Protherm II and the emergency warmer ESH 04, designed for mobile use.

The automatic pressure Infusor AUTOPRESS can be used directly with

the warmer or as stand-alone solution wherever fluids have to be dispensed under constant pressure.

This year, Biegler is also going to be launching the new cassette warmer BW 410.

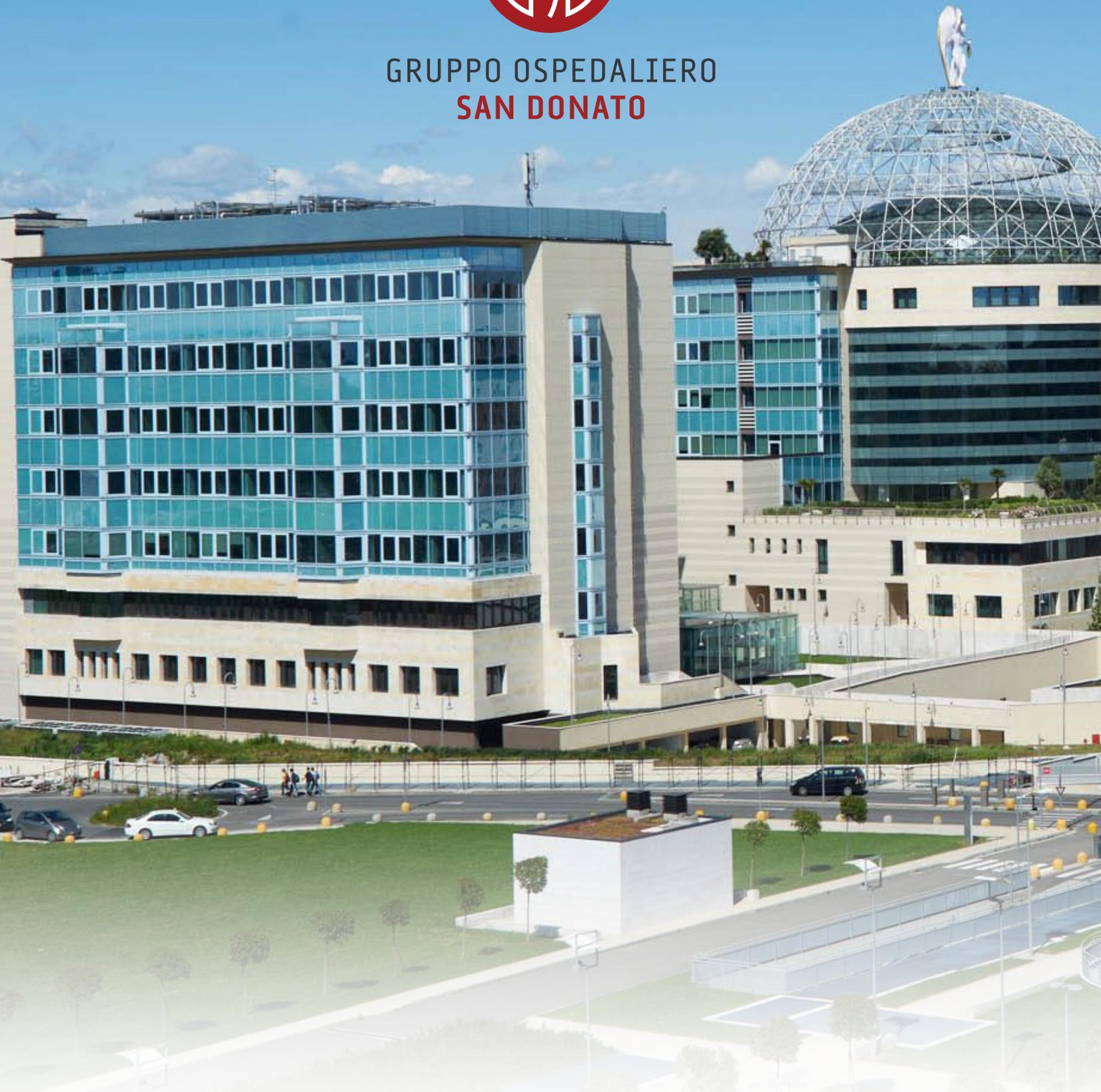
In addition, Biegler offers the integrated development and production of medical products as OEM services. The company is FDA registered for several products.

Certifications: ISO 13485:2016, CE 0123





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Ospedale San Raffaele

One of the best University and Research hospital in Europe



Ospedale San Raffaele is a clinical-research university hospital which provides international-level specialized care for the most complex and difficult health conditions. It has over 50 clinical specialties and more than 1300 beds.

Its main areas of excellence are: Cardiac and vascular surgery, Clinical transplantation, Diabetes and diabetes research, Gastroenterology and Gastrointestinal endoscopy, Gynecology & Obstetrics and Reproductive Medicine, Hematology and Bone Marrow Transplantation, Intensive care, Neurosurgery and Gamma Knife, Nuclear medicine, Oncology, Ophthalmology, Otorhinolaryngology, Pancreatic surgery, Pediatric Immuno-hematology and Transplantation, Radiology, Radiotherapy and Tomotherapy, Thoracic surgery, Urology.

Ospedale San Raffaele is also one of the main research institutes in Italy, both for volume and profile of scientific output. In 2014 alone we produced 1179 scientific publications (total impact factor: 6726.056) and we were granted 245 patents worldwide.

Here our main objectives:

- promote research aimed at dissecting the molecular pathways responsible for a variety of important human diseases;
- identify new targets and new therapeutic strategies for such diseases;
- create the best environment for young scientists and physicians.

Thanks to the commitment and enthusiasm of scientists,

physicians, students and all those working at San Raffaele, our in-house research has already brought to the clinic new and important therapeutic approaches against life threatening diseases.

Highlights

- Gamma Knife

The Gamma Knife utilizes a technique called stereotactic radiosurgery, which uses multiple beams of radiation converging in three dimensions to focus precisely on brain tumors or defects, permitting intense doses of radiation to be delivered to that volume safely. It enables physicians to locate and irradiate relatively small targets in the head (mostly inside the brain) with extremely high precision while sparing the surrounding tissues.

- Tomotherapy

Ospedale San Raffaele is one of the few European institutes which offers tomotherapy treatment. Tomotherapy combines CT imaging with a radiation treatment delivery system and allows to apply highly conformal, individualized dose distributions to any target volume, at its true location, during each treatment fraction.

- Diabetes Research Institute (DRI)

Diabetes Research Institute (DRI) is an international center of excellence for the study and treatment of diabetes. Its main objective is to prevent and cure type 1 diabetes (T1D) and its complications.

Evario: A Comfortable Bed for All Hospital Units

Article provided by Stieglmeyer

Hospital beds are expected to meet a broad range of requirements. The tasks they are faced with in various hospital units are so wide-ranging that you could be forgiven for thinking the answer is to use a variety of special-purpose models. But wouldn't it be easier and more user-friendly, as well as more cost-effective, to have one model of bed meeting every need? This is precisely the approach taken by Stieglmeyer in developing Evario.

Thanks to its modular system, the bed can be configured to meet the requirements of different hospital units. Customers can choose between control options, safety side systems, castors and head and footboards to create a custom-made bed for each unit, from general wards and ICUs to premium rooms. In all units, Evario relieves care staff with effortless operation and a large height adjustment range from 32 up to 91 cm. At the same time, its clear design and optional suitability for automated reprocessing provide excellent hygiene characteristics to support the fight against multidrug-resistant pathogens.

The three-fourth safety sides cover a large part along the mattress base and offer high safety. They are space-saving, visually discreet and provide the patient with an unobstructed view. Care staff can operate these safety sides quickly and intuitively with just one hand. With the optional Protega safety sides, Stieglmeyer offers another great alternative that can be adjusted to meet the individual needs of patients. The wing-shaped split safety sides, made of high-strength plastic, can be raised only at the head end or along the bed's whole length. The wings are released with one move and lower in a damped and



quiet way, needing only minimal space. The elements along the head end move along when the backrest is adjusted and thus also protect the patient in an upright position.

When equipped with the Protega safety sides, Evario can also be optionally fitted with integrated control panels on both sides. The inner face offers the patient an intuitive choice of basic adjustments while the outer face with its large display enables staff to choose between separated control levels for nurses and technicians. An especially practical feature for care staff are the three pre-set backrest positions that are often needed in everyday care.



To learn more about the Evario visit Stieglmeyer at Atlas Medical's booth S1.K30 at Arab Health.

Oesophageal Ventilation Monitoring: From Research Instrument to Standard Bedside Method

Article provided by Löwenstein Medical GmbH & Co. KG

Clinical findings in recent years show that lung-protective ventilation can be affected only with regular adjustment of the ventilator settings to the individual lung function. The adaptation of ventilation therapy based on oesophageal pressure measurement is a simple, valid and minimally invasive method, which requires only the placement of a modified feeding tube.

The changes in oesophageal pressure during a breathing cycle reflect the changes in pleural pressure. The transpulmonary pressure situation, or the difference between alveolar pressure and intrapleural pressure, shows the extent of mechanical stress on the alveoli. It is responsible for VALI. The inspiratory plateau pressure set on the ventilator plays a less important role.

Studies show that, given the high variability

in the ratio of the lungs' elasticity to the thorax, the inspiratory plateau pressure set on the ventilator results in highly varied transpulmonary pressure gradients. In patients with elevated pleural pressure, resulting from increased intra-abdominal pressure, for example, the same inspiratory pressure may be associated with lesser ventilator-associated lung injury than in patients with low pleural pressure. When an elevated intra-abdominal pressure is present, an inspiratory plateau pressure of more than 30 mbar can be tolerated.

In contrast to other methods for detection of individual PEEPs, this procedure also can be used during spontaneous breathing and weaning. With the availability of modern intensive care ventilators and PESO monitors, this established method can now be used easily at the patient's bedside.



Nanosonics trophon2: Tap into the Latest Innovation

Article provided by Nanosonics

Nanosonics, a provider of innovative high-level disinfection solutions for ultrasound trophon2, an updated version of its popular trophon EPR device, which has become the standard of care around the world, especially in the U.S. trophon2 offers smarter protection, flexibility, functionality, traceability and integration that results in customised solutions for streamlined workflows and audit-ready reporting. In addition, extensive probe compatibility exists resulting from collaboration with all major ultrasound companies.

Central to trophon2 is a new software platform delivering superior capabilities including the AcuTrace feature for digital



trophon 2 offers smart traceability with its simple-to-use traceability system for ultrasound probe high level disinfection. It captures all the required traceability information and automatically delivers accurate, digital disinfection reports.

traceability of disinfection cycles. This is done using the latest RFID technology embedded in ultrasound probe tags, operator cards, disinfectant bottles and chemical indicators. trophon2 also has the capacity to store over 100,000 disinfection records providing more accurate and complete records for improved compliance with required standards. With the AcuTrace PLUS software, trophon2 can be linked directly to electronic patient records.

View trophon2 at Arab Health, Hall 3, Australian Pavilion, Nanosonics, Stand H3.A50, to discover why trophon is quickly becoming the new standard of care. Alternatively call +31 6 11 40 74 39, or email J.Stokx@nanosonics.eu to arrange a free demonstration, or visit www.nanosonics.us.

ClinicAll: Providing Highest Standard in Patient Infotainment and Hospital Digitalisation

Article provided by ClinicAll

Hospitals worldwide are facing increasingly strong competition in the fields of patient comfort and well-being. ClinicAll has 10 years of experience in creating and operating state-of-the-art visual information and entertainment systems in hospital surroundings, and our current offerings reflect that by implementing latest IT technologies. ClinicAll infotainment systems are able to integrate mobile tablet PCs, stationary bedside terminals with touchscreen panels, and extra-large wall-mounted Full HD or 4K TV screens into one perfect infotainment experience for the patient.

The result is that patients in a ClinicAll-equipped hospital can experience digital infotainment on a level that can match high-quality home installations: TV service can contain Pay TV, On-Demand TV and digital streaming platforms as well. Internet access and phone services are also seamlessly integrated. Hospitals can also opt to offer many additional patient services such as digital food ordering or online ordering from in-hospital shops via the ClinicAll terminals.

ClinicAll systems provide a platform for digitalisation of hospital services. The increasing awareness of hospital operators and the ongoing implementation of digitalisation in facilities all around the world define a clear set of objectives – streamline clinic processes, reduce personnel expenditure especially in administration, minimise error rates. And, above all – more comfort and improved treatment quality for patients. The result is a very demanding set of tasks that hospital operators find themselves confronted with to face all future challenges.

For more than 10 years, ClinicAll is dedicated to the development of a holistic software solution for hospitals that serves as a platform to integrate multiple digital services. Over the



years a comprehensive and holistic system emerged, comprising dedicated software and hardware components.

A Unified System for Doctors, Staff and Patients

Doctors and staff need to be digitally supported to handle the ever-increasing amount of patient data. Digitalisation will lead to significant savings in time and cost. In addition, patients need to feel well cared for – research has proven that higher patient comfort does improve the recovery process.

ClinicAll developed a unified system for a clinic-wide communication as well as sharing and editing information. It is easily accessible to everyone in the hospital and simple, comfortable and enjoyable in use. Throughout the hospital, all terminals – as well as devices in nurse rooms, doctor's offices or mobile devices – are connected to the main hospital information system.

Examples of Successful Digitalisation

By joining forces with specialist software and hardware providers, ClinicAll has successfully rolled out a multitude of new functions. These include food ordering or bed control, a soft nurse call that is interconnected to a room

status display, and an on-screen messaging system for patients and staff. Doctors can use their smart card to log in at any terminal and discuss medical results with patients.

In Slovenia, a clinic has been equipped with terminals where patients' check-in at the hospital on their own. Even their treatment plans are handed over to them automatically. In Arabian countries, a market that is very high-tech savvy, digitalisation has already been taken a few steps further than in Europe. Food ordering, blood analysis, lab data, patient results, treatment routines – information and processes are integrated into one big clinic digital network. The first ClinicAll systems have already launched successfully on the Arabian Peninsula.

A vital advantage of digitalisation is that it eliminates multiple error sources. When data is always automatically checked for plausibility – for example when patients order their food – the possibility that something goes wrong is drastically decreased.

Together with our long-term software and hardware partners, ClinicAll is able to deliver turnkey high-class IT-powered hospital infotainment systems that, whenever the time comes, can also be expanded to include additional digital functions.

RUBBER MEDICAL GLOVES

Essential Protection for Healthcare Providers and Patients

Medical gloves are a form of personal protective equipment that prevent contamination of healthcare workers' hands and help reduce transmission of pathogens when they are used appropriately along with proper hand hygiene practices.

All medical gloves are disposable, single-use items to prevent cross-contamination. The two main types of disposable medical gloves are examination gloves and surgical gloves and they are available in various types of materials including natural rubber latex, nitrile, polychloroprene and synthetic polyisoprene.

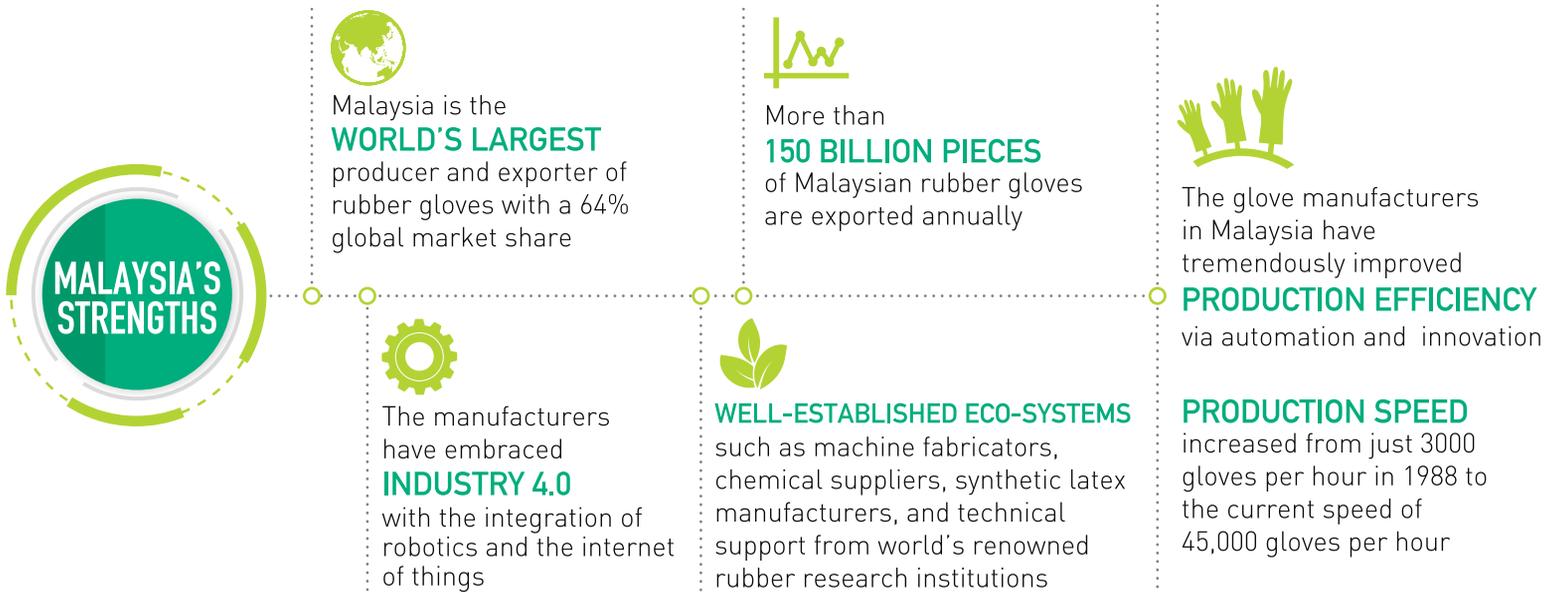
Medical gloves protect both healthcare providers and patients from the spread of infection or disease during medical procedures and examinations. The Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA) all stress the importance of appropriate glove selection.

