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Spotlight on Saudi Arabia

In line with Saudi Arabia's Vision 2030 and the National Transformation Program (NTP), the country's Ministry of Health (MoH) is expected to spend close to US$71 billion over five-years ending in 2020. The Global Health Exhibition that will be held from 10-12 September, at the Riyadh International Convention and Exhibition Center, will put the spotlight on all these exciting developments taking place in the country's healthcare sector. This issue sheds light on how the event will provide the perfect platform for companies to promote their latest innovations in healthcare products and services to some of the region's largest institutes and key decision makers *(pg 08)*.

This edition also features articles from conference speakers at the recently concluded Florida International Medical Expo (FIME) and recaps topics that were highlighted at the event, right from insights into wearable technologies *(pg 20)* to improving the medical supply chain *(pg 28)*.

Technology continues to drive innovation in healthcare. This has been highlighted with concepts such as e-patient and telemedicine platforms where patients and doctors use video to consult virtually, saving them both time and money as well as the heavy burden of travel for the sick patient *(pg38)*. Another such model is telerehabilitation (TR) which is the use of digital technologies to provide rehabilitation services from a remote location, a helpful solution for the increasing demand being placed on the healthcare sector *(pg44)*.

We hope you find this issue informative and look forward to welcoming you at the Global Health Exhibition in September. Till then, hope you have a memorable summer break!

Deepa Narwani

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Contents

Spotlight on Saudi Arabia's evolving healthcare landscape

Global Health Exhibition and Congress will shed light on all the exciting developments taking place in the country's healthcare sector

By Arab Health Magazine Staff

Healthcare remains a top priority for the government in the Kingdom of Saudi Arabia (KSA), and there are enormous opportunities for growth in this high-potential business sector.

In line with the government's Vision 2030 and the National Transformation Program (NTP), the Ministry of Health (MoH) is expected to spend close to US$71 billion over five-years ending in 2020. According to U.S.-based consultancy Aon Hewitt, the healthcare sector in KSA is expected to grow at a compound annual growth rate of 12.3 per cent by 2020. There is also a significant rise in population with an increase in those over the age of 60 years, as well as the adoption of mandatory health insurance in the country.

According to a report by Knight Frank, the main goal of the Vision 2030 is to diversify the economy away from hydrocarbons and achieve greater participation of the private sector by encouraging both local and international investments in several key industries such as healthcare. Privatisation of government services is expected to help meet the goals set out in Vision 2030. This is set to increase the private sector's contribution to GDP from 40 per cent to 65 per cent in 2030.

According to U.S.-based consultancy Aon Hewitt, the healthcare sector in KSA is expected to grow at a compound annual growth rate of 12.3 per cent by 2020.

Global Health Exhibition

By Informa Markets

To increase efficiencies and reduce costs, the government in KSA is exploring private sector involvement in the development of the healthcare infrastructure in the Kingdom. By introducing Public-Private Participation (PPP) models for healthcare, the government is working towards unlocking value in the health system and fast-tracking healthcare reform with plans to increase private sector contribution in total healthcare spending to 35 per cent by 2020.

In a review of KSA's 2019 budget and recent economic developments, a report by KPMG highlighted that the healthcare sector holds the third largest share of 15.6 per cent in the budget expenditure of 2019. The budget allocation for the sector has grown by 8 per cent to reach SAR172 billion in 2019, as compared to SAR159 billion in 2018.

Furthermore, research from Knight Frank indicates that to keep pace with population growth, KSA would require an additional 5,000 beds by 2020 and 20,000 beds by 2035, based on the current density of beds. Based on the global average of bed density, KSA faced a gap of 14,000 beds in 2016, and this gap is expected to widen to 40,000 beds by 2035.

According to Export.gov, the KSA market for medical equipment is estimated at just under US$2 billion and is growing annually at roughly 10 per cent. With increasing awareness of health issues and a growing consumption of healthcare services in the country, there is a strong market for medical equipment.

Encouraged by recent regulatory changes, medical device manufacturers, service providers and dealers & distributors are now able to make significant inroads in the KSA market.

The recently introduced Medical Device Interim Regulations has made the Kingdom a regulated market for all types of medical devices and all manufacturers wishing to supply a medical device within KSA require Saudi Food & Drug Authority (SFDA) Market Authorisation.

According to Colliers International, some of the key factors that make KSA's healthcare market attractive are:

1. The Structure – The KSA healthcare structure provides basic healthcare services to all with specialised treatment offered at both private and public hospitals.

2. The Population Boom – With the World Bank estimating the KSA population will reach 45.1 million by 2050 (from an estimated 32.6 million in 2018), the demand for healthcare services is expected to grow exponentially.

3. The Rise of the Private Sector – As the public sector is gradually transitioning to become more of a regulator, private players are being incentivised to play a larger role in the healthcare sector. Foreign investors can now have 100 per cent ownership in the healthcare sector.

4. The Power of PPPs – The government continues to invest in the development of healthcare infrastructure with various medical cities under construction. The private sector is expected to act as operators in the form of PPPs.

5. The Budget Increase – The annual increase in budget allocation towards healthcare social services in KSA reflects a strong indication of potential demand as well as the government's willingness to augment growth and improvement within the sector.

Premier business platform

The Global Health Exhibition and Congress, organised by Informa Markets, will be held from 10-12 September, at the Riyadh International Convention and Exhibition Center, and will put the spotlight on all the exciting developments taking place in the country's healthcare sector. The exhibition is the ideal meeting place for the global market to gather and do business with the Saudi healthcare sector. The exhibition provides the perfect platform for companies to promote their latest innovations in healthcare products and services to some of the region's largest institutes and key decision makers.

The upcoming edition of the event will see 180 plus exhibiting companies, 25 exhibiting countries, 9 educational tracks and is expected to welcome over 10,000 attendees ranging from healthcare service providers, product dealers and distributors, key decision makers and government officials. The exhibition will feature three new dedicated zones – Lab, Innovation and Building Healthcare.

The Innovation Zone will be hosting the award-winning Intelligent Health Pavillion, produced by the Intelligent Health Association, to showcase some of the most innovative healthcare technologies, delivering several compelling use cases across collaborating vendors to highlight how multiple technologies can seamlessly interoperate with state-of-the-art medical equipment and co-exist to improve the overall patient care environment.

Complemented by a diverse range of scientific and educational content, Global Health will be hosting a variety of conferences including Continuing Medical Education (CME) conferences for attending healthcare professionals across all three days of the show. The conferences are divided between five clinical conferences and four non-clinical conferences including: Emergency Medicine, Laboratory Management, Patient Experience, Quality Management, Total Radiology, Hospital Build, Biomedical Engineering, Digital Health and Leaders in Healthcare.

For more information visit globalhealthsaudi.com

Global Health Exhibition 2019 will see 180 plus exhibiting companies, 25 exhibiting countries, 9 educational tracks and is expected to welcome over 10,000 attendees.

NTP targets for KSA's Ministry of Health for 2020

- Increasing private healthcare expenditure from 25 to 35 per cent of total healthcare expenditure
- Increasing the number of licensed medical facilities from 40 to 100
- Increasing the number of internationally accredited hospitals
- Doubling the number of primary healthcare visits per capita from two to four
- Decreasing the percentage of smoking and obesity incidence by 2 and 1 per cent from baseline respectively
- Doubling the percentage of patients who receive healthcare after critical care and long-term hospitalisation within four weeks from 25 to 50 per cent
- Focusing on improving the quality of preventive and therapeutic healthcare services.
- Increasing focus on digital healthcare innovations

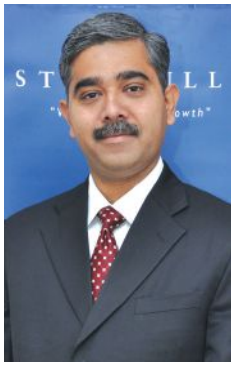
Source: Healthcare in Saudi Arabia Opportunities in the Sector, May 2018, Knight Frank

Middle East: The hotbed of healthcare innovation

By Deepa Narwani, Editor

A recent report by Frost & Sullivan highlighted that in 2019, GCC countries will represent 13 per cent of global revenues for healthcare products, with services growing at 12 per cent. The report said that the rising demand for better healthcare services in the region and global advancements in medical technologies have opened up a number of opportunities for information technology (IT) organisations to tap into this growing sector.