Made-in-Malaysia medical gloves are manufactured from high Quality materials with state-of-the-art manufacturing to meet stringent international EN, ASTM and FDA standards

Malaysian medical glove manufacturers produce an extensive variety of quality natural and synthetic rubber medical gloves for the healthcare industry including examination gloves, surgical gloves and specialised medical gloves for chemotherapy, dental, orthopaedics, gynaecology, ophthalmology and radiation attenuation. Malaysian glove manufacturers also offer innovative products with special features and design which can be customised to meet different requirements.

As the world's leading supplier of medical gloves, Made-in-Malaysia rubber medical gloves are exported to 195 countries and account for more than 50% share of the world's exports. In 2017, more than 240 billion pieces of Malaysian rubber gloves were exported globally.

Malaysia's commitment to deliver quality medical gloves that meet international standards at competitive prices is the reason why we remain **THE WORLD'S NO. 1 FOR MEDICAL GLOVES**



GSD Healthcare Offers Unique Executive Education Programmes in Dubai

Article provided by GSD Healthcare

The program in Hospital Management is a unique experience of executive education offered in the Gulf Region. It exploits the long-term experience in healthcare management of two top-ranked international institution, the SDA School of Management and San Donato Hospital Group, and thus promotes a continuous exercise of bringing the evidences and modelling from research into the everyday organisation.

The full programme is made up of five modules that includes three days of face-to-face training, plus workshops on-site and an individual field project.

The workshops explore breakthrough issues and provide the opportunities of a close discussion with key opinion leaders and players in the healthcare market, strengthening the professional community of participants.

- Networking
- Workshops
- Individual field project
- Simulations

Prof. Verdiana Morando, Head of Education and Consultancy, GSD Healthcare, UAE said: "Participants are challenged to look at the international scenario of healthcare management models and operational tools, to understand the broad value of the health policy making and then apply these key insights through the case-based learning methods and get the chance to boost their leadership skills. The course is targeted to managers holding C level positions or aspiring to, combing the individual creativity, and cultural heritage, with a thorough and forward-looking business-oriented approach."



Hospital Management Class of 2018-2019

▼ *The Program Structure: Five modules of three day face-to-face training*

Module 1: Organization and Leadership

Module 2: Clinical Management and Operations

Module 3: Budgeting and Performance Management

Module 4: Quality, Risk Management and Audit

Module 5: Innovation and Technologies

Upcoming Modules

- Quality, Risk Management and Audit
7 - 9 March 2019
- Innovation and Technologies
11 - 13 April 2019



Verdiana Morando

Value-Based Care to Meet Patient-Centeredness in Hospitals

The Innovative Experience of San Donato Hospital Group

IN
THE
KNOW

By Giuseppe Banfi MD, PhD, Professor, Research Director San Raffaele University, IRCCS Galeazzi Orthopedic Institute, Director San Raffaele Foundation, and Verdiana Morando, PhD, Associate Professor, Head of Training and Consulting, GSD Healthcare, Dubai, SDA Bocconi School of Management

Worldwide healthcare systems and organisations are facing the complex challenges of continuously providing high-quality and innovative care while keeping healthcare systems accessible and affordable. In pursuit of this challenge, the pillars and the model of the value-based care are gaining their pinnacle momentum. Scholars, practitioners and policy makers are largely adopting this flag to address the attempts made to change the actual health delivery system organisation. Beyond such a buzz puzzle of “value-based care” interventions, there are very few experiences that are worth of being considered and analysed in depth to extrapolate the key lessons learned.

From theories to practice, implementing an actual value-based system requires a deep and rooted reorganisation of traditional healthcare delivery and, foremost, starting from the hospital care. For decades, hospitals' organisation, partly preserving its military origin, has been organised through isolated silos or chimneys named and labeled after the major clinical disciplines. Such an organisational pattern was driven by the supply's needs and the focus on volumes. Fee for services or DRGs were consequently the best mix to incentivise the providers' behaviours, maybe introducing some forms of payments by results/performance to strike the hospital's strategy objectives yearly.

On the contrary, the value-based care provides another narrative, a different organisation and a renewed focus on strategy objectives: from volumes of services to volumes of patients, and the latter should be treated inclusively. The new organisational unit, the hospital's bricks, will be functional processes (instead of physical walls and departments) focused on the disease and the person.

The value-based care model rose as a shining and fresh-new solution for the healthcare systems to muddle through the

financial crisis: the model epitomised by Michael Porter's works since 2008, it was further reinforced by the so-called Triple Aim of Donald Berwick (2008). Both bounded together, they have become the main stream of innovations in healthcare management.

Moving towards hospitals with value-based care models requires major changes and steps to be performed almost simultaneously. To be effective and efficacious, in fact, the introduction of the integrated care pathways as new hospital's “bricks” should deeply influence all the operations and management – for instance, replacing gradually DRGs with bundle payments and adapting the new accounting system, setting-up of multidisciplinary team and integrated practice unit based on disease, using formalised integration and communication procedures and tools, reviewing the performance system and measures applied and so on and so forth.

Whereas implementing the value-based care in hospital settings is challenging, the efforts are due and no more escapable if hospital care is willing to embrace the future of healthcare systems, and not just survive to it. Transforming a traditional hospital organisation, and indeed a university hospital, devoted to the basic and translational research, into a value-based hospital finally represents a further complexity with the change management processes. And San Donato Hospital Group has embraced these challenges. In 2017, the Group launched different projects that aim at implementing the value-based care in hospitals. That means developing innovative frameworks for translating its key tenants into actionable and operational road maps for the change management.

Firstly, the University hospital San Raffaele, as member of the EUHA network*, is currently working at developing hospital value-based care with the high prevalent

care pathways: namely, prostate and breast carcinoma, stroke, and heart failure. San Raffaele Hospital indeed recently proposed to extend the programme to the pancreatic carcinoma, due to its increasing incidence.

Secondly, GSD has launched a targeted care pathway in ophthalmology focused on maculopathies, engaging the 14 ophthalmology units from the hospital's group, including inpatients and outpatients care. Finally, given the sound excellence in orthopaedics achieved by the Group, a new project exploiting the PROMs (Patient Reported Outcome Measure) methodology has been recently initiated in two hospitals, focusing on hip and knee arthroplasties, thanks to the internal availability of a high-quality treatment registry. The measurement of PROMs will allow to shift the performance evaluation from the processes' results to the assessment of patients' quality of life and their functional improvements gained after surgery.

Link: <http://www.euhalliance.eu/>

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**The European University Hospital Alliance (EUHA) includes: San Raffaele University Hospital, Milan; Vall d' Hebron Barcelona Hospital Campus, Barcelona; Charite Universitätsmedizin, Berlin; UZ Leuven, Leuven; King's Health Partners, London; Assistance Publique – Hôpitaux de Paris, Paris; Erasmus MC, Rotterdam; Karolinska Universitetssjukhuset, Stockholm; MedUni Wien und AKH Wien, Vienna

Professional Medication Dispensing for Challenging Numbers of Patients in Chinese Outpatient Hospital Pharmacies

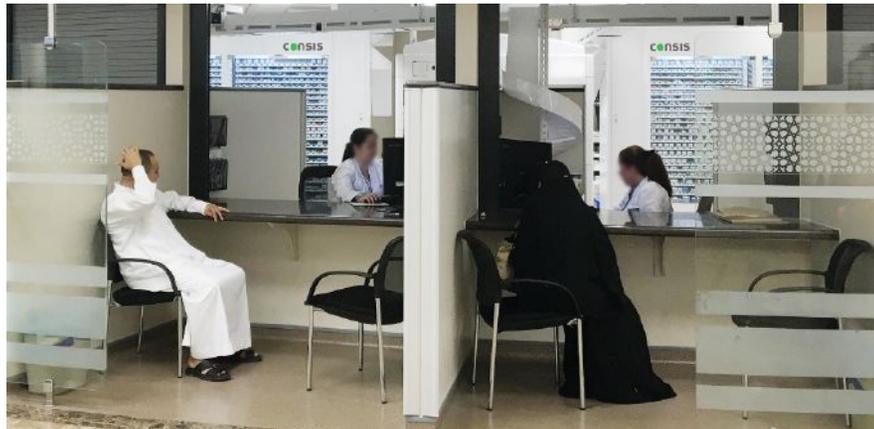
Article provided by Willach Pharmacy Solutions

With a population of more than 1.1 billion people, China is one of the world's largest healthcare markets. The Chinese government is trying to optimise the quality of healthcare services but dealing with the sheer numbers of medicine items dispensed each day is already a massive challenge.

It is common practice for patients to come to hospitals to consult doctors as they would in health centres, and to receive their prescriptions for immediate collection in the outpatient hospital pharmacies. This is especially true of patients with chronic diseases who come from the countryside to collect a three-month supply of three or four different types of medicines. In total, an outpatient hospital pharmacy dispenses up to 50,000 medicine packages per day. Furthermore, it's hard to find enough qualified staff at an affordable cost. Preparing and checking thousands of prescriptions tires staff and increases the risks of the wrong medication being dispensed.

Pharmacy automation is the only way to address all of these issues: it is tireless and reduces dispensing errors; it can process larger volumes of packages more quickly; and it frees up pharmacists' time for all areas of patient consultation and care.

To dispense up to 50,000 packages a day, automation technology needs to split into parallel systems. Up to six robots supply more than 12 dispensing counters. The dispensing burden on each robot may be more than 8,000 packages per day, with multiple packages per prescription. So, the only fast and reliable principle capable of doing this over prolonged periods of time is parallel ejection from several storage channels. The channel principle allows very



Automatic dispensing with CONSIS robots from Willach Pharmacy Solutions at consultation areas in Saudi Arabia.



Automatic dispensing with CONSIS robots from Willach in a Chinese outpatient hospital pharmacy.

compact storage and lines up the same drugs in an inclined channel, releasing them by ejection mechanisms. Gravity then pulls the packages onto conveyor belts for transport to the exit points. The bottleneck for each automation is the loading speed. The advantage of channel storage is that the manipulators for automated loading can carry up to 10 packages at once, almost

completely refilling a channel in a single motion. This means reloading speeds of up to 1,200 packages/hour become possible.

The set-up described above can, of course, be scaled accordingly (e. g. only one or two robots for smaller pharmacies) without losing system efficiency and serves as a raw model of automating for other high-volume markets, such as the Middle East.

Using a Clinical Decision Support System to Achieve Measurably Better Healthcare Outcomes

Article provided by Abbott Diagnostics

The Collaboratory” reflects the transformation through collaboration that Abbott wants to ignite by working in partnership with clients. Abbott supports healthcare organisations to overcome their challenges and materialise their future state vision, by breaking down the silos and barriers that exist today in healthcare. The results of a global study show the contribution expected from labs to facilitate this transformation.

The study was conducted with thousands of healthcare executives, physicians, and patients about the role they expect the laboratory to play in the future. The results were surprising. It found that 93 per cent of executives want the lab to LEAD healthcare analytics. While 77 per cent of physicians want additional interpretation from the lab to help with diagnosis. Furthermore, 69 per cent of patients are not satisfied with the meaning of their lab results.

It highlighted that by leveraging their data and teaming up with other services and stakeholders, labs can shift from being a manufacturing facility to a decision support engine, helping the decision making across the system and achieve measurably better healthcare performance.

With advancements in medical research and technology breakthroughs happening daily, doctors and clinicians must remain on top of latest medical guidelines, patient

historical and holistic information to reduce unwarranted variations, improve patient outcomes and reduce costs.

The Limbach Group is a leading private provider of laboratory services in Germany, with more than 6,000 staff and 32 laboratories. MVZ Cottbus, the group’s laboratory, serves four hospitals and a rehabilitation centre, and provides diagnostic services for a population of more than one million people. Burdened by the extensive employee-hours needed to process and analyse laboratory data, MVZ Cottbus, in partnership with Abbott, recently completed phase 1 of a project to establish how the use of Abbott’s AlinIQ Clinical Decision Support (CDS) solution could: 1) standardise the application of clinical guidelines and evidence-based medicine, 2) improve clinician test-ordering practices, 3) save laboratory time and resources, and 4) improve the quality of reports provided to clinicians.

According to Dr. Peter Thoraus, co-founder and CEO: “A huge part of our time is spent processing and analysing data and writing reports. Being able to automate much of this work – and providing guidance to the requesting clinician – will lead to smarter, leaner and quicker diagnostics and ultimately adding real value to the services we provide.”

After three months, the MVZ Cottbus phase 1 of the project demonstrated that AlinIQ CDS was able to provide recommendations to improve test ordering and identify secondary

diagnosis and comorbidities (Figure 1). The implementation of CDS live has the potential to improve patient outcomes, materialise operational efficiencies and achieve cost savings. Additionally, with just the 70 rules created by MVZ Cottbus and Abbott in this phase, AlinIQ CDS not only recommended testing and provided results interpretations for the four ICD/DRG targeted conditions, but also for other conditions that originally were outside the scope of the project. These results show the benefits that AlinIQ CDS can deliver.

Beyond that, AlinIQ CDS flagged potential comorbidities for further investigation, which could have a significant impact in terms of optimising patient treatments and improving reimbursement coding for the organisation.

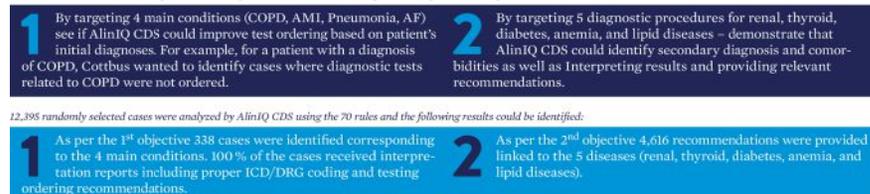
Following the success, AlinIQ CDS has now been integrated with the laboratory’s database and live data streams at MVZ Cottbus to enable real-time analysis and reporting. Prior to commencing this phase, Abbott trained the staff to ensure a smooth transition and the team worked to review the results of the phase 1 and adjust the CDS rules before the system went live with reports and comments for the physicians. Additional work is ongoing to evaluate the strategic, operational and financial impact of AlinIQ CDS in a live setting, comparing performance metrics against the baseline benchmark. In the future, MVZ Cottbus will be able to expand the reach of AlinIQ CDS to other clinical use cases, disease states and lab locations. Additional data streams will be integrated to enrich the clinical information available and enhance the generation of patient-specific recommendations.

For more information please visit www.corelab.abbott or email to wired@abbott.com



FIGURE 1

For Phase 1 there were 2 main objectives chosen by the lab Cottbus and the hospital client of the laboratory Guben:



12,395 randomly selected cases were analyzed by AlinIQ CDS using the 70 rules and the following results could be identified:

Little Boy Goes on Tough Journey to Battle Neuroblastoma, A Rare Cancer

Article provided by UChicago Medicine

Charlie Betzold loves playing with his collection of toy animals. He's happy to tell you his list of favourites: elephants, giraffes, zebras, gorillas, monkeys and sloths.

Having so many favourites would keep any child busy. But back in the fall of 2014, Regina Wan and Eric Betzold became concerned when their young son stopped being active. "He started getting really sleepy, not really eating and not playing like a toddler is supposed to," Regina said.

When Charlie didn't get better, the Jefferson Park couple took him to a nearby emergency room.

There, they got a heart-wrenching diagnosis. Charlie had a rare paediatric cancer called neuroblastoma. He was transferred by ambulance to Comer Children's Hospital at the University of Chicago Medicine.

"And then our lives went into a whirlwind," Eric said. "All of a sudden we were living at the hospital. Charlie had lost a lot of weight and looked very sick."

Paediatric oncologist Susan Cohn, MD, an authority on neuroblastoma, met with the family soon after they arrived at Comer Children's. The news became even harder to bear. The cancer, which had started in his abdomen, already had spread. The treatment for the high-risk tumour would be complex.

"High-risk neuroblastoma is particularly hard to treat," Cohn said, noting that only 50 to 60 per cent of children with the disease achieve long-term survival. "We're always looking for new and better treatments."

Regina and Eric remember Cohn's team walking them through a rigorous care plan that included a clinical trial of a new combination therapy. "They didn't make it



Charlie Betzold

sound easy, but they gave us the knowledge to make decisions every step of the way," Eric said. "And they put us at ease."

Cohn told Charlie's parents about the clinical trial testing the effectiveness of adding a drug called MIBG that contains a form of radioactive iodine (I131-MIBG) to standard high-risk neuroblastoma therapy, which can include intensive chemotherapy, surgery, stem cell transplant, radiation and immunotherapy.

MIBG, or metaiodobenzylguanidine, is a compound that is actively absorbed by neuroblastoma cells. For the therapy, the I131-MIBG is given to patients through an IV. As the cancer cells absorb the MIBG, the linked iodine delivers cancer-killing radiation to the tumour cells. Comer Children's is the only hospital in Illinois offering the treatment.

"We've been using I131- MIBG therapy for children with relapsed disease for more than two decades and have seen good responses," Cohn said. "This is one of the most active agents available to treat relapsed neuroblastoma. We next wanted to evaluate if MIBG therapy will improve survival rates for

children with newly diagnosed neuroblastoma."

In March 2015, after five cycles of chemotherapy and surgery, Charlie received the I131-MIBG treatment. A few weeks later, he underwent high-dose chemotherapy followed by stem cell transplant and radiation. He then received an additional six months of treatment with immunotherapy.

"The whole treatment was hard for a little person to handle," Regina recalled of her little boy's journey.

"We knew it was going to be intense," Eric added. "Charlie was young and won't remember, but the experience is seared in our minds."

Through it all, the couple tried to stay strong for Charlie and keep his life as normal as possible. They leaned on their families, an online neuroblastoma support group and the care team at Comer Children's – a potent combination in helping Charlie.

"Neuroblastoma can lead to significant side effects and long hospitalisations," Cohn said. "The experience is tough on the patient but also very stressful for the entire family. Even when Charlie wasn't feeling well, he and his parents managed to stay positive. They were remarkable."

Today, the five-year-old is happy, healthy and full of energy and life.

"Cancer can't compete with the amazing research that's taken place over the years," said Eric. "It's all coming together to give kids like Charlie a better chance to beat neuroblastoma and other childhood cancers."

And that's the ultimate goal: "We are going to keep working hard until we cure every child," Cohn said.

For more information, please visit our website at <https://www.uchicagomedicine.org/global>

A Global Destination for Continuous, Compassionate Innovation

Setting a New Standard: Uniting Quality Care with Groundbreaking Research

Article provided by Nationwide Children's Hospital

America's second largest children's hospital – performing more than 1.4 million patient visits per year – is also one of its best: Nationwide Children's Hospital is consistently ranked among the 10 best children's hospitals in the U.S.

Founded in 1892, the hospital has a long tradition of serving the residents of Columbus, Ohio, as well as families from all 50 states and more than 68 countries.

A Well-Deserved Reputation

The hospital's prestigious standing results from tireless emphasis on top-quality patient care and a longstanding commitment to being a global driver of clinical innovation and advanced research.

Key hospital metrics include:

- Ranked #7 among U.S. children's hospitals by *U.S. News & World Report*
- Ranked among the best U.S. children's hospitals by *U.S. News & World Report* for all 10 evaluated specialties
- National Institutes of Health (NIH) research funding ranked 6th of all U.S. children's hospitals
- Magnet™ facility designation from the American Nurses Credentialing Center, awarded to only two per cent of U.S. hospitals

Colorectal Surgery

Experts from 10 disciplines unite to provide the world's leading colorectal, urologic and gynaecologic advanced care in the Center for Colorectal and Pelvic Reconstruction (CCPR). The programme offers the most experienced paediatric surgeons in the world – performing nearly 1,000 procedures per

year – for conditions such as anorectal and cloacal malformations, Hirschprung disease and gastrointestinal issues. CCPR also offers sacral nerve stimulation and a renowned Bowel Management Bootcamp for children coping with constipation or incontinence.

Cardiovascular Surgery

Nationwide Children's offers the world's first therapeutic Hybrid Cardiac Operating and Catheterization Suites, compatible with both interventional cardiology and cardiothoracic surgery. The Heart Center also runs the first FDA-approved human study of tissue engineering repair for congenital heart defects.

Neurodiagnostics and Epilepsy

Patients requiring testing of the brain, spinal cord and peripheral nervous system now have access to the Neurodiagnostic Programme's multidisciplinary, innovative evaluation of injury and disease. Epilepsy patients also receive expert care in the hospital's Epilepsy Monitoring Unit and Level 4 Epilepsy Center, which offers 21 advanced epilepsy treatment procedures and a 100 per cent surgical survival record. The Neurology programme ranks 7th in the U.S.

Muscular Dystrophy and Neuromuscular Disorders

Nationwide Children's is the only center in the world that has carried out clinical trials in all three major forms of spinal muscular atrophy (SMA) and is hosting the world's first gene therapy clinical trial for SMA1. Nationwide Children's was also the first Certified Duchenne Care Center.

Gastroenterology

Disorders caused by behavioural concerns or physiological abnormalities receive critical investigation from the nation's leading experts in intestinal function. The team leads the world in gastric pacemaker experience and offers the country's only inpatient Rumination Rehabilitation Programme.

Hematology, Oncology & Blood and Marrow Transplantation

Ranked 5th in the country for oncology, Nationwide Children's has one of the largest paediatric cancer programmes in the U.S. and offers personalised and unrivalled care for brain tumour resection, blood disorders, immune system deficiencies and more. The hospital hosts the Children's Oncology Group (COG) North American biobank and is home to the worldwide Head Start 4 clinical trial (led by the hospital's Director of Neuro-Oncology, Jonathan Finlay, MD) via the National Experimental Therapeutics (NEXT) Consortium, expediting evidence-based treatment protocols for paediatric cancers.

Welcome to Columbus

With convenient access to the city's international airport, downtown food and cultural centres, arena district and more, Nationwide Children's offers global visitors a comfortable and welcoming place to call home during treatment.

MORE INFO

Contact Global Patient Services via email at GlobalPatientServices@NationwideChildrens.org, call +1 614 362 9127, or visit NationwideChildrens.org/Global-Patient-Services

Location: Nationwide Children's Hospital, Columbus, Ohio, U.S.

New Paradigm for Cancer Care

Article provided by Elekta

For almost five decades, Elekta has been a leader in precision radiation medicine. We are committed to ensuring everyone in the world with cancer can benefit from more precise, personalized radiotherapy treatments.

“We believe that clinicians and patients around the world should have access to advanced, high quality and efficient cancer treatments,” said Habib Nehme, Elekta’s Vice President, Middle East and Africa. “Achieving this goal requires advanced radiotherapy solutions that simplify and streamline the delivery of complex treatment regimens. As we grow our customers in the Middle East, we are dedicated to building an infrastructure

to serve more healthcare professionals, including highly-skilled oncologists, medical physicists, neurosurgeons and technologists – and the patients they treat.”

Two new innovations from Elekta that optimize care for clinicians include:

Elekta Unity, a magnetic resonance radiation therapy system that combines high-field 1.5 Tesla MR imaging, precision radiation therapy and intelligent software, allowing clinicians to see what they treat in real time. Addressing an unmet need in cancer therapy, clinicians can now see and track the tumor and difficult-to-visualize soft tissue anatomies during treatment and adapt the treatment plan based on the

patient’s anatomical status while on the treatment table.

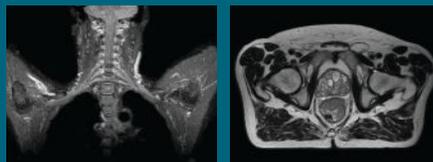
MOSAIQ Plaza, Elekta’s newest software solution offering for streamlining and simplifying the delivery of complex precision radiation medicine treatment regimens. MOSAIQ Plaza is a patient-centric, integrative operating system, designed to work seamlessly with Elekta’s radiotherapy systems to deliver a comprehensive treatment. This technology will drive efficient daily practice and connectivity to bring people and information together.

Please visit elekta.com to learn more and visit our booth at Arab Health to meet our Oncology Specialists.

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Captured on Elekta Unity during 2018 imaging studies



elekta.com/unity

Elekta Unity has CE-mark and 510(k) clearance but is not commercially available in all markets.
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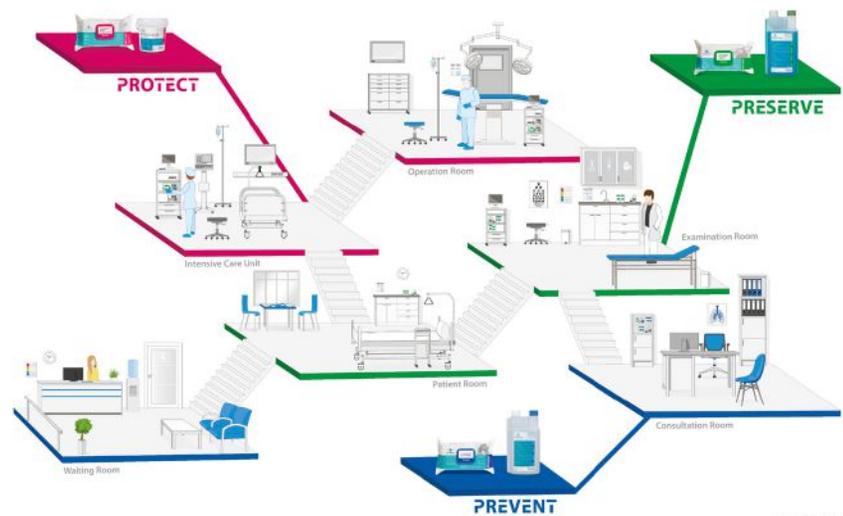
Article provided by Dr. Schumacher GmbH

Dr. Schumacher is celebrating its 40th year as a leading manufacturer of innovative hygiene products, medical experience, partnerships and expert consultations. The company is going to present its new concept for simplicity in disinfection and hygiene at Arab Health, where customers will have the chance to learn more about its products.

In addition to new products and current hygiene trends, Dr. Schumacher also offers a user-friendly orientation system to keep your safety in focus – The Dr. Schumacher Hygiene Levels. The Hygiene Levels: PREVENT::PRESERVE::PROTECT offer simplicity, transparency, safety and systematics for all hygiene related tasks, for each requirement and in all areas of application. Especially in daily routine, this concept reduces complexity and uncertainty, increases hygiene regulation compliance and employee and patient safety.

The Dr. Schumacher Hygiene Levels: PREVENT::PRESERVE::PROTECT®

- All PREVENT level products are designed to create a safe environment for patients, staff and visitors in areas like public corridors and waiting area. Preventative disinfection measures can inhibit the spread of pathogens.
- The PRESERVE area concerns outpatient or inpatient treatment scenarios in which the risk of infection increases due to a variety of influences. The goal is to ensure hygiene at the point of care.
- In critical areas of medical facilities as well as in outbreak situations, the focus of hygiene is on maximum effectiveness. The aim of PROTECT measures and



products is to protect health and prevent further impairment of already weakened persons in high-risk areas such as isolation and intensive care units.

The products for the hygiene levels PREVENT, PRESERVE and PROTECT are colour-coded to make the application as safe and easy as possible. Users know intuitively which measures and products have to be used in the respective use case.

According to General Manager Michael Aupke: "We've listened very carefully to our customers and realised what the

market desperately needs: to be safe. Convenience is the key – the new hygiene levels provide the framework for efficient and user-friendly hygiene. Or as we say: Safety made simple."

For 40 years, Dr. Schumacher GmbH has been an internationally recognised specialist for the development and production of disinfection, hygiene and care systems in all medical areas. Employing 1,800 people in eight countries, the family owned German company headquartered in Malsfeld/Hesse is producing disinfection and cleaning products for skin, hands, instruments and surfaces. The company is one of the largest manufacturers of wet and dry wipe systems in Europe, with its own production of soft cloth systems and wet wipes. A distribution network in about 70 countries emphasises the international scope of the hygiene specialist.

For more information visit www.schumacher-online.com/en

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NORA LUNATEC MOTION:

New Type of German Material Absorbs Shearing Forces

Article provided by nora

Every step subjects our feet and joints to compressive, impact, and shearing forces that must be reduced, above all for patients with painful foot or joint diseases, e.g. rheumatism but also diabetes. For this purpose, the EVA material Lunatec motion has been developed. It is available in two versions: Lunatec motion 10 (extremely soft) and Lunatec motion 20 (soft), as well as a composite sheet, which means Lunatec motion 10 (approx. 10 Shore A) is already bonded with Lunasoft SL (approx. 40 Shore A) to mould an insole in only one step.

These special materials are ideal as bedding for people with foot pain and as absorption of shearing forces caused by walking. A large part of the load of the musculoskeletal system is being removed, and therefore the pain. What must be highlighted as well are its excellent bedding and damping properties in the horizontal load plane. Experience has shown that patients are particularly pleased about the soft wearing comfort of this material that also facilitates treatment that was inconceivable with hygienic closed cellular EVA material before. This quality material can also be used for general orthopaedics, prosthetics and orthotics, e.g. as cushioning in classical orthopaedic devices or as a functional lining on support orthoses and corsets.

Visit the nora team at Arab Health Exhibition in Za'beel Hall 2, Booth Z2.H52, Pavilion of Baden-Württemberg, Germany.



Why International Pharma Should Invest in Sub-Saharan Africa

Article provided by CPhI

Last October, at CPhI Worldwide in Madrid, pharma stakeholders working in Nigeria, Tanzania, Madagascar, Zambia and Zimbabwe gathered for a panel discussion on the growth path of pharma in Sub-Saharan Africa. The panel brought together representatives from regional pharma companies, associations and investment platforms to explore the potential this market holds for international players.

Capturing a Growth Market

The African continent boasts a population of more than 1.1 billion and is experiencing a demographic shift, which makes it particularly attractive to international pharma. A rise in employment opportunities has contributed to a growing middle-class, and with it, an increase in non-communicable diseases linked to lifestyle choices, such as diabetes, hypertension and cancer. Increased health insurance coverage for citizens has also improved access to medicines, creating the need for a sustainable pipeline of trusted pharmaceutical products.

A growing prevalence of certain disease profiles and the need for access to quality, safe and effective medicines have led Governments to look for ways to reduce reliance on imports and encourage local development.

Panel member Emmanuel Mujuru, Chairman of the Federation of African Pharmaceutical Manufacturers' Association described the African market as 'one of the fastest growing pharma markets globally', enjoying 'double digit growth' each year. Mujuru added that by 2020, the market's projected value will be approximately US\$45 billion, having almost doubled in the past 5 years. Based on this growth trajectory, he anticipates the market to be worth over US\$100 billion in the next 10 years.

A More Favourable Environment

With such a demand for affordable and accessible products, what is being done to facilitate domestic production and attract



outside investment? Moderator Olukayode Afolabi, Co-Founder & Executive Director of DFS Africa, a platform for fostering development in Africa through attracting foreign investment and expertise, pointed to the African Union's Pharmaceutical Manufacturing Plan for Africa (PMPA) as a catalyst for stimulating local production.

The PMPA aims to address current hurdles, including introducing reforms to unfavourable policies around tax, financing and utilities.

Harmonisation on the Horizon

One key challenge faced by pharma companies looking to register and supply medicines across the African continent is that this is not a unified market. However, African nations and development agencies such as NEPAD and the African Union, are looking at ways to harmonize registration requirements for medicines. Mujuru described the establishment of the African Medicines Agency earlier this year as a crucial step towards regulatory harmonisation - the AMA represents a single, continental regulatory agency, acting as an umbrella body for continent-wide regulation, and is similar in its framework to the EMA.

For international players, these steps towards creating regulatory harmonisation across the continent means the process for new drug approvals will be centralised.

An Investment Opportunity

One of the biggest challenges in building local production capacity is funding. Many

companies in Africa do not have access to affordable long-term financing and are looking to international partners for investment.

So, what's in it for investors? The panellists shared how they would convince multinationals to invest in the region. Shailesh Kapadia describes Africa as a 'future continent' with ripe opportunities for private equity firms and foreign investors, while Hitesh Upreti, CEO & Managing Director of Zenufa Laboratories Tanzania Ltd agreed, saying 'Africa is the future' and offers 'long-term business opportunities'.

Himanshu Patel, Director of Yash Pharmaceuticals, accepted that market entry may be a risky prospect for investors, but is ultimately a decision that would pay off.

Emmanuel Mujuru endorsed Africa as 'the pharma market of the moment'. He noted that investing in Africa gives access to a huge population - almost double that of Europe.

This volume, combined with the efforts of African nations to make doing business on the continent easier, means the Sub-Saharan Africa market is an attractive option for internationals seeking long-term growth opportunities.

Interested in learning more?

Sub-Saharan Africa will be a key focus to the content programme at CPhI Middle East & Africa 2019. This event gathers key pharmaceutical stakeholders from across the entire Middle East & Africa to do business in pharma.

To find out more about how to capitalise on the growing pharma market, join us in Abu Dhabi from 16-18 September 2019.

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medifa: Bringing Operating Room Expertise Under One Roof

Article provided by medifa

medifa is an owner-run and internationally active company that covers all operating room requirements from modular wall, door and ceiling systems (RooSy Room Systems) for the turnkey operating room, mobile operating tables and accessories for operating tables, right up to examination chairs, with its product and service portfolio. In addition, one of the largest German OEM suppliers in the medical technology sector

also belongs to medifa.

medifa GmbH & Co. KG (Finnentrop), medifa hygienic rooms GmbH (Ötigheim) and medifa metall und medizintechnik GmbH in Rastatt, are all part of this group of companies. The medifa healthcare group employs approximately 350 employees at three locations within Germany. The planning, engineering and production take place exclusively in Germany, and with over 90 per cent added value in the group

of companies, the group guarantees fast reaction times.

At medifa, the slogan "we care" means that the company consistently orientates itself according to the requirements of its customers. Customers all over the world can rely on top-class consultation, processing and quality from a single source, made in Germany, according to certified national and international quality standards.

From Diagnosis to Aftercare: The Patient Journey with BEWATEC

Article provided by BEWATEC

One solution – from admission until after discharge. The goals are clear – more efficiency, more service, more time for care and above all, higher convenience and quality of care for patients. As a provider of holistic solutions, BEWATEC connects all digital tools and services improving the processes at the point of care. From registering at the hospital from home to getting information about treatment and therapy during the hospital stay to the active involvement of patients – the perfect patient journey starts with tools and services by BEWATEC.

The holistic solution by BEWATEC integrates all relevant digital services into

one system, providing required contents to nursing staff, doctors and patients at the right moment. The apps interface and take over a huge range of tasks – staying expandable and tailored to the hospital's needs. Whether its Internet of Things or innovative real time applications, together with our partners, we extend the limits of technical feasibility each passing day. For better ways of communication at the point of care and a perfect patient journey.

The software solution BEWATEC. ConnectedCare connects all systems with the intelligence behind them – the know-how, the interfaces and the partners. A safe HIS integration allows for accessing

all information and data. Meal ordering, blood analyses, lab data, room control, bed management – all information and processes are integrated into a comprehensive digital hospital network.

Over the last years, BEWATEC has transformed from a hardware-oriented producer of patient terminals with more than 200,000 sold devices to a provider of comprehensive digital solutions. With more than 20 years of experience in the development, conception and realisation of communication solutions, today BEWATEC offers a range of services covering all demands of modern communication in the hospital.



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Improving processes. Inspiring people.

Passionate about Paediatric Care

Article provided by Ann & Robert H. Lurie Children's Hospital of Chicago

Ann & Robert H. Lurie Children's Hospital of Chicago provides superior paediatric care in a setting that offers the latest benefits and innovations in medical technology, research and family-friendly services. As the largest paediatric provider in the region with a 130-year legacy of excellence, kids and their families are at the centre of all we do. Lurie Children's served over 212,000 individual patients in fiscal year 2018.

Lurie Children's Ranks Among the Very Best Children's Hospitals in the U.S.

Lurie Children's once again ranked in the top 10 best children's hospital by the *U.S. News & World Report*. These rankings are based on patient care resources, treatment, patient safety and reputation, as well as patient outcomes.