In an interview with *Arab Health Magazine,* Sandeep Sinha, Associate Partner – Healthcare, Life Sciences & BFS, Middle East, Africa & South Asia, Frost & Sullivan, shed light on the different factors driving growth and the latest healthcare trends in the Middle East.



Sandeep Sinha

He shared: "Dubai is one of the most progressive healthcare markets and there are a number of healthcare investments happening here. Earlier it was a non-insurance market but today it has evolved into an insurance driven one. The overall growth of the market has been very good and there has been an increase in access. Earlier the patient used to pay from their pocket but now they do so through insurance. The volumes have gone drastically high in the last three years. In the UAE, Abu Dhabi is quite matured and an already regulated market, and Dubai has been driving pretty decent growth. Now we see Sharjah will be the next market and the other emirates will follow soon."

Sinha said that Saudi Arabia is also an exciting market and is witnessing a lot of growth. There has been an increase in private investments in the healthcare space, along with Public-Private Partnerships (PPP) in the country. "The government is giving an opportunity for private investments and private players to come and invest in the healthcare space. As one of the biggest markets of the region, some of the highest growth can be seen in Saudi. Soon, Oman and Bahrain will also be implementing the insurance model. Health insurance is one of the major drivers of growth in the region," he added.

Technology at the forefront

The Middle East has a positive outlook when it comes to adopting technologies, stressed Sinha. Basic IT infrastructure such as the Hospital Information System (HIS), Electronic Health Record (EMR) or other database related technologies, are quite prevalent in the UAE and Saudi Arabia. On top

of it, new technologies such as Artificial Intelligence (AI) are being adopted in the region and provide opportunities, especially in the diagnostic space, where it is going to play a major role.

He said: "The UAE has been the most prompt in adopting any technology, not just in healthcare. The country is always at the forefront and is keen on adopting those technologies and wants to have an edge when compared to other countries not just in the region but in the world.

"Within healthcare, the DHA is trying to build a new platform and is bringing some new guidelines to the AI side of it. Private hospitals are also very open to adopting AI. It is not just on the diagnostic side but can also be applied to improve the patient-customer experience and the third area where I see the government working with it is to integrate the Emirates ID to the health data. Both Abu Dhabi and Dubai are working towards trying to integrate the health data of all the residents of the UAE and have access of the information securely so that it can be accessed by various healthcare entities where the patient travels."

Another technology integration that has been gaining traction is home healthcare. It is already a pretty decent business model in Abu Dhabi, said Sinha, but in Dubai too, it is gradually picking up.

What's trending?

One of the key trends, Sinha highlights, that has been noticed since the beginning of 2018 in the UAE has been consolidation. The price points are coming down and the providers are offering better care.

"Efficiency will have a major impact. Every healthcare entity needs to ensure they have operational excellence otherwise they won't be able to survive," he said. "Be it patient care, human resources or processes, everywhere they need to ensure that there is efficiency then only will they be able to provide good care at better prices. Second, is the adoption of technology, which is linked to efficiency.

"Also, we see innovative business models being adopted such as home healthcare, rehab, long-term care, speciality-based clinics, and alternative medicine. The UAE is open for alternative treatments as India's Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) held a conference in Dubai, and some homoeopathy conferences have also been held recently."

Some of the other trends that have been observed are that large healthcare chains have become quite aggressive on offering high-end tertiary services, and a lot of investment is being made in this area. The institutions have started building capabilities in cardiology, oncology, nephrology, urology, and other specialised services for which patients used to go back to their home countries or the locals used to go abroad. This is a trend where good capacity is being built in the market, added Sinha.

The UAE also has a huge aspiration to become the region's healthcare hub and for some of the specialities such as cosmetic and dentistry, and IVF, Dubai has secured a good number of patients coming in from neighbouring countries as well as from the African continent.

Dubai's population keeps moving every three to four years, as its largely expatriate driven. That poses another challenge as to how do you maintain the balance of the population, as all these different people will have different healthcare needs. It is not just about the patient but also about the caregiver because a patient coming in from the African or European region, will have different kind of healthcare needs.

"Taking things into consideration such as retention of the manpower, quality, etc., the cost of treatment goes high. Dubai is trying to meet these challenges by introducing new reforms that will benefit the entire population," he concluded.

Every healthcare entity needs to ensure they have operational excellence otherwise they won't be able to survive.

The overlooked value of quality cost programmes implementation in healthcare

By Dr. Nashat Nafouri, Chairman, Healthcare Group & Executive Officer, Saudi Quality Council

Dr. Nashat Nafouri

A dilemma comes to end

In the last decade, senior management in healthcare (voluntary or mandatory) implemented quality concepts in their facilities due to many reasons including globalisation, industry competitiveness, customers demand, emergence of social media, resources brain drain, and regulations became more robust, in order to achieve better health care outcomes.

On their strategic radar, the use of different accreditation or certification models as an approach to improve healthcare services, operations and outcomes was the catalyst that would solve all problems and gain the blessing of the stockholder. Therefore, one can notice a tenfold increase in the number of healthcare facilities obtaining different types of accreditation and/or certification over the last 15 years such as different ISO certifications, Joint Commission International (JCI) accreditation, Canadian accreditation, Australian accreditation, College of American Pathologist (CAP) accreditation, American Association of Blood Bank accreditation and recently local Central Board for Accrediting Healthcare Institutions (CBAHI) etc. To some extent it became an accreditation marathon where you may find a healthcare facility that has a boutique of different types of accreditations.

This approach put the executive management in a very difficult situation to balance between the pressure coming from the stakeholder to deliver high strategic outcomes and the extra burden on the operational budget. Executives assumed many unnecessary and exhausting additional expenses of quality deployment due to accreditation such as creating new quality positions, extra labour works, overtime, extra supplies, facility upgrades, renovation, processes redesign, acquiring new equipment, third party testing, mock inspections and the list goes on and on in order to meet accrediting bodies' requirements. This created a negative impression among executives and doctors claiming that quality deployment is draining the budget, is labour intensive, and hence accreditation is a redundant practice and impractical in advancing medical treatments and services. In addition, chief financial officers and financial department did not buy-in into quality and were totally under the impression that quality is a draining cost centre with zero profit when compared to the return on investment (ROI).

On the other hand, many studies and surveys showed that patients and their families did not express the utmost satisfaction in accredited hospitals aside from knowing their rights in these hospitals and hence the complaints increased over the years. Despite the extensive training on quality improvement methodologies such as quality tools, root-cause-analysis (RCA), risk management, six-sigma, balance score cards (BSC), change management, key performance indicators (KPI) to different disciplines and levels of healthcare workforce, the buy-in in deploying quality tools as routine practice is very marginal if not only detained in the quality department and among

those who want to work in quality improvement projects for the sake of publication.

No one can doubt the importance of quality concept implantation in healthcare nor argue about the value of accreditations in discovering the gaps in healthcare services and improving processes but the only attribute that led to this situation, in my opinion, is the lack of understanding and implementing of quality cost programmes to reduce operating expenses and/or increase productivity, efficiency and revenue in healthcare services. Even though quality directors and managers view quality as the prime goal for services improvement in healthcare, in my opinion, they failed in highlighting the importance of using quality cost system to organisation leadership to gain their buy-in and produce a tangible outcome of the routine quality practice.