Lurie Children's is also placed on the Best Children's Hospitals Honor Roll – the highest level of recognition – for the seventh year in a row. The honor roll is a designation by the *U.S. News & World Report* for hospitals that score in the top 10 per cent in at least three specialties. We were one of 10 hospitals in the country to be given this special designation.

Pioneer in Cardiology and Heart Surgery

Lurie Children's is ranked third in the U.S. for child cardiology and heart surgery by *U.S. News & World Report*. The Society of Thoracic Surgeons also rated Lurie Children's as a three-star hospital, the highest rating level awarded. Our first-year survival rate for heart transplant patients, more than 95 per cent, far exceeds the U.S. national average of 87 per cent, and our long-term survival rates are also exceptional. Each year, our cardiologists see more than 16,000 paediatric patients in outpatient diagnostic visits and treat more than 300 inpatients.



Lurie Children's is the first paediatric hospital in the country to implant the new smaller version of a total artificial heart. Eleven-year-old Jaheim Whigham of Illinois is the world's youngest person—and one of 40 worldwide – to receive this version. To save his life, Lurie Children's cardiac surgeons removed his failing heart and implanted the 50cc SynCardia Temporary Total Artificial Heart. The device replaces both failing heart ventricles and the four heart valves. It restores blood flow to the body and the vital organs, acting as a bridge to a heart transplant.

Cancer Care

Although cancer is rare in children, we treat a wide range of childhood cancers. We also have a complete array of programmes and services for children with blood disorders such as Haemoglobin Disorders, Haemophilia, Thrombophilia and Sickle Cell Disease. A new inpatient unit is underway to treat more patients. The centre is ranked in the top 20 by *U.S. News & World Report* for paediatric oncology.

Neurosurgery

Lurie Children's Division of Neurosurgery is one of the busiest in North America, seeing more than 5,000 outpatients and performing approximately 1,000 surgeries a

year. *U.S. News & World Report* has ranked Lurie Children's in the top 15 in the nation for paediatric neurology and neurosurgery.

We offer a joint Paediatric and Adolescent Neurovascular Disease and Stroke Program with Northwestern Memorial Hospital. This partnership supports Lurie Children's efforts to assist our teenage patients in the transition from paediatric to adult care. We provide support and resources for the whole family.

Telemedicine

We offer a telemedicine service that can be used for follow-up care after being discharged from Lurie Children's, as well as for chronic care management. Using a variety of telecommunication technologies, including real-time video conferencing equipment, hospitals across the globe will be able to collaborate closely with Lurie Children's specialists who can assess the patient, review diagnostic images and data, and provide an expert diagnosis. Our specialists connect with outside organisations using Polycom videoconferencing, a secure platform that will protect patient data.

Family Focused for International Patient Services

Our International Patient Services (IPS) Department works with families around the world seeking specialised paediatric healthcare services. We're committed to providing family-centred care through every interaction, from referrals through treatment and the journey home.

MORE INFO

To contact IPS, call 312.227.4550 or e-mail IPS@luriechildrens.org. To learn more about Lurie Children's Hospital and the International Patient Services, visit luriechildrens.org/international.

Meyer-Haake puts the Spotlight on “Made in Germany”

Article provided by Meyer-Haake

The term “Made in Germany” has an excellent reputation worldwide. Distributors from all over the world are proud of representing the global German players such as Siemens, BBraun, Fresenius, Maquet, etc., in their countries. But what about all the small and medium sized German companies – who wants to represent them?

Germany offers about 1,180 medical technique companies with more than 20 employees. Only 33 companies out of these have more than 500 employees (*Source: Federal Statistical Office*). So the market in Germany is driven by small and medium sized companies offering modern and innovative products. Sometimes global players begin in a garage. So, think twice, is it not worth having a closer look at those “little” companies?

In the last 20 years, our private as well as business environment has changed

dramatically. We send messages via email, read books as e-papers, but sometimes the devices that we use on a daily base in our professional life might not be state-of-the-art. Sometimes we even don't know what is offered on the market.

Today, who wants to use an electrosurgical device in their Operating Room (OR), when innovative radio frequency devices offer so much more?

In 1987, Meyer-Haake GmbH introduced the first high frequency surgical device with an output power in the Megahertz range to the market. Due to the high frequency, it was possible to conduct surgeries with minimal heat development causing less thermal damage and tissue shrinking. Therefore, the devices quickly triggered the market.

The latest models radioSURG 2200 “PT” and “PTA” have been designed by a well-known designer in the medical field. It offers a

clearly arranged, self-explanatory touchscreen and five outputs. In addition to the permanent coagulation, the coagulation degree can be set in nine strengths and the coagulation time in 10 steps up to one second. An absolute sensation is the development of the new foot pedal. With the foot pedal, the modes can be changed, the output power be increased or decreased, and the device activated or deactivated. The device offers parameters for more than 40 surgeries from eight medical fields, which can of course be changed and saved again. Additionally, in all five output modes, five personal settings for surgeries can be saved. All surgical parameters can be read out, printed out or saved on the computer via an USB stick.

Never before have such novelties been offered in a radio surgical “Made in Germany” device. The company is also the manufacturer of the tissue adhesive EPIGLU.

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Meril: Developing Best-in-class Solutions

Article provided by Meril Group

Meril Group (www.merilife.com) is a global medical device manufacturing company having presence in more than 120 countries including the U.S., Latin America, EU, CIS, South East Asia, Middle East, Australia and Africa. We have manufacturing facilities in India and U.S. and wholly owned subsidiaries in U.S., Germany, Brazil, Turkey, South Africa, and Bangladesh.

Situated on 180 acres of land and built over a 300,000 square feet area with headquarters in Vapi, India, Meril has two manufacturing facilities. One being dedicated to the Cardiovascular portfolio and other for Endosurgery, In-vitro Diagnostics and Orthopaedic portfolio. Our products are USFDA, CE, ISO 13485 and cGMP certified.

We are currently a growing team of approximately 4,500 employees. The team is being led by highly experienced professionals from across the sectors.

Product Portfolio

Cardiovascular: Bioresorbable Scaffold, Drug Eluting Stent, Bare Metal Stent, Balloon catheter, Transcatheter Aortic Valves Replacement system (TAVI).

Orthopaedics: Knee Replacement Implants and Instruments, Hip Replacement Implants and Instruments, Trauma Implants (SS and Titanium) and Instruments.

Diagnostic Equipment: Semi and Fully Automatic Analysers (100/200/400/800 throughput equipment), Coagulation Analysers, Haematology Analysers (3PDA), ELISA Readers and Washers, CLIA Reader.

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IUDs: CuT380A, Cu T375, Hormonal.

Mechanical Closures: Linear Cutter & Reload, Linear Stapler & Reload, Circular Stapler, PPH, Skin Stapler, Trocars, Energy Device, Liga Clips.

ENT: Sinus Balloon Catheter System

Veterinary Products: Surgical Sutures for small and large animals, Semi and Fully Automatic Analysers along with reagents, Haematology Analysers along with reagents.

Meril Academy is dedicated to dissemination of scientific knowledge on a global platform amongst Physicians, Surgeons, Medical Interns, Technicians and Paramedic Staff, with in-depth knowledge and skill upgradation with specially designed programmes and a well-structured collaborative learning model.

Meril Training Academy is spread over 200,000 square feet and is articulated in the form of a "wave" located at the headquarters. It is well equipped with modern technologies, large capacity seating, library and a dedicated team.

It is accredited by ASI and AMASI and has organised over 13 CME accredited workshops, 11 General Surgery workshops, 2 diagnostics workshops, over 100 conferences

and workshops, 24 orthopaedic workshops, 21 Interventional cardiology workshops, 7 operation theatre nurses convention, 10 hospital management workshops, catered to more than 6,000 healthcare professionals, over 400 Academic activities, and multiple Cadaveric hands on workshops.

Meril Academy Programmes

CIT: The programme offers opportunities to discuss innovations, develop practical skills, debate challenging technologies in practice, exchange ideas and learn from experts on Interventional Techniques.

Masters Course: An initiative of Meril Orthopaedic Division with a purpose to discuss the latest advancement in Joint Repair & Replacement bringing together national and international delegates. The two-day course offers delegates the chance to see live surgeries of Knee, Hip, and Trauma. This has helped surgeons improve their surgical techniques, patient satisfaction level, counselling skills with patients and ultimately the surgical outcome for the benefit to the patient and society as a whole.

CoE: Aims to support surgical skills of Post Graduate students of Private & Govt. Teaching Institutions on technological advances in the Discipline of Surgery and Minimal Access Surgeries (MAS).

Meril also encourages consistent education programmes at various international locations where we thrive to bring in the Meril Academy experience outside the Academy.

Coaire Compressors: Providing “Oil-free” Air

Article provided by Coaire Compressors

Coaire Compressors has been manufacturing air compressors for over 50 years. Over this time period, the brand has taken many strides into new segments and technology. Thanks to its renowned expertise, it is the name that comes to a customers' mind for solutions for compressed air.

Coaire is one of the few companies that have the know-how to manufacture oil-free scroll air compressors. Oil-free air is a must for

various applications such as medical air, lab instruments, oxygen generators, etc.

When you look at medical application, oil-free air is preferred. Many installations have oil lubricated compressors, as it is less expensive and prone to high maintenance cost.

Scroll doesn't use oil in the system, hence, whatever happens there is no possibility for the oil to enter the pipeline, hence “Zero Oil” is established. While compressing the air, it reaches +165-degree C

and is cooled to 10-degree C and is also good for the medical air.

Furthermore, scroll doesn't use any energy during no load while the unload power of other types varies from 20 to 40 per cent of the full load power. This is considered to be a huge saving.

All reputed hospitals are now moving towards oil-free scroll compressors for their medical air, as it is truly a winner when it comes to hospitals, dental and lab applications.



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Please visit our English playlist on www.youtube.com/norashoecomponents



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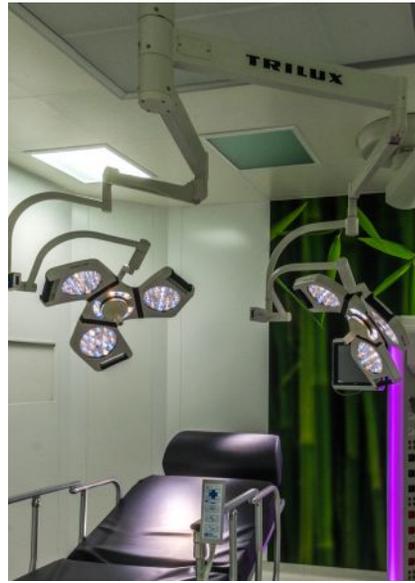
IN
THE
KNOW

Modular OR Solution for Every Condition

Article provided by TRILUX Medical GmbH & Co. KG

Clinique Ophtalmologique opened in January 1996 and is considered to be the first out-patient ophthalmology surgery centre in Tunisia. In February 2018, the expansion of the clinic was put into operation. The expansion encompasses six ORs with a 200 sqm preparation room, an induction room, as well as a monitoring station.

The Mizuho Group was able to provide valuable input for the expansion of the clinic already in the planning phase. They worked hand in hand jointly with the clinic's management and the architects. As a result, the room separation was realised via a modular wall system. Not only did the newly gained room geometry increase the efficiency of the workflows, but also the number of treatments.



Furthermore, the special ceiling microscopes for ophthalmological applications require sufficient space below the ceiling. Therefore, an IS 500 OP was installed as a media supply unit for the smaller operating rooms. For the larger rooms, the Medidrants® CSU OR ceiling supply unit was utilised. In rooms in which an anaesthesia machine is used, the ceiling supply units were equipped with corresponding lifters to fulfil the hygiene and application-specific requirements. All operating rooms were equipped with the Aurinio LED OR light.

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CONSOLIDATION OF RAW MATERIALS

Supply of Active Pharmaceutical Ingredients (API) and Excipients out of one hand

By Peer Foelster, Inter-Harz GmbH

To get material from the producer to the customer is a long process, with a lot of risks and these need to comply with the GDP-standards for API and Excipients.

In a pharmaceutical finished dosage form (FDF) you have a lot of raw materials, which the company normally gets from several suppliers. So, the procurement-department has to contact several companies to check the availability, delivery time and price.

When all the materials are shipped, the procurement department has to monitor all departures and arrivals of each separate material. If one product is delayed, the whole production is standing still. If there is a change in the production schedule and material is needed earlier or later, the procurement department needs to contact all suppliers to manage an arrival as requested – if possible.

On arrival each product has to be

imported separately, which means separate costs for each item. In some countries, you have fees for each individual import process. In addition, each invoice has to be booked separately at your bookkeeping department. That means a lot of head count is necessary to monitor all the procedures.

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Cathejell: Simply Clever, Single Hand Use

Article provided by Montavit

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- lubricant + anaesthetic
- Agent: Lidocaine

Cathejell C

- lubricant + antiseptic
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IN THE KNOW

marLED® X – Xtremely Innovative *The New OR-light Generation*

Article provided by KLS Martin

Light is one of the most important elements in an operating theater. It has a great influence on the course of an operation and is essential for every successful procedure. But every situation, every tissue and every user is different. What is needed is lighting that is so versatile that it is suitable for every situation and for everyone who operates it.

Hospitals are also under pressure to improve success rates while simultaneously reducing costs. Efficiency in achieving results is extremely important – for the budget and also to stay ahead of the competition. marLED® X reduces the time required to set up the lights to a minimum and is very

long-lasting. Therefore, KLS Martin presents innovative light technology in a compact unit: marLED® X.

The powerful, individually controllable LEDs ensure a brilliant and even illumination of the surgical field. No matter which light intensity, luminous field size or color temperature is required, marLED® X provides numerous adjustment possibilities for the surgeon.

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Photo: ICCAS Innovation Center Computer Assisted Surgery / Leipzig University

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Article provided by Amoena

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IN THE KNOW

Kiefel Machinery and Devices for the Medical and Pharmaceutical Sector

Article provided by Kiefel

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IN
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Wakey Wakey



Collaboration with the IFCC and tightening of the NGSP certification and CAP EQA criteria may have acted as a 'wake-up call' for some manufacturers.

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Evaluation of Four HbA1c Point-of-Care Devices Using International Quality Targets: Are They Fit for the Purpose? *Journal of Diabetes Science and Technology*. 2018; 12: 762-770.



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Video Laryngoscopy Wherever and Whenever You Intubate

Article provided by Intersurgical

i-view™ is the new single use, fully disposable video laryngoscope from Intersurgical, providing the option of video laryngoscopy in the ER, ICU, maternity or the pre-hospital environment.

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Visit our dedicated website page www.intersurgical.co.uk/info/i-view to view the video, download the information sheet or make an enquiry.

Intersurgical will be exhibiting their full range of respiratory care products in Hall 7, Stand B50 (UK Pavilion) at Arab health

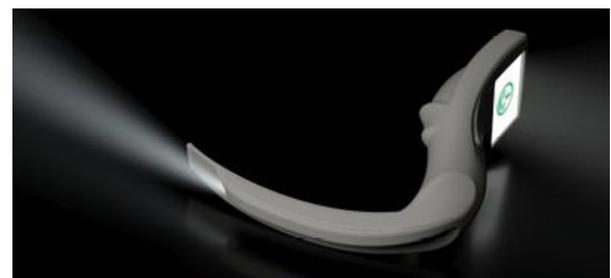
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FCT Speedia/Synapse 3D from FUJIFILM

Article provided by FUJIFILM

Since our release of X-ray film in 1936, FUJIFILM has continued to push the boundaries with its medical imaging. Integrating "Image Intelligence™", the image recognition and analysis technologies defined in our experience on medical imaging, FUJIFILM enters the CT imaging market with its FCT Speedia Advanced CT Solutions.

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All Application is yours. Images on the right expand the SYNAPSE 3D Clinical analysis.



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<p>• Lung Analysis </p> <p>• Virtual Endoscopy </p> <p>• 3D Hepatic </p>	<p>• Real tissue </p> <p>• Liver resection simulation </p>	<p>• Right registration </p> <p>• Non-rigid registration Non-rigid registration enables SYNAPSE 3D to reuse an organ in images acquired at different phases, and different time points to be corrected.</p> <p>• Non-rigid registration </p>	<p>• Non-rigid registration </p>

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Article provided by Dunlee

Dunlee replacement CT tubes offer excellent quality and are engineered to be OEM-equivalent. The tubes' reliability, quality and economic value combine with outstanding service and fast delivery to help reduce CT scanner operational costs and downtime.

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Visit Dunlee at Arab Health Booth # S1.B54, Sheikh Saeed Hall 1. For more information please contact sales.dunlee@philips.com



IN THE KNOW

Medics! Are You Ready for a Challenge?

Test your skills and experience the ZOLL solutions on advanced resuscitation and acute critical care

Article provided by ZOLL

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- Ventilation Challenge – Ventilating a patient with the right frequency and

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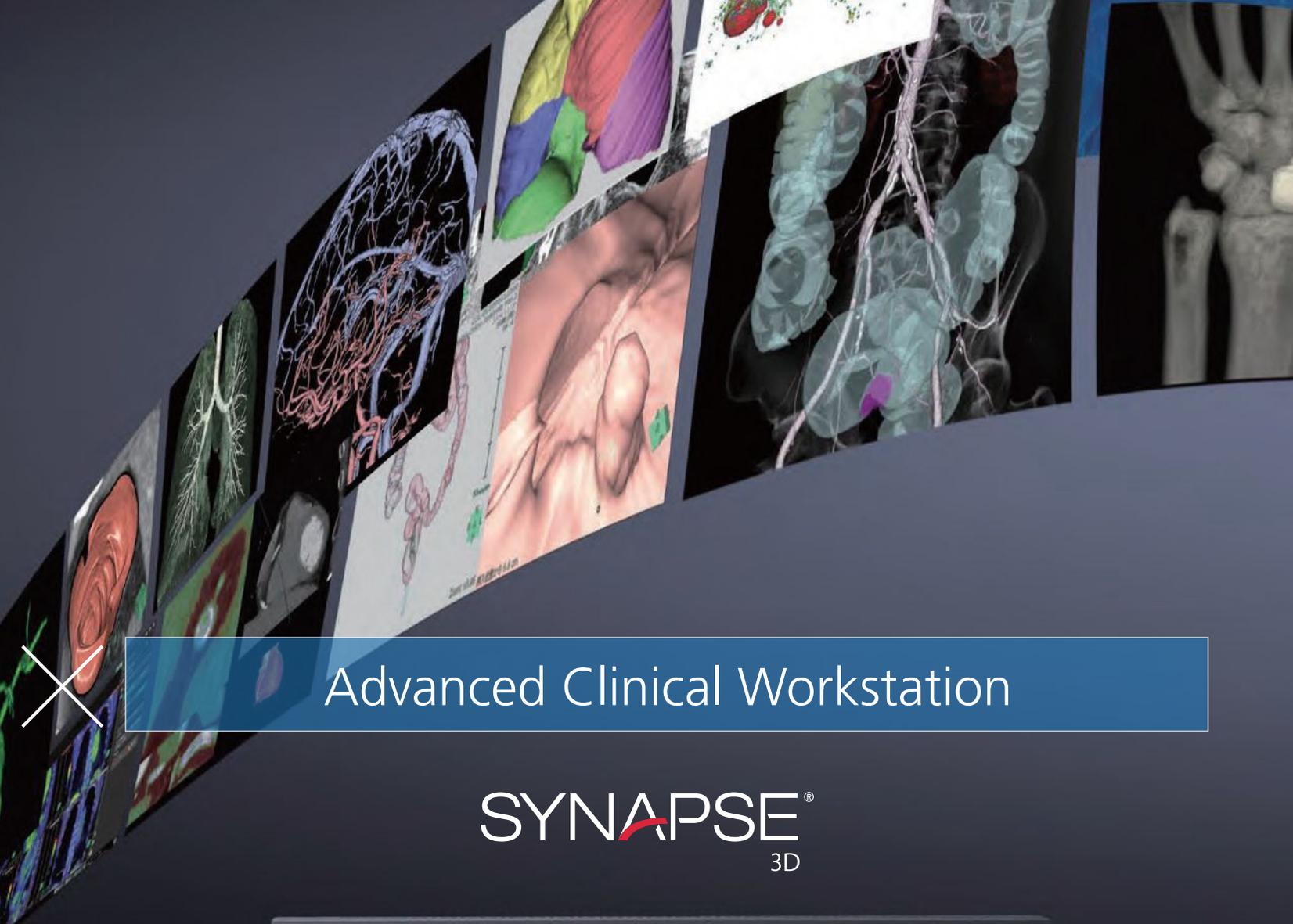
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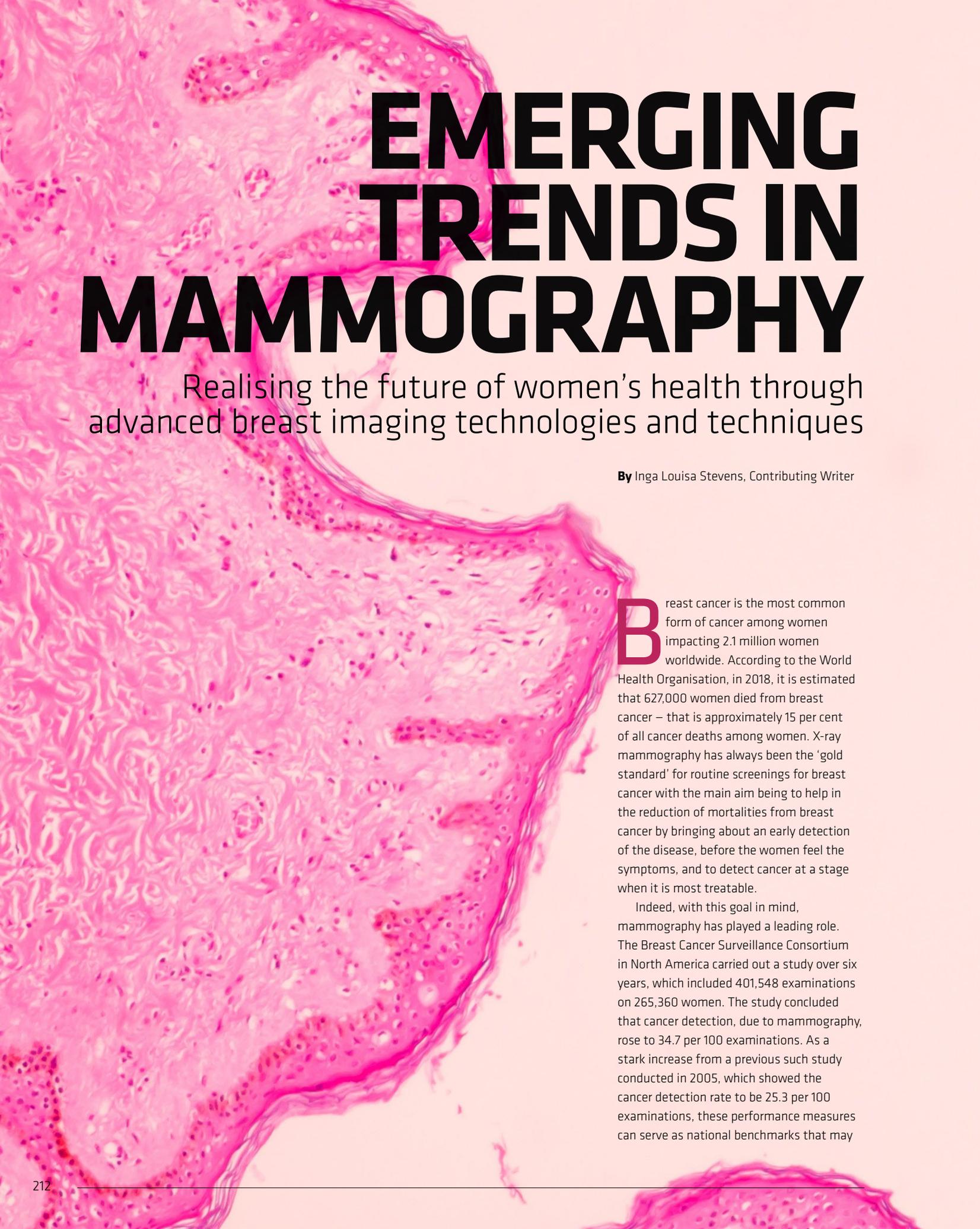
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A large, detailed microscopic image of breast tissue, stained with hematoxylin and eosin (H&E), showing various cellular structures and ducts. The image is the background of the page, with the title and text overlaid on it.

EMERGING TRENDS IN MAMMOGRAPHY

Realising the future of women's health through advanced breast imaging technologies and techniques

By Inga Louisa Stevens, Contributing Writer

Breast cancer is the most common form of cancer among women impacting 2.1 million women worldwide. According to the World Health Organisation, in 2018, it is estimated that 627,000 women died from breast cancer – that is approximately 15 per cent of all cancer deaths among women. X-ray mammography has always been the 'gold standard' for routine screenings for breast cancer with the main aim being to help in the reduction of mortalities from breast cancer by bringing about an early detection of the disease, before the women feel the symptoms, and to detect cancer at a stage when it is most treatable.

Indeed, with this goal in mind, mammography has played a leading role. The Breast Cancer Surveillance Consortium in North America carried out a study over six years, which included 401,548 examinations on 265,360 women. The study concluded that cancer detection, due to mammography, rose to 34.7 per 100 examinations. As a stark increase from a previous such study conducted in 2005, which showed the cancer detection rate to be 25.3 per 100 examinations, these performance measures can serve as national benchmarks that may

help to transform the marked variation in radiologists' diagnostic performance into targeted quality improvement efforts.

However, according to Dr. Lavina Verma, who is a specialist radiologist at Aster Clinic Bur Dubai, UAE, there are some shortcomings faced when mammography is used as the only radiological tool in order to assess a patient's risk for breast cancer. "One of the primary reasons for the shortcomings is the presence of dense breast tissues (parenchymal tissue) in the breasts of some patients, which has resulted in false negative results (15 to 20 per cent) of mammograms for those patients that have dense breasts," she explains.

As a result, healthcare professionals around the world agree that mammography can longer be used as a 'one-size-fits-all' approach and that there are ongoing efforts to develop and clinically translate alternative modalities that could provide for new contrast mechanisms and may potentially improve lesion detection and diagnosis. "The challenge is to use new technologies to increase cancer detection rates without also increasing recalls and false-positives," notes Dr. Verma.

Some of the new and emerging technologies include:

- Digital Breast Tomosynthesis (DBT)
- Dedicated Breast Computed Tomograph
- Elastography
- Molecular Breast Imaging (MBI)
- Positron Emission Mammography (PEM)

"A newer breast imaging modality Digital Breast Tomosynthesis (DBT) and more recently, Dedicated Breast Computed Tomography have been developed to alleviate the tissue superposition problem," says Dr. Verma. "Increasingly, DBT is being used as an adjunct screening tool for the detection of breast cancer."

DBT or 3D-mammography, is a mammography technique in which multiple mammographic images are acquired of compressed breast from multiple angles by using low dose x-rays and are then reconstructed into overlapping thin slices that can be displayed either individually or in a cine loop. The radiation dose received when DBT is combined with conventional 2D mammography is nearly double that of digital mammography alone, but within the established and acceptable safe dose.

Dr. Verma highlights a multi-centre clinical trial conducted by Hologic that has found

that DBT takes only seconds longer than conventional 2D digital mammography, and can assist in increased cancer detection (by 27 per cent), increased invasive cancer detection (by 4 per cent) and decreased call-back rates (20-40 per cent), localising structures in the breast and improved lesion and margin visibility. Also, clinical data shows that 3D mammography was helpful for all breast densities.

"Multiple studies have demonstrated that with DBT, breast cancer detection rates are improved by 33-53 per cent (sensitivity) and that false-positive recall rates are simultaneously reduced by 30-40 per cent (specificity). However, all of these modalities rely upon x-ray attenuation contrast to provide anatomical images, and there are ongoing efforts to develop and clinically translate alternative modalities," she explains.

"Ultrasound and Magnetic Resonance Imaging (MRI) are two supplementary breast imaging modalities that retain their sensitivity in women with dense breasts, and when used in addition to mammography, can demonstrate an increased cancer detection rate compared to mammography alone," adds Dr. Verma. "Elastography is another test that can be done as part of an ultrasound exam and is useful in revealing if the area is more likely to be cancerous or a benign (non-cancerous) tumour."

According to Dr. Verma, the new emerging modalities like Molecular Breast Imaging (MBI) and Positron Emission Mammography (PEM) could provide for new contrast mechanisms and may potentially improve lesion detection and diagnosis.

MBI utilises a tracer and a custom camera in order to detect breast cancer. Unlike, mammograms, that take an x-ray image of the breast, MBI creates an image that shows a difference in the activity of the tissues. Those tissues that contain cancer cells can be identified because they appear to be brighter than their less active counterparts. PEM, on the other hand, works very similar to mammography, with the only difference being the injection of a positron and the use of a dedicated camera.

"The advantage of PEM over regular mammography is that it provides a far more specific image," Dr. Verma says. "However, the drawback is that it cannot be used for regular breast cancer screenings, since the patient is exposed to slightly higher radiation doses as compared to other screening modalities."

When asked about the basic rules for screening standards in the UAE, Dr. Varma outlines how breast cancer screening must be provided in accordance with the breast screening and diagnosis care pathway as provided by the The National Cancer Screening Committee. She also describes how, in addition, the following activities should be included:

- History and risk assessment
- Clinical breast exam (physical exam)
- Screening mammogram – Screening mammography must involve two x-ray images for each breast; craniocaudal (CC) and mediolateral oblique (MLO).
- All women must be informed about the results of screening within three weeks (15 working days) of the date of screening mammogram.
- Women with abnormal mammogram, who require further assessment and diagnosis, must be recalled/referred to Diagnostic Breast Assessment unit within five working days of screening mammogram date.
- Assessment and diagnostic work up of screen-detected abnormality is best achieved using the triple assessment: 1. Imaging; usually diagnostic mammography and ultrasound; 2. Clinical examination; and 3. Image-guided needle biopsy for histological examination, if indicated.
- Cytology alone must not be used to obtain a non-operative diagnosis of breast cancer.
- Clinical examination is mandatory for every woman with a confirmed mammographic or ultrasound abnormality that needs needle biopsy and for all women recalled because of clinical signs or symptoms

According to the Abu Dhabi Department of Health (HAAD) screening guidelines, women should typically start having regular mammograms from the age of 40 onwards. And the screenings should be scheduled twice a year. However, for those women who have a family history or genetic predisposition to breast cancer, the screening age can be even earlier, at 30. Screening MRI and Ultrasound of the breast is recommended as adjunct to screening mammogram for women with dense breast/s or increased risk.

"In future, as assessment of risk and breast tissue density becomes a reality, more personalised screening will likely be added to that screening mammography regiment," Dr. Varma concludes. **TR**

NEW CONCEPTS IN ONCOLOGIC IMAGING



By Daniele Regge, MD, Associate Professor,
University of Torino, Candiolo Cancer Centre

The way we image cancer could change dramatically in the next decade. This will probably be determined not only by the

improvement of existing hardware or the advent of new cutting-edge imaging tools but rather because of two important disruptive technologies that apparently have little to do with medical imaging. The first innovation is related to the technical improvements of molecular diagnostics, in particular the advent of next generation sequencing; the second is related to the advent of deep convolutional networks for Artificial Intelligence (AI).

In order to evaluate the impact of new technologies one must keep in mind that, with some approximation, there are two types of cancer patients: those with metastases or locally advanced disease, that undergo medical therapy or radiotherapy and still have a dismal diagnosis, and those that have cancer diagnosed early enough to be treated with surgery. The latter have a higher probability of being cured.

Imaging can contribute significantly in detecting cancer at an early stage, even before symptoms arise. Examples of imaging test for early diagnosis are mammography,

low dose lung CT, Virtual Colonoscopy and prostate MRI. Mammography is adopted within European boundaries for large scale, usually government sponsored, screening programmes; in other countries, mainly those outside Europe, breast screening is on a voluntary basis. The use of mammography has brought about a reduction of breast cancer mortality of approximately 20 per cent. Lung CT is being used in high risk patients (i.e. mainly smokers) in the U.S. and Russia with similar results in terms of impact on survival. Looking to the future we soon expect European guidelines to introduce prostate MRI as the first line examination in patients with high prostate specific antigen (PSA). Finally, three randomised trials have shown that Virtual Colonoscopy can compete with other screening tests, i.e. FIT, sigmoidoscopy and colonoscopy, in a screening setting.

So how can AI and molecular biology be game changers in the context of early diagnosis? Recent literature supports the statement that AI will probably be adopted by radiologists to detect and characterise cancer and might even take over simple tasks, such as detecting lung nodules, thus increasing the efficiency of screening programmes. Today, AI algorithms can identify lung nodules and breast cancer at least as well as expert human readers; they can also distinguish benign from the malignant lung nodules with a higher accuracy than humans; furthermore, computer-aided diagnosis has also allowed radiologists to detect more prostate cancers at MRI and more cancerous polyps at virtual colonoscopy.

Recently, a blood test has been developed at John Hopkins University that can detect eight common cancer types through assessment of the levels of circulating proteins and mutations in cell-free DNA. On average, for eight cancer types the sensitivity of the test was 70 per cent but was near 100 per cent for ovary and liver cancer. If findings will be confirmed, we will be on the verge of a paradigmatic shift. Indeed, in the future it might not be necessary to screen all individuals but only those with suspicious findings at a routinely performed blood test. Only individuals with a positive test will undergo imaging, probably supported by AI detection and characterisation algorithms, to confirm diagnosis and localise cancer. Hopefully, investments will be available in the future to

validate the new tests and to implement them in screening programmes. Unfortunately, as of today, only 5 per cent of funds for cancer research go into early diagnosis.

Following radical surgery, some cancer patients eventually develop local recurrence or distant metastases. High risk patients are monitored by CT or MR so that treatment can be started as soon as possible in case of recurrence. Some patients actually have minimal residual disease after surgery that is not detectable by imaging. In stage II colorectal cancer patients, presence of circulating DNA in blood has been shown to be almost 100 per cent specific. In future, patients with cancer could be monitored with liquid biopsy and imaging be performed only in patients with suspicion of disease recurrence at the blood test.

When patients develop metastases, they can be treated with drugs that inhibit growth of cancer cells and determine their death. CT and occasionally MRI are used to measure objective response to treatment by summing up the diameter of most significant lesions. Change in sum of diameter is evaluated at successive timepoints and compared to baseline. Usually tumours treated with chemotherapy initially shrink, but in a large percentage of cases eventually grow back. When this happens, we say that cancer has become resistant to therapy. Actually, cancer is a genetic disease and now drugs are available that target patients with specific somatic mutations; but drugs become ineffective as new mutations develop downhill. However, if molecular drivers of resistant metastases are found then the patient can be treated again with a different drug. We call this adaptive therapy. After more lines of therapy, metastasis start behaving differently, some may shrink, others may grow, sometimes at different rates. This behaviour is defined mixed response.

So, in the future of cancer imaging, as the number of drugs and lines of treatment increase, we will not be able to assess response properly if we look at the patient as a whole. It will be necessary to evaluate the dynamics of each single metastasis. This will allow us to detect early on lesions that escape control as the new resistant clones proliferate. These lesions are a major concern and should be investigated by re-evaluating their mutational status and maybe could be treated aggressively, for example by surgery

or if accessible by percutaneous ablation. Attempts are ongoing to identify lesions that will start growing back before they actually do, by radiomic analysis. Images are like the dark matter of the universe, they have hidden information derived, for example, from the spatial distribution of pixels, that may be decoded and processed to obtain scores of probabilities. Combining radiomic and genomic data could yield more robust and accurate information and might allow early identification of patients or of individual lesion that will become resistant to treatment.