Upon personally reviewing many quality programmes across healthcare facilities in the last 15 years, I could not find a link between the quality implementation programme and quality cost programme nor a single quality manger working closely with a functional manger and coordinating with the finance department to report quality costs to executive management in order to measure the level of improvement and make informative decisions.

The main focus of quality units is about proactive or reactive assumptions on how to meet accrediting bodies' requirements and standards without taking into consideration the quality cost programme but accreditation expenditures. In my opinion, the lack of knowledge and expertise among quality, functional and finance professionals in deploying quality costing system in healthcare services have negatively impacted the development of quality concept over the last decade. This scenario will come to an end with the management style transformation, which is taking place today due to the new certainty of economic diversion and in moving towards project management style in healthcare in the region. There is a need for new set of skills to be learned by quality professionals by looking in-depth into the healthcare operations and fully understanding the iceberg of measured and hidden quality costs.

What are quality costs and categories?

Understanding the cost of quality is one of the oldest quality business methods. The root goes back to 1951, when Dr. Joseph M. Juran's first *Quality Control Handbook* made the analogy of "gold in the mine" That is, there are often hidden costs we cannot see but which can be recovered. Other publications adding to an understanding of quality costs included Dr. Armand V. Feigenbaum's book, *Total Quality Control.* Quality costs are the costs connected with both attaining and missing the desired level of quality in a service or product. They may be seen as the costs of preventing quality problems, measuring quality levels, monitoring and/or inspecting quality level or failing to accomplish the desired quality levels.

Over the last several decades, quality costs have been divided into several categories but the most commonly accepted and comprehensive classification have categorised them as 1) prevention, 2) appraisal 3) internal failure and 4) external failure. The detailed definition of each category is:

Prevention costs – Costs of all activities specifically designed to prevent poor quality in products or services. Examples are the costs of new service review, quality planning, supplier capability surveys, process capability evaluations, quality improvement team meetings, quality improvement projects, quality education and training.

Appraisal costs – Costs associated with measuring, evaluation, or auditing product or service to assure conformance to quality standards and performance requirements. These include the costs of incoming and inspection/test of purchased materials, accreditation, services audits, commissioning tests, verification and validation, and calibration of measuring and test equipment, and cost of associated supplies and materials.

Internal failure costs – Failure costs occurring prior to delivery or shipment of the product, or the furnishing of service, to the customer. Examples are the costs of scrap, rework, rescheduling, reinspection, retesting, material review, snag list, and downgrading.

External failure costs – Failure costs occurring after delivery or shipment of the product, and

Quality costs are the costs connected with both attaining and missing the desired level of quality in a service or product.

during or after furnishing of a service, to the customer. Examples are costs of processing customer complaints, warranty claims, product recalls, medical errors, fines, readmission, compensations, and hospital acquired infections.

The total of these costs defines quality costs in the broadest sense. There are 75 elements of these categories and the total list of potential quality costs can be exhaustive and create its own financial exercise. It is recommended that when establishing a quality cost tracking system, the implementer use the Pareto chart to identify the highest loss contributors to improve them and as the improvement diminishes, add the secondary quality costs and repeat the improvement process.

The aim of a quality cost system

The principal idea behind cost of quality systems is the largest and highest quality costs occur after a service has been performed, that is, external failure costs. Altering activities and focusing efforts so that quality issues are identified in progressively earlier stages of internal failure, appraisal and prevention will reduce overall organisational costs. Reducing quality costs is also considered an effective way to regain margin. A second idea is that while external failure costs are often larger than costs created earlier in the flow, they can be also be harder to measure or link to casual events.

Medications returns complaints, for example, are usually easy to measure, but it may be difficult to identify how the problem found by a patient and paid for in a compensation claim was caused in the drugs' preparation and dispensing process. In addition, costs due to lost trust are very difficult to quantify. One approach is to start with those internal failure costs which can be identified and tie to specific work activities because in most cases, the roots that underlie these internal failure cost-generating activities are tied to those much larger external failure costs. So, by eliminating the root cause internally, all quality costs are reduced. Installing and using a quality cost programme will allow leadership to make a guided transition from an organisation's current operational costs to a state of minimal quality costs. The cost of quality for a given issue grows larger as the services moved toward the customer. From service design, setup, delivery, completion, and finally to possible litigation, each step can result in a tenfold increase in quality costs. Not all issues make it to the last stage, but all increase in cost as they move forward.

Improving the bottom line is the goal. A properly understood and managed quality cost programme will aid organisations in realising cost savings while avoiding some of the serious pitfalls that can accompany cost cutting: decrease in service quality, increased patient dissatisfaction, added rework costs, or complaints handling.

The role of accounting and the management of quality costs – focus on the positive

Establishing a quality cost system usually does not require extensive accounting system changes. Access to detailed data currently available may provide enough information to set up a quality cost programme. The key to an effective system is to strike a balance between practicality and comprehensiveness. However, if the larger elements of quality cost are not identified by the existing accounting system, some form of estimation may be needed at first. The critical need is to make sure that the quality cost data makes sense to management, that is, it covers all the known and/or expected sources of quality cost.

During the setup of a quality cost system there may be a need to do some trials to establish the key sources. However, a successful cost of quality programme should be comprehensive and not just cover those portions of the business or cost centres that are simple or obvious. Leaving out portions that are significant but difficult to obtain will skew the decisions and approaches taken to reduce costs. The cost of quality approach and its measurements should be viewed as behaviour modification tools. The goal is to change the behaviour of the organisation's employees as a group. What senior management expects from an accounting team are reports that measure the totality of costs within a particular area that can have significant impact on operational decisions but not a comprehensive accounting measure. It is important to emphasise

Installing and using a quality cost programme will allow leadership to make a guided transition from an organisation's current operational costs to a state of minimal quality costs.

to everyone involved that isn't just a measurement exercise. In the words of Taiichi Ohno, "Costs do not exist to be calculated. Costs exist to be reduced."

All of the previous discussion indicates a major role in the quality cost system for the accounting office, which is totally missing from the equation of quality cost programmes implementation in current healthcare organisations that strive to achieve high quality services. While the accounting department may not at first wish to accept this task eagerly taking into consideration the misconception that quality improvement is the central function of quality department, but the concept of linking quality measurements to cost does fit within the normal practice of using costs as primary decision drivers. It is hard to argue against the concept of reducing cost while at the same time improving quality especially in the private healthcare sector where each spent dollar counts. To some extent private healthcare sector may recognise the importance of quality cost system but the accounting systems in these organisations are antiquated to optimise its benefit and the quality department don't push for it due to lack of knowledge. In the public sector, quality cost system never existed because healthcare budget is allocated by the government and quality improvement was a mandate. Efforts were concentrated to improving quality in general under the impression that by embedding quality tools, practice and/or champions in every functional unit in healthcare may act as integral part of errors prevention and cost saving. This approach made quality sound redundant and overlooked quality cost as a powerful tool in healthcare for many years.

This picture has changed in recent years with the Kingdom's Vision 2030 and the paradigm shift in economic diversity toward services industry and the classic management style has transformed into a modern project management style where costing is a cornerstone in projects' life cycle and success. Therefore, the quality cost programme will establish its footprint in the upcoming years and is expected to be the main drive for decision making in the right direction.

Quality management often has a negative connotation. Service quality is seen as a good thing, but the management of quality too often focuses on where it is not: on the mistakes, not the successes. In the same vein, views of quality costs within the organisation may focus on negative issues. Some department managers view quality costs as a measure of their department's mistakes. To counter this view, focus on the positive aspects of quality cost measurement. By helping to reduce overall organisational costs, a department not only makes the organisation more successful, it may also save jobs and therefore retain talent. But to do this, departments must work together and healthcare providers within these departments should uphold the ownership of costs reduction and be empowered by the leadership to foster the organisational culture toward costs reduction and increase revenue.