Of course, we also expect significant improvements in imaging technology. In the future Magnetic Resonance Imaging could substitute CT for most oncologic examinations, providing superior tissue contrast and additional functional information. With new generation phase array coils and high field magnets it will also be possible to perform whole body examinations in a few minutes, increasing patient throughput and without exposure to ionizing radiations. Linking diagnosis to treatment will allow implementation of new strategies for treatment of advanced cancer. In particular, the new medical discipline of theranostics will allow targeted therapy of specific cancers by radioisotopes on targets preliminarily assessed by a diagnostic nuclear medicine test.

Oncologic imaging tools provide high diagnostic accuracy in the detection of cancer, are reliable in the assessment of tumour response and deliver useful information for planning of targeted therapies. In the future, AI will increasingly support the radiologist by further improving lesion detection and characterisation, by contributing to the development and validation of new predictive imaging and by improving patient workflow. Integration of genomic and radiomic information will be sought, so that each individual patient may benefit from the best possible treatment and change in therapeutic strategy put in place when a tumour progresses. **TR**

Prof Regge will be speaking on 'Imaging of Prostate Cancer' and 'Imaging of Liver Metastasis' at the Total Radiology Conference on January 31, at the Arab Health Exhibition and Congress

RISK COMMUNICATION IN MEDICAL IMAGING

By Prof Dr. Graciano Paulo, Professor of Medical Imaging & Radiotherapy, IPC-ESTeSC, Coimbra Health School, Head of the WHO Collaborative Centre for Radiation Protection and Health IPC-ESTeSC, Coimbra Health School, Past President, European Federation of Radiographer Societies, Coimbra, Portugal

An increasing volume of medical imaging procedures combined with a demand for more rapid access to diagnostic services, is putting high pressure on medical imaging departments. Because of that a communication strategy should be adopted, to explain the procedure in an understandable manner, adapted to patient social and economic characteristics, giving the adequate information for him/her to be able to make a proper decision.

We need to incorporate into our daily practice the understanding of the concept that the 21st century patients have higher expectations and are becoming more demanding, as they are progressively being part of the process and therefore have access to information, allowing them to make better informed choices.

It's important to be aware that a patient's listening is motivated by universal needs: The need for compassion; the need to be heard; the need to be recognised. From a tone of voice or acknowledgment, the patient can readily hear if the white coat standing in front of him/her is someone who can care enough to listen.

Medical imaging departments present an excellent test environment to study interventions to enhance patient satisfaction as: a) the imaging environment is highly complex, and workflow and time schedule constraints are extensive; b) there is a wide spectrum of patients referred from multiple clinical specialties whose conditions vary in acuity, ranging from outpatients undergoing routine examinations to critically ill patients undergoing emergency imaging studies.

Research indicates that training Radiologists and Radiographers to make simple modifications in their language and behaviour during patient care, can significantly impact patient satisfaction, which can impact quality-of-care. Authors have also described that radiographers have reported that as the use of technology

has increased, traditional radiographer communication has decreased, mainly due to the fact that the implementation of picture archiving and communication systems (PACS), electronic health records (EHR) and digital imaging shorten turnaround times and increase medical imaging department volume without a subsequent staffing increase.

Radiographers usually are the only ones that are in contact with patients and might notice duplicate or inappropriate examinations before they occur and the ones to be asked about the risk. Therefore, it's crucial to develop guidelines with clearly defined roles and responsibilities on how to communicate risks in a harmonised way, to avoid patient misinterpretation in their imaging clinical pathway.

Teamwork is needed wherever multiple individuals with multiple skills are required to work interdependently to achieve a favourable outcome. This means that teamwork is absolutely critical in the management of patients, since healthcare is a complex activity, which needs many different types of professionals, with different knowledge, skills and competences and with specific roles.

One individual working alone cannot achieve the target of taking care of a patient and from the concept defined in 1926 by Francis Peabody that "the secret of the care of a patient is caring for the patient" we moved nowadays to: "the real secret of the care of a patient is teamwork".

According to the WHO, communicating radiation risk in paediatric imaging, the major challenge in communicating the benefits and risks of medical imaging procedures that use ionizing radiation is the existence of insufficient awareness and understanding of radiation protection issues by health professionals. Research has shown that there is widespread underestimation of doses and risks. There is a need to ensure that all referring medical practitioners have sufficient

background, education and resources to communicate clearly and effectively about the benefits and risks of imaging procedures.

Effective communication with patients and caregivers is increasingly recognised as critical to patient-centred care, and an important component of effective healthcare delivery. This is also true in the paediatric population related to communicating radiation benefits and risks from medical imaging. However, the quantity and quality of communications training that most healthcare professionals receive, and the lack of resources available to them, present a hurdle to effective communication in these settings.

Communication with patients and caregivers is one of the requirements of the new International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. Communication of benefits and risk of medical interventions forms the basis of good medical practice. There are several stakeholders who have an interest in providing high-quality care to the patient undergoing imaging procedures. It is essential for them to participate in the risk-benefit dialogue.

In conclusion, despite the pressure on medical imaging departments to produce more, we must dedicate time in communicating effectively with our patients.

Because each patient has his/her own needs and perceptions, we need to be able to identify those needs and perceptions and adapt our messages accordingly, keeping them simple, objective and understandable.

We need to engage with our patients, comfort them, talk with them and show that we particularly care about them. **TR**

Prof Dr. Paulo will be speaking about 'Risk Communication in Medical Imaging' at the Total Radiology Conference on January 30, at the Arab Health Exhibition and Congress



AMULET *Innovation*



CONTRAST MEDIA IN RADIOLOGY

Allergy to Iodine Does Not Exist, But
True Allergy to Contrast Media Does

By Prof Olivier Clement, Chief of the Radiology and Imaging Department, Hospital Pitié-Salpêtrière, Paris, France



Among adverse events to contrast media (CM), immediate hypersensitivity (IH) reactions raise the highest level of concern for radiologists and patients, since they may lead to severe anaphylactic shock within minutes after injection, sometimes leading to death. The frequency of reactions to iodinated CM (ICM) was reduced with the use of non-ionic in the 90s, but not the frequency of death. Numerous pre-treatment protocols have been implemented, but their overall efficacy remains unclear.

Gadolinium chelates used as contrast agents for Magnetic Resonance Imaging were initially thought to be safe and to induce less adverse reactions than iodinated agents. This is probably true for mild reactions, since the osmotic load of a regular gadolinium chelate injection is four times lower than an iodinated contrast one. However, severe reactions and cardiovascular arrests have still been described with all the gadolinium chelates available on the market, leading to similar pre-treatment strategies despite the lack of evidence supporting them.

For decades, a true allergic mechanism was discounted by the community, who have advocated non-specific, so-called “anaphylactoid” or “pseudo-allergic” reactions and identified risk factors such as “previous reaction”, “asthma”, and “allergy to drugs”. Several pre-treatment protocols have been tested, mainly based on antihistaminic drugs and corticosteroids. However, these do not prevent severe reactions and anaphylactic shocks.

Over the last 20 years, cumulative evidence has been published in literature about the involvement of a true allergic mechanism in some IH reactions to contrast material for iodinated agent and a few cases have been reported for GBCM.

It is important to differentiate allergic from non-allergic reactions, because allergy implies immune memory of the epitope, and recurrence (even at very low doses) with the culprit CM and potentially with other CM containing the same epitope (cross-reactivity).

Drug allergy is associated with increased

tryptase and histamine concentrations in plasma during the first hours of the reaction and is diagnosed by positive intradermal skin testing with diluted drug solutions.

Most of the published studies included retrospective cases tested years after the reaction, or lacked precise clinical history, name of culprit agent, or were mixed immediate and delayed reactions.

In France, we conducted the first prospective study of IH reactions to iodinated or gadolinium-based agents (CIRTACI study). It needed to be multicentre, since the incidence of severe reactions is so low, in order to include a few hundred reactions over the term of the study. Based on an incidence of 0.1 per cent moderate and severe reactions, we included 31 centres from across France that were able to provide allergy testing shortly after the reaction. We assumed that each centre could perform at least 7,000 injected examinations per year, meaning that 600,000 examinations could be obtained over a three-year period, so that we could include 600 reactions.

However, after two years, the inclusion rate was lower than expected, and we decided to continue the study for a total of 4.5 years. Between 2005 and 2009, 319 patients presenting with IH reactions to iodinated or gadolinium-based contrast media were included. After appropriate medical treatment, blood sampling for histamine and tryptase measurements was performed, and six weeks later an appointment with an allergist for skin testing was organised. All 10 iodinated and five gadolinium agents on the French market were tested.

We classified the reactions as allergic when intradermal skin tests were positive to the culprit contrast solution diluted to the tenth (as recommended by the European Network for Drug Allergy), potentially allergic when skin tests were positive only with the pure solution, and non-allergic otherwise.

Among 245 skin-tested patients, we identified 41 allergic reactions to iodinated agents, and 10 to gadolinium-based ones. The frequency of allergy increased with the severity of the reaction. Similarly, histamine and tryptase concentrations

increased with the severity of the reaction, confirming the findings. Cardiovascular symptoms were highly linked to allergy.

The group called “Potentially Allergic” presented clinical symptoms and concentrations of histamine and tryptase intermediate between those of the allergic and non-allergic groups, suggesting that some allergic patients are missed when using the recommended skin testing criteria.

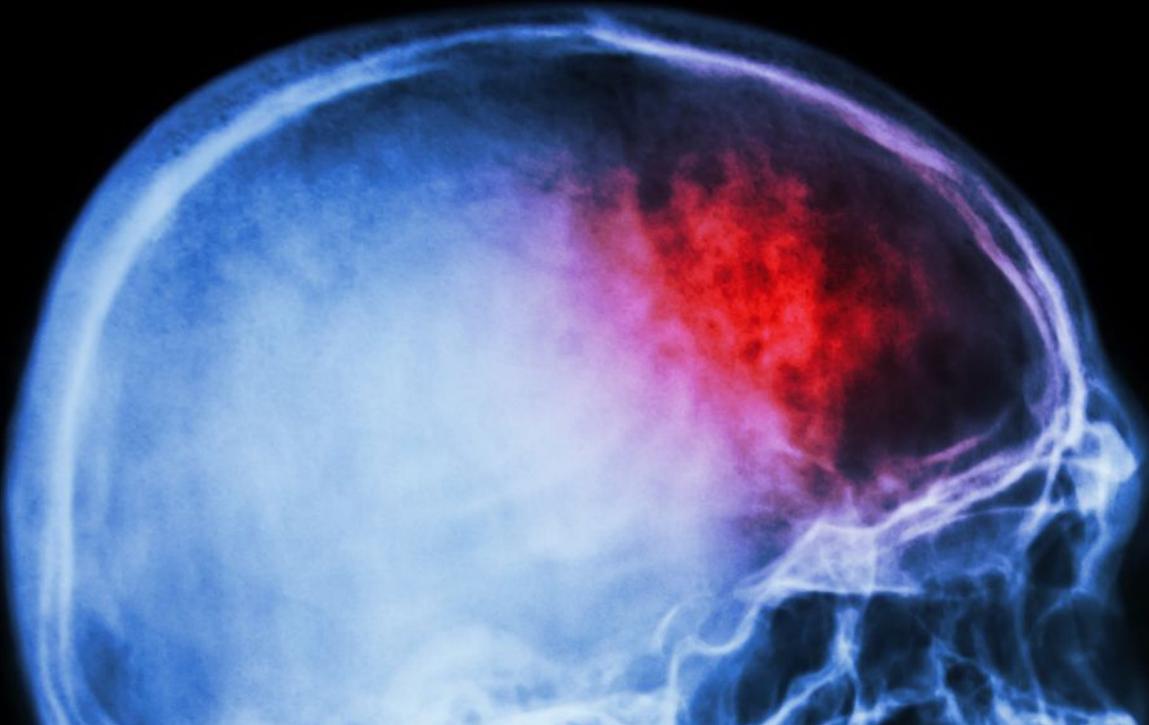
Implications for Clinical Routine

This prospective study shows that allergy is responsible for 21 per cent (and possibly more) IH reactions to contrast agents. Allergic patients are at high risk of recurrence if skin-test positive contrast media (culprit or non-culprit) are administered. Patients who have experienced life-threatening reactions and cardiovascular symptoms in particular should be managed with the highest care, as they are most probably allergic to one or more other contrast media.

A systematic follow-up of the patients experiencing IH reactions would vastly improve the safety of patients, by blood sampling rapidly after the onset of the reaction to measure histamine and tryptase, and then by sending the patient to an allergist with competence in drug allergy, in order to perform skin tests. The culprit agent should be contra-indicated for life, together with the other agents inducing skin cross reactivity.

These results strongly support reorganisation of radiology departments, with better identification of previous reactors, elimination of systematic premedication, availability of sampling kits with needles and vials on resuscitation trolleys, and identification of drug allergists to send reacting patients within one to six months following the reaction. ^{TR}

Prof Clement will be speaking on 'Hypersensitivity Reaction' as part of the Total Radiology Conference on January 30, at the Arab Health Exhibition and Congress



MECHANICAL THROMBECTOMY

for Acute Ischaemic Stroke in the UAE

New hope for large artery occlusion stroke

By Jamal Aldeen ALkoteesh, Chair of Department, Clinical Imaging Institute - Chief Medical Officer, Physician-Radiology, Al Ain Hospital

The Magnitude of Stroke in the UAE

Stroke is a devastating disease for the patient and family and is estimated to cost the UAE around AED 3 billion per year, with additional cost to the economy of a further AED 4 billion in lost productivity, disability and informal care. About 20 per cent of patients die within the first year (and most of these patients die within the first three months) and over 50 per cent of survivors are left with long-term disability. A disproportionately high share of the disability burden arises within the 30-50 per cent of patients with proximal large artery occlusive stroke. Many of these patients will have a mixture of cognitive, mood and physical function problems.

Stroke Types and Treatment Options

Almost 85 per cent of strokes are ischaemic, resulting from a blood vessel becoming blocked. Brain tissue is then damaged from a lack of oxygen and nutrients. Up to 10-20 per cent of people with ischaemic strokes from large vessels occlusion are suitable for and respond to intravenous thrombolysis. However, many of those treated will not benefit because the blood clot is too large and does not completely dissolve. In addition, some patients cannot receive the treatment due to contraindications such as recent surgery, late presentation or being on anticoagulant (blood-thinning) drugs. For some of these patients, the evidence suggests that mechanical thrombectomy performed within six-twenty-four hours of the onset of symptoms is an effective treatment that can reduce brain damage and prevent or limit long term disability. Evidence suggests that the quicker this intervention is delivered the greater the benefits. Other than established intravenous thrombolysis, there are no other acute interventions that have been shown to reduce the area of infarcted brain despite efforts to develop new and more effective thrombolytic agents or neuroprotective drugs.

Large Artery Occlusion (LAO) Stroke

The group of patients that are likely to benefit from mechanical thrombectomy are those with proximal occlusion of the internal carotid or middle cerebral arteries who present early after the stroke before there is irreversible ischaemic damage to the brain. These patients, often with extensive thrombus, are much less likely to respond to

the conventional intravenous thrombolysis and more likely to experience severe disability. Around 40 per cent of ischaemic strokes are caused by a large artery occlusion (LAO).

For patients who do not respond to intravenous thrombolysis there has previously been no active intervention available to prevent brain damage. Treatment in these patients is limited to rehabilitation and high-quality nursing care.

The Intervention A specially-designed clot removal device is inserted through a catheter into the blocked artery to remove the clot. The catheter is usually inserted into the femoral artery in the groin and advanced up to the location of the blockage. The clot removal device is then inserted through the catheter to remove the clot (thrombus) blocking the artery. The device could be just an aspiration catheter or stent retriever or the two combined.

In addition to introducing this procedure, the intervention will require a new model of care, which builds on existing acute stroke networks to improve outcomes for adults and improve access to the procedure as soon as possible after the onset of stroke symptoms.

There are approximately 7,000 stroke admissions in the UAE per year. Currently, around 12 per cent of all stroke patients receive intravenous thrombolysis and the majority of patients suitable for thrombectomy will come from this group, with the remainder made up of those for whom intravenous thrombolysis is contraindicated.

Latest Literature Review

An extensive search of the international research literature was undertaken to establish the effectiveness of mechanical thrombectomy. Sixteen relevant research studies; seven trials, and a further nine systematic literature reviews and meta-analyses (two of which use secondary analyses of pooled trial data) were identified as relevant and were examined in detail. All seven trials examined the effects of mechanical thrombectomy on patients who were functioning independently prior to their stroke. All reported strongly positive findings, with the proportion of people who could function independently at 90 days following stroke increasing by between 19-35 per cent. All trials also examined the safety of the mechanical thrombectomy,

usually by monitoring total mortality and the probability of an intracranial haemorrhage. None of the trials showed a significant excess of either of these outcomes compared with best medical treatment.

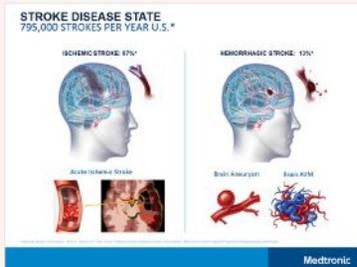
The facilities, personnel and equipment required to undertake thrombectomy take time to coordinate. These studies provide valuable insights into the time this takes, measured by time from arrival in a healthcare facility to arterial puncture. For most patients admitted direct to the thrombectomy hospital site, arterial puncture was achieved within an hour and a half of admission (median 81 minutes) and in just under two hours (median 116 minutes) for those requiring transfer to the thrombectomy centre (Goyal et al., 2016). The trials differed in aspects of their design, including the interventions allowed as best medical therapy. However, many examined the effects of adding mechanical thrombectomy to a best medical therapy protocol that included intravenous thrombolysis (which has to be administered within 4.5 hours of stroke onset), with prompt initiation of further therapy (aiming for clot retrieval within six hours).