In conclusion, quality cost programmes are becoming evident as best practices to reduce waste in healthcare services and to be implemented in many functional units in hospitals including laboratories, pharmacies, imaging department, admissions, patient relation, bed management, emergency and other areas where quality cost may have huge positive impacts on the performances and outcomes of these units. Finally, executive management needs to understand the importance of quality cost programmes in running modern healthcare services and quality directors and managers, and the accounting team need to develop new set of skills to coordinate together and develop their employees to implement the most suitable quality cost programme that fit in their functional units and accounting system.

By helping to reduce overall organisational costs, a department not only makes the organisation more successful, it may also save jobs and therefore retain talent.

References available on request.

Dr. Nafouri is the chair of the Quality Management conference of the Global Health Exhibition set to take place between September 10 to 12 at the Riyadh International Convention and Exhibition Center, KSA.

Health as a transformative policy domain

The national strategic significance of health policy

By Mohammed Berrada, Partner, Head of Healthcare Practice, Middle East and Africa, A.T. Kearney

Mohammed Berrada

No policy domain or sector of the economy is more fundamentally human, of strategic importance or evolving more rapidly than health. This intensity of its impact is universal – touching the entire population without exception. Moreover, the level of government expenditure injected into the healthcare industry make it a top of mind and highly sensitive political issue globally.

There has been enormous progress in global health trends over the last several decades: child mortality rates decreased by over 50 per cent, antiretroviral therapy has driven a 48 per cent decline in HIV-related deaths, and tuberculosis incidence declined 19 per cent in 15 years. However, rising healthcare expenditure increases pressure on all governments in GCC. KSA's national health expenditure rose from 3.5 per cent of GDP in 2010 to 5.8 per cent in 2015, UAE's health expenditure rose from 3.3 per cent of GDP in 2010 to 4.7 per cent in 2017, and the upward trajectory is only increasing. Global healthcare spending is projected to rise at an annual rate of 4.1 per cent between 2017-2021, up from 1.3 per cent over the preceding five years. Other challenges persist in an increasing complex environment, with the advance of science and technology, shifting demographic patterns, and the fiscal pressures facing governments around the world driving new approaches to handle care. Saying this, there are several fundamental and interrelated forces that are driving the transformation of the health policy landscape.

From cure to prevention

Historically, the focus of most health systems was on curing the sick. The model was driven by supply rather than demand; however, it quickly became financially unsustainable. Today, we are seeing a fundamental shift in thinking, enabling proactive health management rather than reactive attempts to cure illness. As health systems have developed the ability to treat acute crises and prevent communicable diseases, the focus has shifted to preventing chronic diseases (many of which are associated with modern sedentary lifestyles and food consumption patterns) which the World Health Organization (WHO) estimates now account for 50 per cent of the global burden of disease. The continued monitoring and care that chronic diseases require has driven the emergence of holistic approaches focused on cultivating healthy lifestyles, consistent monitoring, early diagnoses, and targeted treatment that can prevent minor ailments from developing into critical conditions. Increasingly, the orienting objective is to keep patients out of the hospital both before they are ever admitted and by minimising return visits through effective post-treatment community care. Key to this shift has been altering the incentive system such that providers are paid based on the health of patients, or alternatively paid a flat rate for patients subscribed, whether they receive any treatment or not.

Expanding reach and inclusion

The focus on expanding the reach of the healthcare system is no longer centred on building more hospitals and training more doctors, instead, it is being redefined by the ability of individuals to access the right care at the right time. Precise, rapid triage and referral systems optimise the location of treatment. Common cases are treated in primary care close to home, while rare, complex cases are attended to in specialised hospitals that are best-suited to patient needs, even if they are in another region of the country. In addition, National Healthcare Systems across the world are working to make high-cost therapies equally available for the entire population, including rural areas, through development of National Treatment Standards and subsidising regions based on their needs. Taken together, these measures are emerging as solutions to the "post-code lottery" in which superior care is more available to those in major cities than those living in rural regions.

Digitally enabled self-care

New technologies that enable individuals to monitor their own health conditions, from fitness trackers to condition-specific mechanisms such as continuous glucose monitors, are aiding the transition to preventative care. As the affordability of these devices increases, more citizens are gaining access to the tools that can enable them to take charge of their own health. In addition, the advent of high-quality digital and virtual communication tools in the health sector serves to close the gap between rural and urban provision of care. With these technologies, preventative care becomes ever-more accessible for the individual. As a result, the roles of doctors and nurses will necessarily change. The specialised knowledge of doctors can become better leveraged, while the need for nurses becomes even more critical in cases of continuing and long-term monitoring and care. The increasingly important role of healthcare policymakers is to facilitate the growth and affordability of such solutions, while ensuring their efficacy, efficiency and proper use.

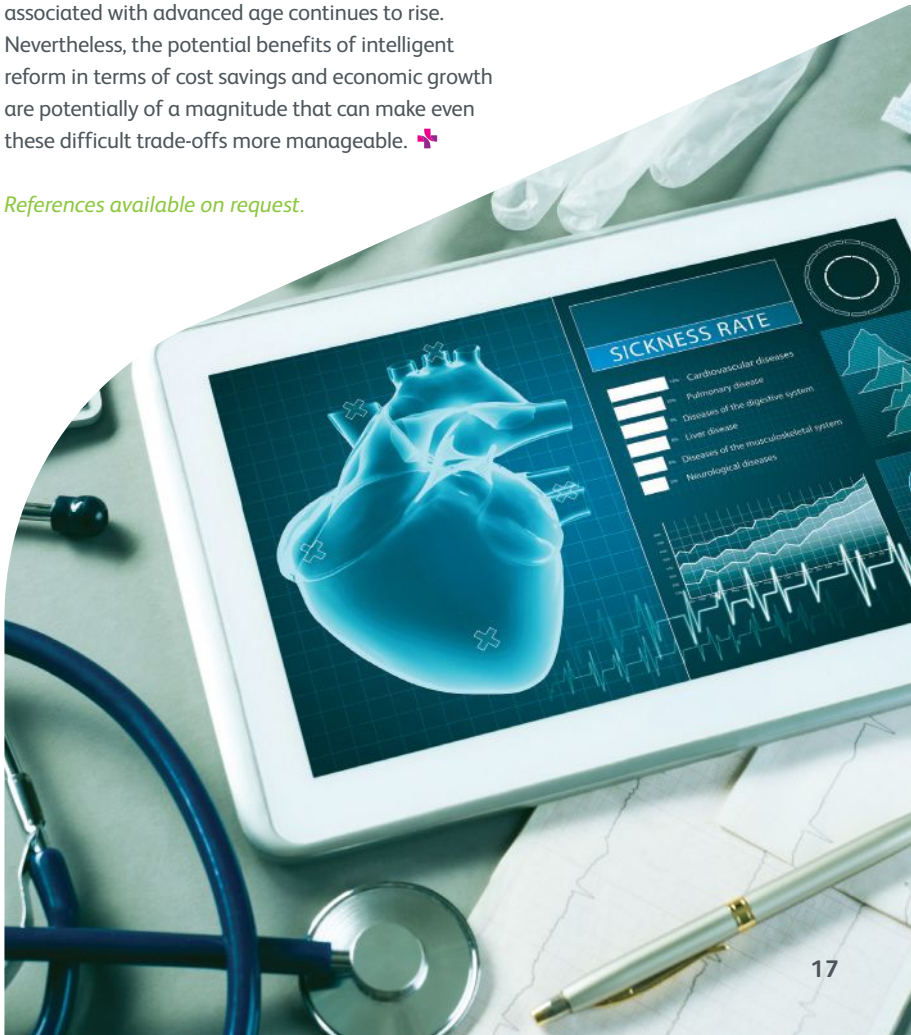
Accelerating scientific and technological advance

The application of next-generation technologies and scientific understanding in healthcare is further transforming the health landscape. Advances in understanding and addressing health challenges from the earliest indications of health risk to the final stages of treatment are dramatically altering the effectiveness of preventative and curative treatments; from chatbots to diagnose common ailments to machine learning and Artificial Intelligence that can recognise cancerous tissue or correct gaps and errors in diagnosing illnesses. Meanwhile, advances in detecting and recognising early indicators of disease are helping to proactively identify individuals most at risk for poor health outcomes so that they may monitor, catch, and address diseases effectively. Finally, in the context of new genetic and genomic understanding, the ability to treat individuals with tailored medications and methods is becoming an ever-greater possibility. As the advance of technology and our understanding of biology accelerate, the opportunities for their application in the health sector are increasing exponentially. At the same time, the proliferation of technology requires careful assessment and effective government regulation, to ensure that the quality and safety of care meet the strictest standards.

A key challenge in realising this transformation of health is the complex set of trade-offs between quality, cost, and accessibility. For example, intergenerational equity in the provision of healthcare will continue to gain prominence as a central political issue – as birth rates have fallen and life expectancy has grown, the proportion of the population experiencing medical challenges associated with advanced age continues to rise. Nevertheless, the potential benefits of intelligent reform in terms of cost savings and economic growth are potentially of a magnitude that can make even these difficult trade-offs more manageable.

As the affordability of these devices increases, more citizens are gaining access to the tools that can enable them to take charge of their own health.

References available on request.



Latifa Hospital for Women and Children delivers 'miracle baby'

By Kamakshi Gupta, Dubai Health Authority (DHA)

Minimum radiation was used, and the mother's abdomen was protected with special lead shielding to block radiation to the foetus.

Celebrations are in full swing since baby Layan was born on May 26 at Latifa Hospital for Women and Children. Her parents and three siblings are delighted to have the little one by their side.

Wajdy Mohammed Ali, a 47-year-old Egyptian expatriate says, "Layan is our miracle baby. My wife suffers from heart failure. The private hospital we were initially consulting told us that it is not possible to continue the pregnancy, they referred us to Latifa Hospital."

Doctors at Latifa Hospital for Women and Children first examined his wife at 17 weeks.

Dr. Amal Qedrah, Head of Gynecology at Latifa Hospital for Women and Children says, "She was referred to us by a private hospital for termination of pregnancy in view of her condition and the fact that she had stage 4 heart failure. She was admitted to the ICU in Latifa Hospital. Upon assessment by teams from both Latifa and Rashid Hospital we decided that minimally invasive cardiology intervention and close observation throughout the pregnancy was a viable solution to save both the mother and baby."

Dr. Haitham Al Hashimi, head of cardiology at Rashid Hospital and lead physician for pregnancy related cardiac issues says, "When we examined her in January this year, she had class 4 heart failure, had markedly elevated lung pressure and a severely narrow mitral value. Upon examination, we decided to carry out a minimally invasive cardiac procedure while she was pregnant so that she could continue her pregnancy. This way we could save the mother and her baby."

Three days later, a multidisciplinary cardiology team headed by Dr. Al Hashimi conducted a cardiac procedure but there were many considerations and modifications required to protect the mother and her unborn child. Additionally, no anaesthesia was given because of the complications it can cause in a patient with high lung pressure. This meant the patient was awake for 30 minutes throughout the procedure. "We kept talking to her and making her comfortable all through the procedure."

Dr. Sanjeev Agarwal, Consultant Interventional Cardiologist and an expert in such procedures says, "Minimum radiation was used, and the mother's abdomen was protected with special lead shielding to block radiation to the foetus. Rather than depending solely on x-rays, we carried out an endoscopy, a small camera went down her throat and provided us the necessary imaging so that we could precisely guide the catheter from her groin and into the heart. The catheter had a balloon that was inflated to widen the valve."

Dr. Juwairia Al Ali, consultant cardiologist and expert in echo carried out the endoscopic echo (ultrasound of the heart) throughout the procedure.

After the mitral balloon valvuloplasty was performed, the patient immediately witnessed the benefits. Al Hashimi says, "Her lung pressure reduced from severe to mild. She went from being a class 4 heart failure patient to class 2 heart failure patient. Her valve narrowing became minimal with no further leakiness in the valve. She was given medications and we continued to closely monitor her condition together with an expert team in Latifa Hospital, consisting of obstetricians, anaesthesiologists and the medical obstetrician. The key to success in such cases is a well-structured multidisciplinary team".

Dr. Qedrah says, "We closely monitored her progress and carried out a planned C-section at 37 weeks."

Ali says, "We are thankful to the doctors at Latifa and Rashid Hospital. We feel so blessed to have our little one by our side."

Dr. Amal Qedrah, Dr. Juwairia Al Ali, Dr. Haitham Al Hashimi, and Dr. Sanjeev Agarwal

FIME 2019 captivates Latin America's healthcare market

By Arab Health Magazine Staff

The recently concluded edition of Florida International Medical Expo (FIME), organised by Informa Markets, that took place from June 26-28, welcomed more than 1,200 exhibiting companies and 14,119 attendees from over 103 countries.

As one of the largest medical trade fairs across the Americas, the exhibition offered a unique business platform for healthcare and trade professionals and provided an opportunity to connect with new suppliers and customers looking to do business in the region. The event put the spotlight on thousands of latest products that were on display and allowed visitors to evaluate the latest competing solutions in the healthcare sector.

Key insights

As a leader in the healthcare industry that emphasises the importance of innovation, FIME ensured that several avenues were available throughout the show for healthcare professionals to develop themselves. The event not only provided insights into the advancements of the healthcare industry through the exhibition but offered dedicated educational tracks of CME conferences and seminars that delivered the opportunity for growth in multiple fields. Furthermore, FIME helped enhance the knowledge and skills of visitors through various educational opportunities available through the different workshops and training sessions.

For instance, the Healthcare Supply Chain and Procurement Conference provided supply chain insights, current prospects of sector policies, trends and regulatory compliance updates. At the conference, distributors/importers and manufacturers were presented with the latest market trends, forecast and distribution channels to improve trade and business in the medical devices industry in the Americas. While the Sterilization & Decontamination (CSSD) Conference featured techniques and methods to improve services and performance of CSSD professionals.

Also, the Medical Devices International Trade Seminar provided healthcare market insights, trade prospects and regulatory affairs for market entry to the U.S., Latin America, China, Asia, APAC and Europe. The seminar provided insights to grow business and manage risk by finding and capturing opportunities in an evolving market.

FIME welcomed more than 1,200 exhibiting companies and 14,119 attendees from over 103 countries.

Expanding portfolios

Some of the visitor profiles who attended the show included manufacturers of medical devices and equipment who used FIME as an opportunity to showcase their latest products. Exhibitor companies varied from large organisations such as Avante Health Solutions and Edan Instruments to smaller businesses getting involved in an exhibition for the first time.

The exhibition also proved to be a beneficial experience for dealer and distributor job functions, right from senior management of larger organisations that were looking to connect with key industry players, sales and business development professionals tasked with expanding their product portfolios and entrepreneurs hoping to source their next 'big principle' and supply products in their country.

While professionals tasked with procurement responsibilities for healthcare facilities, and medical speciality associations used FIME as a way to find the latest medical devices, equipment and services. They had the chance to scope the full variety of options available and had detailed discussions with key influencers from manufacturing companies attending the show to secure the best deals.

After two years of being hosted in Orlando, the event moved back to the newly renovated Miami Beach Convention Center (MBCC), which is a US$620-million state-of-the-art-project. As the "gateway to the Americas", Miami continues to serve the world's healthcare business community thanks to its strategic geographic location.

The following pages (20-35) feature articles from conference speakers at FIME and recap topics that were highlighted at the event, right from insights into wearable technologies to improving the medical supply chain.

Digital Continuous Care: Wearable technology that healthcare can capitalise on

In a digital health environment, the transformational power comes from knowing a specific, detailed collection of data about patients and its medical life flow

By Dr. Leon Eisen, CEO and Founder of Oxitone Medical Inc.