The Benefit of Mechanical Thrombectomy

Five systematic literature reviews synthesised the results of the same/similar pool of studies and reached similar conclusions. The absolute chance of patients being able to function independently at 90 days after stroke were improved by around 20 per cent (19-22 per cent) among those undergoing mechanical thrombectomy compared with controls (Bush et al., 2016, Marmagkiolis et al., 2015, Lambrinos et al., 2016, Touma et al., 2016, Anonymous, 2016). This suggests that for every four to six patients undergoing thrombectomy following stroke, one more will be able to function independently at 90 days, compared to those that receive thrombolysis alone. The studies that pooled individual level data gave similar findings. The larger of these calculated median disability scores at 90 days, and concluded that the median score on the Modified Rankin (mR) scale for those who received best medical therapy was four, i.e. that patients were moderately severely disabled. In contrast, the median score at this time for patients who had also undergone mechanical thrombectomy was two i.e. ►



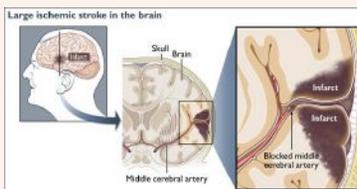
Stroke disability



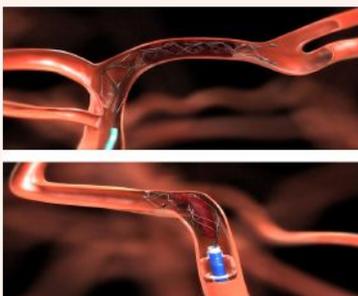
Stroke Types



CT Angiography showing right ICA occlusion



Large artery occlusion stroke



Stent retriever

they were able to function independently. Further, using a “differences in differences” approach mechanical thrombectomy increases the odds of being in a less disabled category at 90 days (one point different on the mR scale) by more than two-fold (Odds ratio 2.26 $p < 0.0001$) (Goyal et al., 2016).

Time Is Brain, Do Not Delay

Pooled analysis allowed other factors to be explored, particularly the significance of time from symptom onset to key events in the treatment pathway, such as decision to treat (randomisation), start of procedure, and restoration of cerebral blood flow.

The HERMES study (Saver et al. 2016) identified that the absolute chance of being functionally independent 90 days after thrombectomy diminish by 3.4 per cent with each hour’s delay to starting the procedure (arterial puncture), and the probability of a beneficial reduction in decline in disability (one point on the mR scale at 90 days) fell by 5.3 per cent for each hour’s delay. Whilst treatment benefits fell, the outcomes for those undergoing thrombectomy were better than those receiving best medical therapy for up to seven hours from stroke onset (i.e. where arterial puncture could be achieved within this time). In summary, for every four to six people with an acute ischaemic stroke who present with an identifiable occlusion in the anterior cerebral circulation who undergo mechanical thrombectomy, one more person will be functioning independently at three months compared with if they had received intravenous thrombolysis alone.

Window of Treatment

Rapid treatment is important, as the benefit from mechanical thrombectomy falls by 5.3 per cent for every hour of delay. However, the percentage that can be expected to be independent declines from 50 per cent for thrombectomy within three hours to 45 per cent at 4.5 hours, to 40 per cent at six hours and to 33 per cent by eight hours, even with a favourable advanced brain imaging profile in the patients treated beyond six hours. Some patients where advanced brain imaging indicates the continuing presence of salvageable brain tissue may still have better outcomes from thrombectomy than best medical treatment alone, even if thrombectomy occurs up to 24 hours after onset. There is no evidence to support later

treatment in the absence of a favourable advanced brain imaging profile.

Complications of Stroke Mechanical Thrombectomy

Symptomatic intracranial haemorrhage is no more common among people who had thrombectomy (4.4 per cent) than best medical therapy (4.3 per cent). Death rates at three months appear lower for those undergoing thrombectomy (15.3 per cent) than for those receiving best medical therapy (18.9 per cent), though these differences were not statistically significant.

Brain Haemorrhage

Specifically, to ensure that those with the most to gain achieve important benefits, a decision should be made on both thrombolysis and on referral for thrombectomy within 4.5 hours of stroke onset, ideally achieving arterial puncture within six hours.

Criteria for Mechanical Thrombectomy Treatment

Inclusion Criteria:

Mechanical thrombectomy will be routinely performed for patients, of all ages with proximal occlusion of the internal carotid or middle cerebral arteries who present early after the stroke before there is irreversible ischaemic damage to the brain.

The criteria that would need to be met for treatment are:

- 1) Thrombectomy (clot retrieval) can be achieved within six hours of the onset of symptoms, unless advanced brain imaging (perfusion or multiphase computed tomography angiography (CTA)) indicates substantial salvageable brain tissue is still present up to 24 hours after the onset of symptoms. And either:
 - Where there has been an inadequate response to intravenous thrombolysis by the time of groin puncture,
 - OR b) for patients who are unable to receive intravenous thrombolysis because they are on anticoagulants or have had recent surgery, and
- 2) Where a proximal occlusion (intracranial carotid; and/or, M1 or proximal M2 segments of middle cerebral artery) in the anterior cerebral circulation is demonstrated on vascular imaging.
- 3) Where there are no major new ischaemic changes on plain computed tomography

(CT) or MRI brain scan

- 4) With significant new disability with a score of >5 on the National Institute of Health Stroke Score (NIHSS)
- 5) Previously independent in activities of daily living (Modified Rankin score less than three).

The National Institutes of Health Stroke scale (NIHSS)

The NIHSS is used to measure the severity of a stroke. It scores areas such as level of consciousness, vision, sensation, movement, speech and language with a maximum of 42 points representing the most severe symptoms.

The levels of stroke severity on the NIHSS are categorised as: 0: no stroke/5-15: moderate stroke/16-20: moderate/severe stroke/21-42: severe stroke.

Modified Rankin Scale (mRS)

This is a functional assessment scale that measures the degree of disability or dependence of people who have suffered a stroke. The scale runs from perfect health without symptoms to death:

- 0: No symptoms.
- 1: No significant disability. Able to carry out all usual activities, despite some symptoms.
- 2: Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.
- 3: Moderate disability. Requires some help, but able to walk unassisted.
- 4: Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted.
- 5: Severe disability. Requires constant nursing care and attention, bedridden, incontinent.
- 6: Death.

Exclusion Criteria:

- 1) No proximal intracranial large artery occlusion
- 2) No appropriate vascular access or contraindications to arterial puncture

Patient Pathway

The model of care includes; the admission of patients to an emergency department in the nearest hospital with a hyperacute stroke unit (HASU); undertake the initial investigations including CT or magnetic resonance (MR) angiography; start treatment with intravenous thrombolysis as appropriate; and then transfer

urgently those who might benefit from thrombectomy and fulfil the inclusion criteria, to the nearest thrombectomy centre that fulfils the criteria and is equipped to provide thrombectomy services.

Auditing Points and Outcome Measures

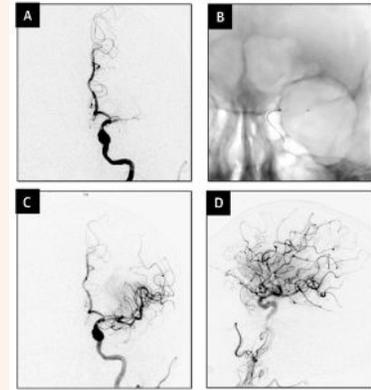
- Treatment related mortality
- 30-day mortality post treatment
- Disability at six months
- Disease/procedure-related complications such as symptomatic intracranial haemorrhage
- Disease-associated complications (e.g. lower respiratory tract infections, urinary infections, from SSNAP)
- Time from onset to thrombectomy
- Time from onset to arrival at thrombectomy centre
- Time from arrival to arterial puncture
- Time from arterial puncture to thrombectomy.

Conclusion

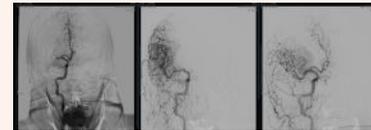
Acute ischemic stroke is a major cause of death or disability in industrialised countries. Significant modifiable factors influencing the clinical outcome are the time span between symptom onset and revascularisation, recanalisation rate and the occurrence of symptomatic intracranial haemorrhage (sICH). Recanalisation has been shown to be the most important modifiable prognostic factor for favourable outcome in ischemic stroke treatment. Successful recanalisation overall increases the chance of favourable outcome 4-fold compared to patients without recanalisation, and decreases the mortality rate 4-fold. The importance of recanalisation is even more pronounced in basilar artery occlusion, where the chance of an independent life is only 2 per cent in patients without recanalisation .

Recanalisation success depends on the site of vessel occlusion: proximal large vessel occlusion such as the Basilar, ICA or M1 segment have a limited recanalisation rate after IAT and especially after IV rtPA. Therefore, the key aims of mechanical treatment approaches for acute ischaemic stroke treatment are achieving rapid and efficient reperfusion with short procedure times and high recanalisation rates while extending the treatment window. **TR**

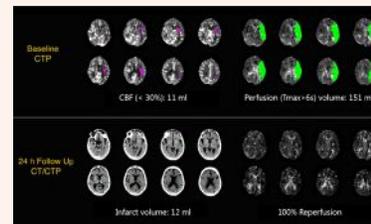
References available on request.



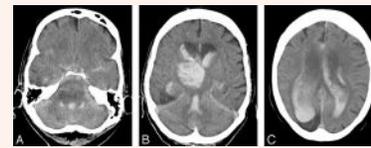
Mechanical thrombectomy of left MCA



Mechanical thrombectomy of Right MCA



CT Perfusion



Brain Haemorrhage



Alkoteesh will be speaking on 'Vascular Erectile Dysfunction Imaging and Intervention' on January 31, at the Total Radiology Conference, at Arab Health Exhibition and Congress

NEW HORIZONS FOR RADIOGRAPHERS

By Mohamed M Abuzaid, RT, Ph.D., Assistant Professor & Ambassador at World Radiography Education Trust Foundation (WRETF), Medical Diagnostic Imaging Department, College of Health Sciences, University of Sharjah

Radiographer and Radiological technologists are key decision makers in the delivery of radiology diagnostic services to patients. Within clinical, they operate services in general radiography, fluoroscopy, portable, mammography, dental, computed tomography, ultrasound, magnetic resonance image and nuclear medicine. Traditionally, radiographers are responsible for producing high-quality diagnostic images that answer the clinical problem at the lowest radiation level. These images are essential in the modern diagnostic setting. They collaborate with and support consultant doctors in the delivery of crucial services in these areas. While the final diagnosis has traditionally been the role of the radiologist, changes driven by research, education, technology and service have increased the demand for clinical and diagnostic input by radiographers.

Although several researches have been conducted internationally, very little is known about how the health sector is affected by limiting the role of the radiographer to a technical domain in the Middle East. The current undergraduate preparation for radiography practice meets best practice, however, what is not known is how the reality of clinical practice affects recruitment and retention of radiographers. Radiographers showed a strong desire to research, learn and innovate, and the dynamic and efficient technology development has helped to change their work and made them ready to adopt new changes. The shortage of radiologists and the spread of medical diagnostic imaging has created a situation in which highly trained, highly skilled radiographers have been called upon to fill the gap in diagnosis and image interpretation services.

An example of where radiographers are working at image interpretation, and diagnosis already exists in the UK's NHS healthcare system, where radiographers deliver services, are recognised as advanced

practitioners, and incorporate the provision of final clinical reports by appropriately trained radiographers. Several countries including Canada, Australia, Norway and Denmark changed their healthcare system by developing models of advanced radiographer practice, which includes definitive clinical reporting. The competency and performance of trained radiographers to provide definitive clinical reports was investigated in many articles worldwide, and it is stated that radiographers' reports have high confidence and accuracy.

Radiographers are able to make first line interpretation of images in support of patient management and, following approved postgraduate training. Nevertheless, irrespective of the level of preparatory education it is not necessarily the case that the role of a professional in one country will translate to another healthcare setting in another country.

The radiographer reporting practice will continue growing in the future and will become crucial to the delivery of efficient and timely imaging services in the UK. The acceptance of the need to move services towards better 24-hour provision can only emphasise the value of radiographers' contributions.

Preliminary clinical evaluations and clinical reporting are core parts of the radiography profession's scope of practice, and the benefits are well evidenced and far-reaching. By developing their scope of practice in this way, radiographers are helping the clinical imaging service meet the needs of patients and referrers for rapid access to the right imaging examinations and the ensuing outcomes and reports.

Healthcare systems in any country who would like to move towards implementation of radiographer's role in image interpretations should work extensively with the academic institutes and professional bodies to develop proper education and training programmes. Typically, this will involve a formal postgraduate degree together with extensive clinical training and supervision. The accuracy of radiographer

and confidence in image interpretation and reporting will improve with appropriate education and training.

Professional societies and organisation at the national and international level should work hand-in-hand to develop and highlight the importance of the new role of the radiographer through developing professional journals, professional excellence and to define a set of standards, which can be followed by local bodies.

How Do We Get There?

It is a long way to go, much work to do but we have got the energy, enthusiasm and at the end, we will do it. A strong collaboration between different parties related to radiographer practice to discuss the advancement of the radiographer practitioner role in several pathways is required, such as:

- Development and innovation of the role acceptance by health organisations and the clinical team
- Establishment of a multi-disciplinary research
- Motivation of the radiographer to accept advance practice role

In addition to the above pathway, a strategic plan for five to 10 years should be developed, including academic degree programmes for radiographers, and membership at national and/or international societies for the radiographers who wish to improve their career pathway. Moreover, it is very important to believe that the introduction of an advanced radiographer practice role in the medical imaging services will revolutionise it. ^{TR}

References available on request.

Dr. Abuzaid will be speaking on 'Effectiveness of Thyroid Shield in CT Brain: Evaluating the Dose Reduction and Image Quality' at the Total Radiology Conference on January 29, at the Arab Health Exhibition and Congress

FUJIFILM SonoSite Inc. Celebrates 20 Years of Improving Patient Outcomes

From battlefield to bedside, these rugged and reliable solutions have ushered in a new era of helping clinicians bring ultrasound to any patient, anywhere, anytime

Article provided by FUJIFILM

FUJIFILM SonoSite Inc., specialists in developing cutting-edge, portable and point-of-care ultrasound solutions, are celebrating the 20th anniversary of the SonoSite 180 launch. As the first point-of-care ultrasound machine, the SonoSite 180 developed by FUJIFILM SonoSite in 1998 signified a major step forward in ultrasound technology and was the catalyst to enable clinicians to bring ultrasound to any patient, in any environment for the first time ever.

The introduction of this new technology broke the convention within ultrasound, by ensuring that point-of-care ultrasound is durable, mobile and reliable – resulting in care for those in need in the most remote areas of the world. “For the past 20 years clinicians have turned to FUJIFILM SonoSite Inc. as a reliable and trusted partner to deliver innovative point-of-care ultrasound systems with extreme portability, image optimisation and intuitive controls,” said Diku Mandavia, M.D., senior vice president and chief medical officer of FUJIFILM SonoSite Inc. and FUJIFILM Medical Systems U.S., Inc. “Since the introduction of point-of-care ultrasound with the SonoSite 180, clinicians can utilise ultrasound anywhere

and anytime to provide clinical answers that are critical in the decision-making process and can ultimately save lives.”

FUJIFILM SonoSite Inc. evolved from its roots with the United States Department of Defense to build the world’s first ultrasound for the battlefield, to now helping clinicians everywhere in a range of applications such as paediatrics, surgery, veterinary, physical therapy and even helping to combat the opioid over-prescription epidemic with

ultrasound guided nerve blocks. Today, the company is regarded by clinicians all over the world as the most adopted and considered point-of-care ultrasound brand.

As point-of-care ultrasound continues to gain traction around the globe to help improve patient outcomes, FUJIFILM SonoSite Inc. will continue to be a reliable technology partner to clinicians, by continuing technological innovation and offering educational opportunities.



**CELEBRATE 20 YEARS
OF POINT-OF-CARE
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IN THE KNOW

The SonoSite Story

SonoSite began when the United States Department of Defense awarded a DARPA1 grant to SonoSite's parent company, ATL Ultrasound. The mission from the government was clear: Create an ultrasound machine portable and rugged enough to be carried into battle and brought to a trauma patient's side. It took over a decade of expertise in leveraging digital ultrasound and integrated

circuit technology to complete the project, but the result was SonoSite's first point-of-care ultrasound machine – the SonoSite 180.

The Early Years

Brought to market in 1998, the SonoSite 180 represented a major step forward in technology and a revolutionary approach to healthcare. For the first time clinicians had a tool that made bringing ultrasound to any patient, anywhere, at any time, a possibility.

True Pocus Innovators

By the early 2000s, the team at SonoSite knew that portable and reliable ultrasound systems could save lives around the world. By partnering with clinicians to understand their unique needs, the SonoSite team developed innovative ultrasound systems like the MicroMaxx, NanoMaxx, M-Turbo, and S-Series. These systems didn't just win industry awards, they revolutionised the healthcare landscape by



helping physicians and hospitals improve the patient experience, creating the market for point-of-care ultrasound in the process.

Creating the Point-of-Care Ultrasound Market

Since the company's pioneering days, SonoSite has pushed a progressive product line, educational programmes, and advocacy for a broader understanding of ultrasound's many benefits. This led to SonoSite not only defining the point-of-care ultrasound market, but becoming the most adopted and considered point-of-care ultrasound brand as well.

Sonosite is the Most Adopted and Considered Pocus Provider

Each year, KLAS – an independent healthcare research agency – interviews thousands of healthcare professionals about the products and services their organizations use. This year's KLAS report, Ultrasound Imaging 2017, shows that SonoSite is the most adopted and widely considered vendor for point-of-care ultrasound.

Bringing Innovative Solutions

FUJIFILM SonoSite, Inc., is the innovator and world leader in bedside and point-of-care ultrasound, and an industry leader in ultra-high-frequency micro-ultrasound technology. Headquartered near Seattle, the company is represented by a global distribution network in over 100 countries. SonoSite's portable, compact systems are expanding the use of ultrasound across the clinical spectrum by cost-effectively bringing high-performance ultrasound to the point of patient care. For more information, go to: www.sonosite.com.

FUJIFILM Holdings Corporation in Tokyo, Japan, brings innovative solutions to a broad range of global industries by leveraging its depth of knowledge and fundamental technologies derived from photographic film. Its proprietary core technologies contribute to the fields of healthcare, graphic systems, highly functional materials, optical devices, digital imaging and document products.