Launching an interactive map with built-in asset tracking – via RFID and beacons or other technology can give staff

Utilisation of new technology disrupts the paradigm of many ecosystems and is often resisted in healthcare. However, when a natural evolution of technology is incorporated into an existing organisation, the innovations outpace the disruptive effects while encouraging widespread acclimation. Digital Continuous Care incorporates modern wearable medical technologies and enables reliable patient supervision as a natural evolution of medical monitoring. The combination of AI's predictive power with the convenience of comfortable wearable medical technology can be fine-tuned with existing healthcare ecosystems.

Digital home care is nothing new in today's medical world – everyone is familiar with medical devices for patient home monitoring, such as glucometers, fingertip pulse oximeters, blood pressure monitors, thermometers and other devices connected to smartphone applications and clouds. The common denominator for all these instruments is that they are designed for sporadic measurements and usually are taken from the shelf when patient already feels bad. Transformation

from episodic, manual and fragmented care towards continuous, automated and prolonged monitoring affects the lifestyle and wellbeing of the chronic disease patient. It refers to three key healthcare trends:

- Improve patient lifestyle
- Improve quality of care
- Reduce cost and risk

Digital continuous care capitalises on these three trends to plan and deliver personalised health monitoring products and services. Digital wearable medical technologies allow comfortable and reliable continuous monitoring to drive home healthcare from reactive post-event intervention to real-time and predictive systems and processes. When smart wearable technologies and patient homecare planning come together, they can dramatically change the way clinicians plan and react. Digital continuous care combines the convenience of a wearable, tracking device, with state-of-the-art monitoring capabilities, previously only available in the hospital or care facility.

Real-time means the system can continuously process digital biomarkers and their derivatives and stay synchronised with what's happening with the patient. Intelligent software can continuously monitor and learn the patient's baseline and adapt the care plan and intervention protocols rather than relying on episodic data and prescribed actions. This intelligent software can also predict events, provide insights and communicate with caregiver and clinician. A digital continuous care platform increasingly leverages usability and intelligence embedded in wearable medical devices and software systems allowing providers to analyse data from continuous tracking, empower patients to participate in their own care plan and predict and alert against future potential complications. Digital continuous care is the next step in the evolution of modern remote patient monitoring and management. For example, one of the reasons healthcare providers will inevitably employ digital continuous care is to passively reduce hospital stay and risk of readmission. With the digital continuous care mechanism, the hospital stay could be ultimately optimised without additional medical staff involved, so the hospital does not have to keep patients for extended stays – patients will continue medical-grade, digital care at home.

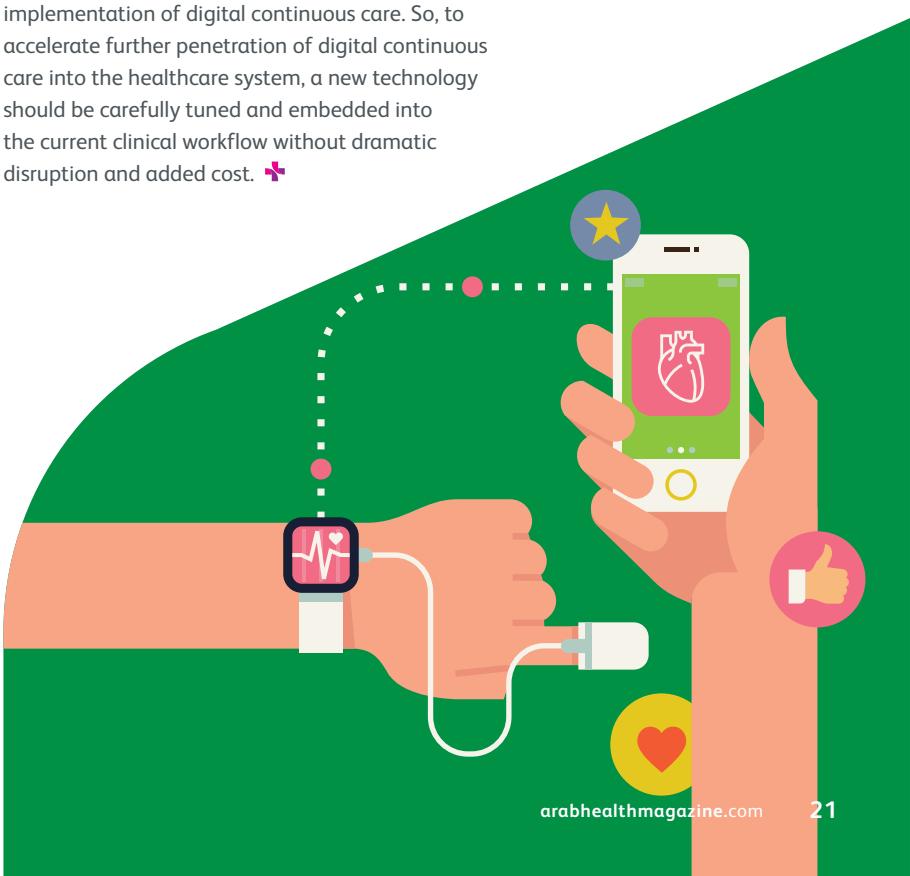
In a digital world, the transformational power comes from knowing a specific, detailed data collection about patients and its medical life flow. These insights enable the application of predictive machines to detect any minor deviations from the patient's established base-line. For example, lack of medication adherence or missing a dose can be immediately recognised by the algorithms and alerts will be sent to a family member or care team. As we look to the future, patient-generated real-time information will talk with medical professionals in a so-called digital information - care circle manner, where passively generated continuous, precision data support patient care processes.

Prediction is the process of filling in missing information. In healthcare, missing information is a patient's real-time and future health status. Soon, prediction will become a central input into decision making in healthcare. Digital continuous care is the only mechanism, and a cheap one, to generate information we don't have. It has many different components and functionalities and can be uniquely configured for each specific use case. However, the ability to generate and analyse patient real-time data, build a dynamic base-line and predict future complications is the common denominator.

Transforming from conventional remote monitoring to accurately predicting patient health status is a slowly becoming reality. Clinicians and payers understand that digital continuous monitoring with predictive analytics can enable mitigation of patient risk much faster than has been possible till now. They are seeing the greatest value and momentum to start their journey, at least in small steps.

However, it is challenging to try out some new technologies while maintaining current processes and workflow that hamper a wider adoption and implementation of digital continuous care. So, to accelerate further penetration of digital continuous care into the healthcare system, a new technology should be carefully tuned and embedded into the current clinical workflow without dramatic disruption and added cost.

Launching an interactive map with built-in asset tracking – via RFID and beacons or other technology can give staff a hospital-wide view of assets.



Wearable technology is key to solving women's health conditions

By Nestor Coronado Palma, Chief Commercial Officer, LifeSense Group

Urinary incontinence can now be solved in a private and comfortable manner due to the integration of different types of technology.

The latest innovations in smart functional textiles coupled with mobile applications are leading to the next generation of wearable devices and the development of new solutions for common problems. The miniaturisation of integrated circuits in the creation of small, thin sensors together with the ability of textiles to incorporate other materials into their knitting has played an essential role. One of these solutions is CARIN, a non-invasive smart wearable that offers a comfortable solution to a taboo women's health condition: urinary incontinence. This condition can now be solved in a private and comfortable manner due to the integration of different types of technology.

Did you know that 1 out of 3 women will experience urinary incontinence after childbirth?

According to the Global Forum on Incontinence (GFI), urinary Incontinence (UI), the involuntary loss of urine, is a very common problem affecting up to 423 million people. This creates a global market of €11 billion with an 8 per cent CAGR of which 95 per cent is addressed with disposable pads or diapers, which only manage the condition in an embarrassing and ecologically unfriendly manner, yet do not offer a solution.