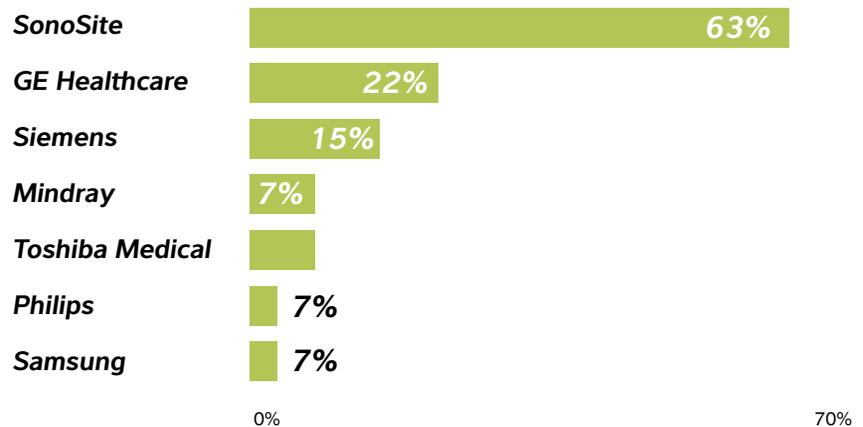
These products and services are based on its extensive portfolio of chemical, mechanical, optical, electronic and imaging technologies. For the year ending March 31, 2018, the company had global revenues of \$23.0 billion,

at an exchange rate of 106 yen to the dollar. The company is committed to responsible environmental stewardship and good corporate citizenship. For more information, please visit: www.fujifilmholdings.com.

Who Are Providers Using for Point-of-Care Ultrasound?

(n=27)

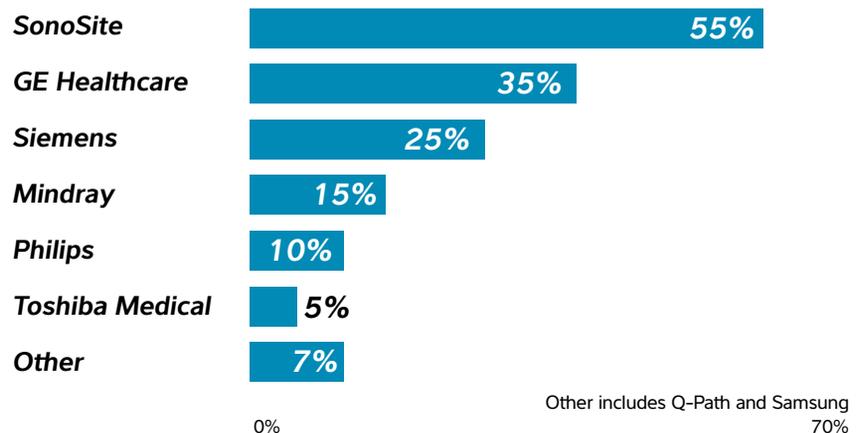
Providers may have given multiple answers



Who Are Providers Considering for Point-of-Care Ultrasound?

(n=18)

Providers may have given multiple answers





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Rochester, Minnesota U.S. News & World Report 2018-2019





7:23 AM Sensor secured.
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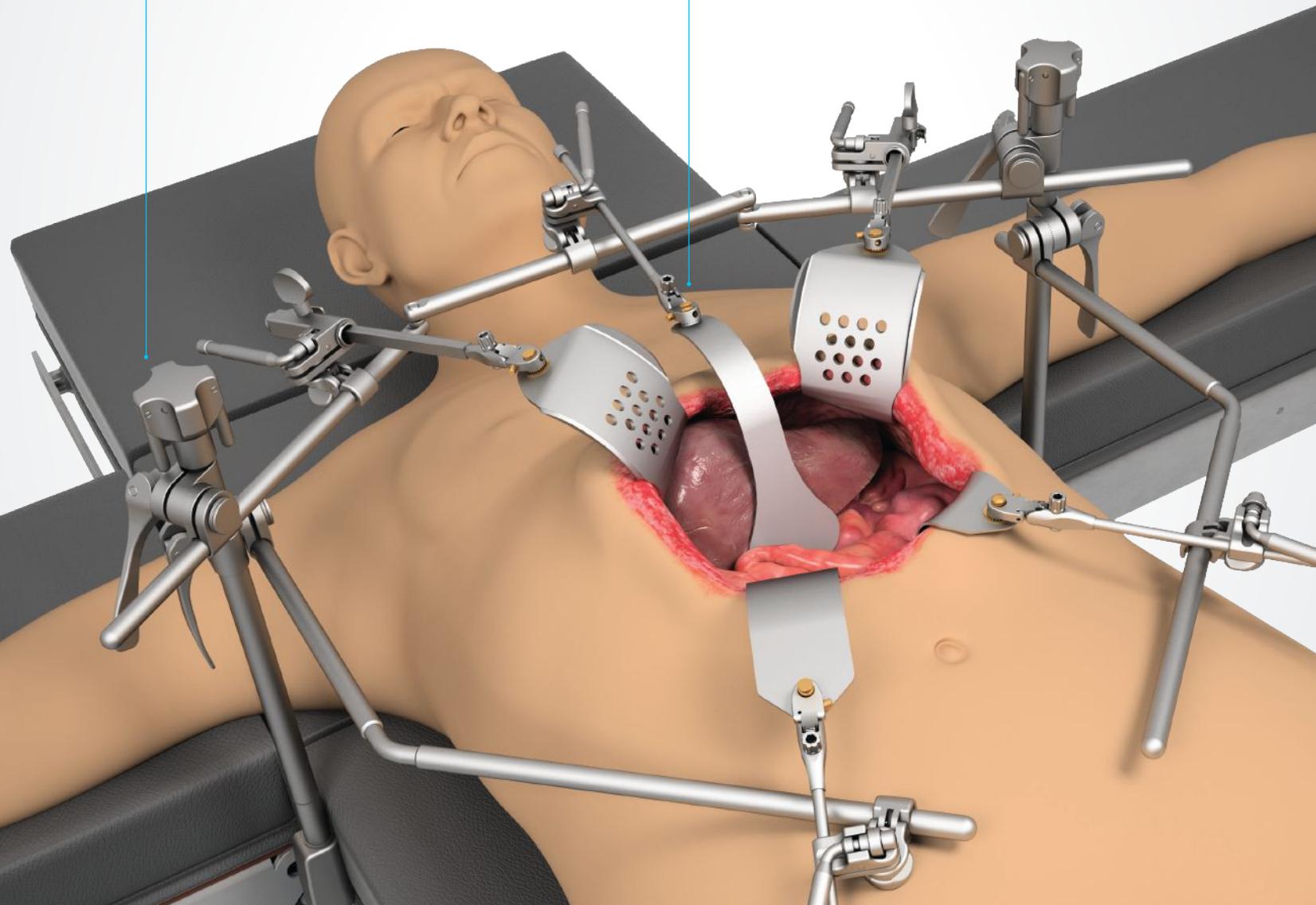
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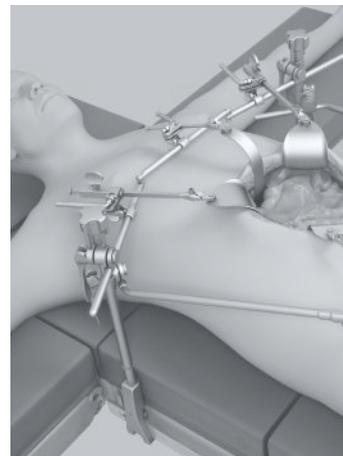
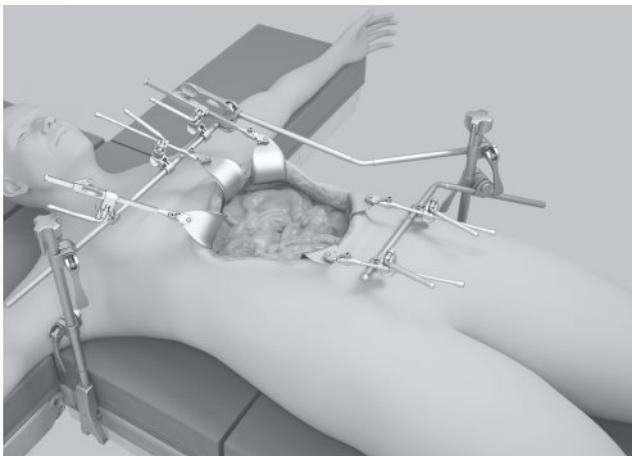
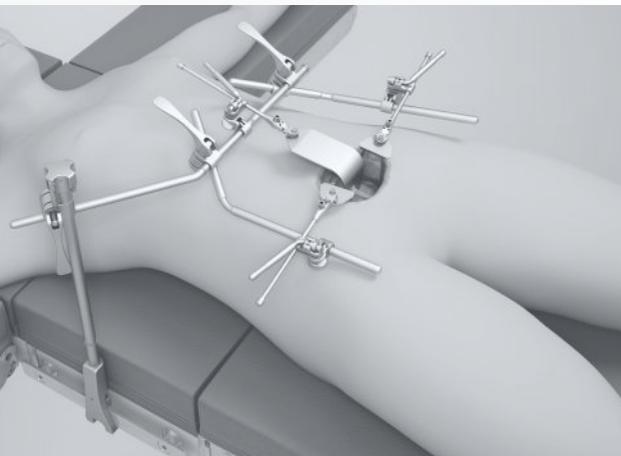
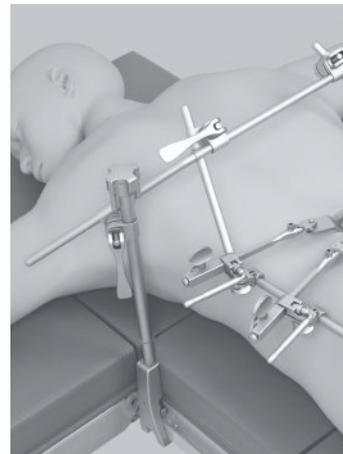
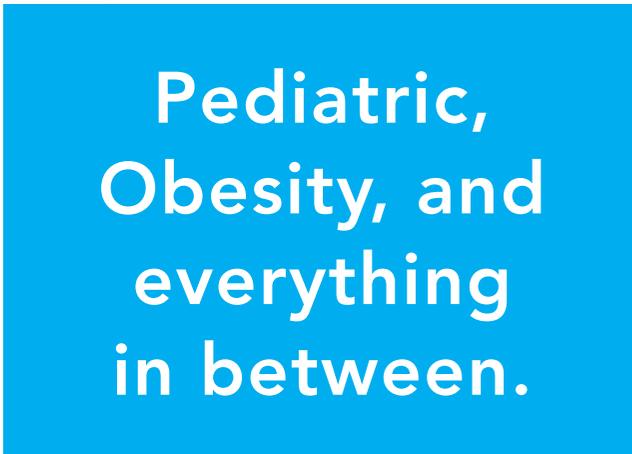
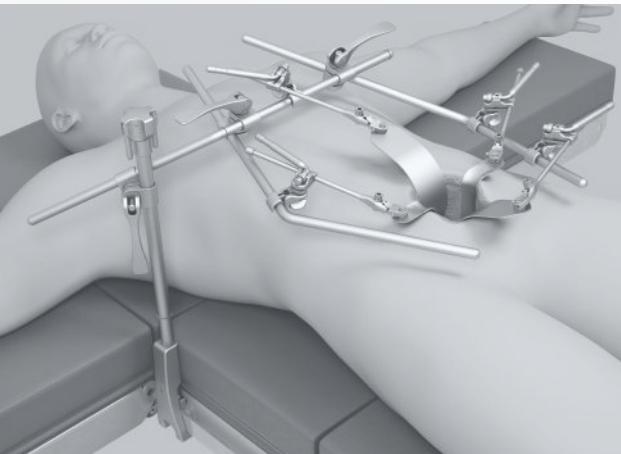
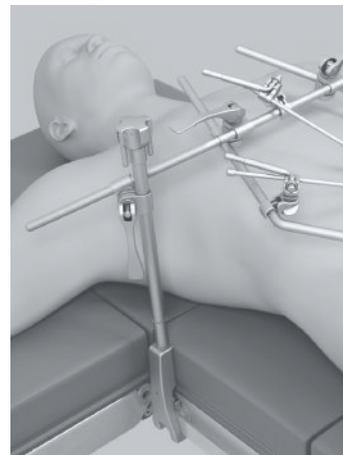
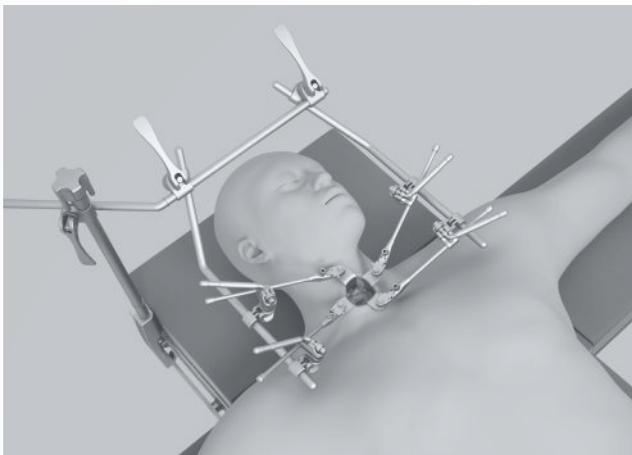
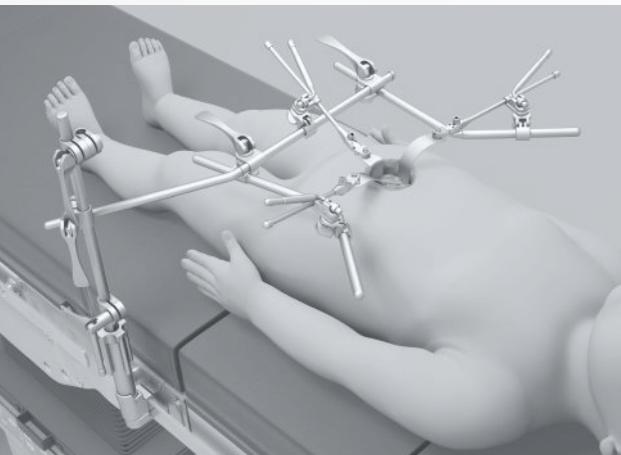
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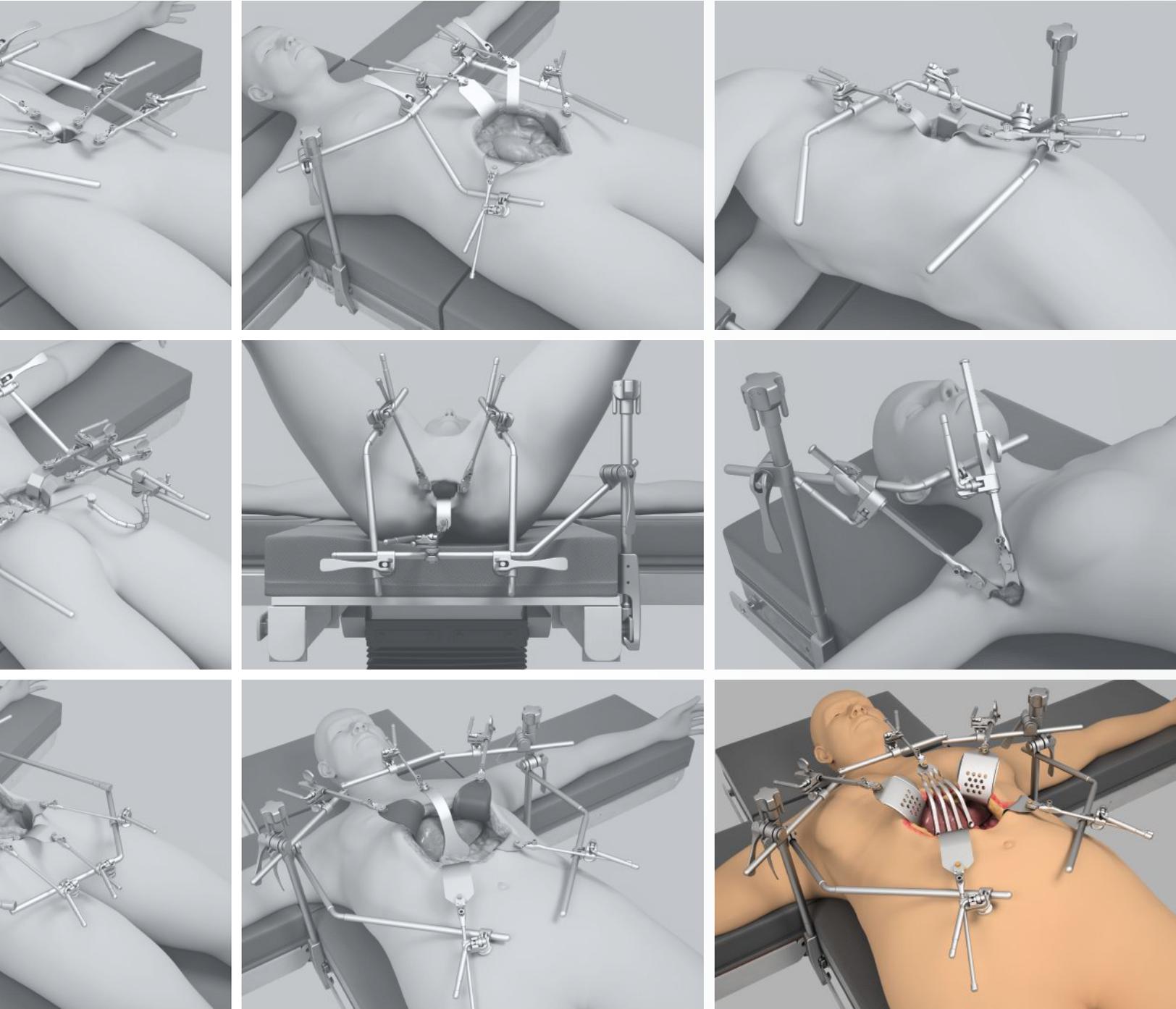


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