On average, 1 in 3 women has symptoms of UI. In the U.S. alone, 25 million women have urinary incontinence, making it the largest market for a solution. Stress Urinary Incontinence (SUI)

is the most common type of UI among women; 70–88 per cent of women have SUI symptoms. SUI occurs when physical activity, such as coughing, sneezing or lifting heavy objects, puts pressure on the bladder causing involuntary urine leaks. The primary cause is weak pelvic floor muscles. The severity ranges from occasionally leaking urine when you cough or sneeze to having an urge to urinate that is so sudden and strong, you cannot get to a toilet in time.

Urinary incontinence is an under-diagnosed and under-reported problem that increases with age. It should not be thought of as a disease, because no specific aetiology exists, according to the International Continence Society (ICS). Urinary incontinence is twice as common in women as in men. Pregnancy, childbirth, and menopause are major reasons for the increased prevalence of incontinence in women as compared to men, as mentioned here under:

- **Pregnancy:** Hormonal changes and the increased weight of the foetus can lead to stress incontinence.
- **Childbirth:** Vaginal delivery can weaken muscles needed for bladder control and also damage bladder nerves and supportive tissue, leading to a dropped (prolapsed) pelvic floor. With prolapse, the bladder, uterus, rectum or small intestine can get pushed down from the usual position and protrude into the vagina.
- **Menopause:** After menopause women produce less oestrogen, a hormone that helps keep the lining of the bladder and urethra healthy. Deterioration of these tissues can aggravate incontinence.

The good news is that stress incontinence is also the easiest form of incontinence to treat. According to the National Association for Continence (NAFC), approximately 80 per cent of those affected by urinary incontinence can be cured or improved, however most people are not aware of this. Despite the high success rates in treating incontinence, only one out of every 12 people affected seek help. People who lose weight and use exercises to strengthen pelvic floor muscles notice a remarkable improvement.

Physiological therapy of the pelvic musculature, first championed by Arnold Kegel in the mid-1950s, focused on strengthening the pubococcygeus muscle of the pelvis. Today, Kegel exercises are widely used as a first-line treatment promoted by Kegel's early writings describing "complete relief from simple urinary stress incontinence in a series of over 700 users." A more recent study from the Norwegian Centre for Physiotherapy Research confirmed that patients who performed Kegel exercises significantly improved stress urinary incontinence as compared with those who did not.

There are currently several different ways of addressing the condition of SUI. Professionals like physiotherapists, urologists and gynaecologists may offer various types of solutions. Different types of products, such as pads and diapers, offer ways to cope with and manage the condition. There are also pelvic floor trainers, which are typically either invasive methods that are uncomfortable to use or pelvic floor apps which lack progress monitoring, causing many people to give up due to the long duration of treatment. However, very few solutions provide an integral approach and a quick, effective solution.

LifeSense Group has created an effective solution by using the latest technology to solve the condition of SUI within 8 weeks. When women perform guided pelvic floor exercises daily for an average of 10 minutes per day, they are able to strengthen their muscles and gain more control over their bladders. The exercise programme paired with a wearable sensor offers a comfortable solution with nothing to insert that also monitors progress, keeps users motivated every day, customises the exercises according to the condition and can be used at any time depending on each woman's lifestyle. This smart wearable empowers women every day to have a stress-free life.

References available on request.

According to the National Association for Continence (NAFC), approximately 80 per cent of those affected by urinary incontinence can be cured or improved.

An insight into regional medical devices regulatory affairs

Reaching the Latin American Market

By Mónica Mabel Guaita, CEO and Founding Partner, MMGC SRL (Regulatory Affairs Consulting) and Magdalena Ferrari del Sel, Regulatory Affairs International Senior Consultant, MMGC SRL, Buenos Aires, Argentina

Mónica Mabel Guaita

Magdalena Ferrari del Sel

The Latin American region comprises around 20 countries many of which are categorised as emerging countries with a population that is reportedly estimated to have reached 644 million people as of 2019.

The Latin American market, while having several local manufacturers, has outstanding world-renowned professionals that are highly trained in the use of the latest technology, research and development. Therefore, the region as a whole shows a strong trend as an import market for high-tech medical equipment and medical devices. The market represents a region of strategic interest for building alliances with qualified partners who have experience in such markets.

Regulatory clearance

Disregarding the regulatory issues may imply significant risks for companies that wish to enter the Latin American market. Choosing a skilled and suitable regulatory partner plays an important role in this enterprise and selecting the right one is critical.

Regulatory clearance is a prerequisite for manufacturers to get access to new markets. Latin America poses a challenge for medical devices registration as each country has its own regulatory legislation or its particular way to apply the same legislation, as it happens among different MERCOSUR countries.

Although there are different regional trade agreements in force such as free trade agreements, trade blocks, common markets, etc., like MERCOSUR, ALCA, Pacific Alliance (Alianza del Pacífico), these agreements do not comprise all countries in Latin America nor have a direct correspondence with a single product regulatory clearance as it happens in the European Community and its Medical Devices Regulations applicable throughout the Community and the CE marking.

It may also happen that some countries in this region issue legislations, but these are

not applied, or are partially applied taking into account the available resources at the moment of application and/or political/economic changes that impact on the system.

Besides, sometimes regulations and requirements to access the Latin American markets are quite challenging and new requirements are gradually incorporated or they are based on practical experience acquired by local authorities on the go. This situation, combined with the fact that when government changes there might be turns in high level public positions, which may result in changes in management and implementation of regulations.

Another aspect that should be taken into account is the different legislation frameworks regarding the medical product license ownership. In general, manufacturers are usually concerned about keeping control of its product licenses and it is exactly at this point where a good regulatory advice is fundamental in order to avoid future problems related to product importation and marketing issues. MMGC SRL offers manufacturers the possibility to address this issue by thinking together about their regional regulatory strategy and supporting them to make the right considerations to choose among the different holding options possible based on each local legislation.

In MMGC SRL, we see that clients launching in the region have an in-house regulatory staff strongly oriented to, and highly specialised in, European medical devices regulations (MDR), FDA regulations or others. However, when entering the Latin America region, they are not familiar with the local healthcare regulations.

In such cases, we recommend them to seek support by outsourcing their Regulatory Affairs Management in the region, particularly at the beginning. In this way, MMGC usually works by centralising the regional regulatory issues in close cooperation with their in-company staff to define the best regulatory strategy for each country and, as we share the same regulatory language, the communication among the people involved is fluent.

Currently, several Latin American Regulatory Agencies are gradually migrating from long and heavy paper-based procedures to on-line submissions for medical device registrations and license renewals. For example, in Argentina, in the last two years, and in an effort to reduce evaluation time-frames for registration of lower risk class devices and for license amendments not involving significant changes, local authorities have implemented a new on-line system to streamline those processes. Nevertheless, as mentioned above, the implementation of these updates is usually gradual and highly-based on practical experience acquired on the go by the regulatory authority.

In order to manage Medical Devices Registrations efficiently, it is critical to have expertise and knowledge of these local characteristics.

On the other hand, there are some common guidelines that allow to group countries and manage regulatory issues of Latin American countries in a centralised way.

Centralised Regional Management of Regulatory Affairs

It offers advantages and avoids extra costs and delays in registrations. In addition, manufacturers have the choice to start with one Latin American country of interest and to expand the market to other countries afterwards, therefore optimising the use of documentation.

In this regard, a Centralized Regulatory Information Management System (MMGC-RIM Portal) is one of the best ways for manufacturers to track the status of each license in all countries of the region where they operate, in a user friendly 24/7 online portal. This enables manufacturers to follow the clearance status of each medical device by country, by product and even by model/size of the product, if applicable. Every day we can see that relying on the support of the portal can help clients avoid missing business opportunities, which may result from issues related to the mismatch between regulatory time frames and commercial time frames. By organising and keeping the regulatory information within this system, the Portal delivers an on-line approach to streamlining compliance, getting products to market faster, and decreasing business risks.

References available on request.

Currently, several Latin American Regulatory Agencies are gradually migrating from long and heavy paper-based procedures to on-line submissions for medical device registrations and license renewals.

Top 5 reasons why medical device safety is a huge global problem

By Susan Ramonat, Chief Executive, Spiritus

The global medical device market will grow from US$483 billion in 2020 to US$795 billion in 2030, a 5.2 per cent CAGR.

Across the globe, adverse events associated with medical devices are on the rise. Here are the top five reasons why:

1. Sheer numbers: Medical device volumes are exploding globally. According to KPMG, the global medical device market will grow from US$483 billion in 2020 to US$795 billion in 2030, a 5.2 per cent CAGR. The major growth drivers are healthcare spending, ageing populations, chronic disease and technological development. More devices and more patients in developed and developing countries mean increased numbers of adverse events – more injuries, more complications and more deaths.

For medical device manufacturers, the costs of quality events are sizeable. According to McKinsey, it is as much as 7 per cent of revenues annually, or over US$35 billion globally.

2. The double-edged sword of innovation: Technology advances also introduce risks. The pace of innovation in medical devices is breath-taking – novel in-vitro diagnostics, drug-device combinations, next generation materials such as graphene and bio-substrates, 3D and 4D printed instruments and implants, nano-scale robotics, IOT sensors, and software as a medical device. With such dramatic innovation in diagnostics and therapeutics comes uncertainty and risk.

Industry sources estimate 15 per cent of devices are connected. These devices are also increasingly interoperable, software-enabled and algorithmically controlled. The result is a huge jump in cybersecurity risks.

Last year, the chief information security officer of a leading U.S. research hospital told regulators his organisation has 25,000 connected devices in its facilities. These comprise 6,000 makes, models and versions with over 15 operating systems. Many of these devices operate as families or clusters of inter-operable devices and equipment. Every device is a snowflake. Keeping up with routine patches and upgrades is tough, not to mention urgent vulnerability mitigation.

Worryingly, some white hat hackers have observed that device-specific cyber-vulnerabilities could provide an entry point for lateral movement into a hospital's IT systems, making real the possibility that a trauma centre could become a centre of trauma.

Regulators are keenly aware of the trade-off between these emerging technologies and the risks they present. For its part, the FDA now insists that medical device manufacturers step up their games when it comes to post-market surveillance and adverse event management. Under the EU MDR, heightened vigilance will be demanded from device manufacturers and distributors.

3. Overwhelmed and underfunded: Clinical engineers and medical technology specialists face huge challenges. They must track, monitor, and maintain growing volumes of increasingly complex medical devices and equipment across multiple delivery locations (e.g. acute care, community facilities and outpatient clinics, and home-based settings).

From beds, hoists and mattresses, infusion pumps, ventilators, flexible endoscopes, surgical instruments, radiation therapy and imaging equipment in an acute care setting to implants, closed-loop diabetes management systems and sensor-enabled asthma inhalers, the challenges in ensuring devices are safe and in good order at the point of care are huge.

4. Standoff over servicing: OEMs, hospital systems and third-party service firms disagree about who's accountable. On a day to day basis, this standoff about qualifications, competence and contractual obligations for medical device servicing further complicates an exceedingly difficult operating environment.

5. Data, system and organisational silos: Silos reduce transparency and delay action when it matters most. Without necessary visibility and traceability, it's difficult for hospital staff to assure that medical devices and equipment are safe and in good order.

Under-reporting of incidents and long supply chains delay action. It can take months or years for manufacturers to recognise and attribute adverse events to their devices. Even then, root cause investigations (e.g. design, production, component failure, training protocols) create further delays, leaving patients vulnerable to preventable injuries, complications and deaths.

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AT THE FOREFRONT
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How can medical supply chain be improved?

By Lou Ramondetta, President, Surplus Service

The global healthcare supply chain management was valued at US$1.27 billion in 2016. By 2025, the value of this market is estimated to reach US$2.56 billion.

In recent years, the wholesale distribution of the medical supply industry has witnessed stupendous growth. The recently held, FIME 2019 at the Miami Beach brought together 14,000 medical and healthcare trade professionals from North, Central, and South America, as well as from across the globe, to do business with 1,400 national and international companies showcasing new and refurbished medical and hospital equipment, technology, products, and supplies. At the event, I was an expert panellist and took part in the discussion of 'Improving the Medical Supply Industry'.

The discussion involved around how to transform the medical supply chain by exploring healthcare distribution models, exploring and analysing case studies on how hospitals seek to maintain patient care while spending less on their supply chain.

Reports indicate that this industry will continue to grow at a rate of 6.5 per cent. According to the Centers for Medicare & Medicaid Services, US$3.5 trillion will be spent on national health expenditures alone. On one hand, the U.S. has witnessed a dramatic rise in drug shortage whereas, on the other, it has also added about half a billion dollars in costs for hospitals worldwide. What are the three words that come to your mind when you hear about ways of reducing cost, improving cost-effectiveness and information (data) into processes? We'd say: Supply Chain Management.

As per a recent collaborative study by Mckesson, Cerner Corporation, Oracle, Tecsys Inc., Infor Inc., GHX, Jump Technologies, Inc., Logitag Medical Solutions, SAP SE, and Ormed Healthcare Management Information Sys, the global healthcare supply chain management was valued at US$1.27 billion in 2016. By 2025, the value of this market is estimated to reach US$2.56 billion. Most people feel overwhelmed when they hear about the term 'healthcare supply chain management'. Before we dive deeper into industry insights, let's understand the term. Healthcare supply chain management refers to the organisation and management of

resources that are necessary to deliver goods and services to the customer.

The process contains many divisions such as information technology, medical devices, pharmaceuticals and other services that help in the delivery of state-of-the-art medical care to the patients.

Cutting healthcare costs is the top concern that runs at the back of every healthcare professionals mind who runs a hospital or an independent practitioner. Usually managing the supply chain in the healthcare industry is a complex system as it contains fragmented processes. If hospitals and physicians are looking to reduce their medical costs and improve quality, then, an efficient supply chain is a must to improve the delivery of their healthcare services. According to Cardinal Health, healthcare organisations lost up to US$5 billion annually due to waste in the supply chain.

Medical supplies refer to a broad range of products that includes surgical, medical, hospital instruments, prosthetic supplies, disposable medical products, etc. Most of the organisations in the healthcare industry want to be the next 'Uber' or 'Amazon' without understanding the challenges, obstacles, and solutions in their supply chain.

Most of these companies wish that their business model will overthrow the traditional business models and value propositions. Hospitals and clinics use a variety of medical supplies on a day-to-day basis to provide patient care. However, a considerable amount of supplies are dumped in landfills on a daily basis, which adds to the operational cost. A wise tip for hospitals is to be aware of the tools that are used in the hospital and recycle and reuse as many items as possible. This helps to preserve the inventory and saves additional costs for the hospital.

As per reports, the U.S. spends more on healthcare per person compared to any country in the world. Did you know if the U.S. healthcare system was a country, it would have been the sixth largest economy though there would be a sharp rise in the rates of cancer, heart disease, and diabetes? Here are some astonishing facts about the U.S. healthcare system that you must know:

- What the U.S. spent on healthcare in 2009 was greater than the entire GDP of Great Britain
- Healthcare costs accounted for just 9.5 per cent of all personal consumption back in 1980. Today they account for approximately 16.3 per cent
- Approximately 41 per cent of working age Americans either have medical bill problems or are currently paying off medical debt
- Prescription drugs cost about 50 per cent more in the U.S. than they do in other countries
- Nearly half of all Americans now use prescription drugs on a regular basis
- The percentage of women taking antidepressants in the U.S. is higher than in any other country in the world
- According to one survey, approximately 1 out of every 4 Californians under the age of 65 has absolutely no health insurance
- According to numbers released by Deloitte Consulting, a whopping 875,000 Americans were "medical tourists" in 2010
- In 2015, 57 per cent of pharmacists were women

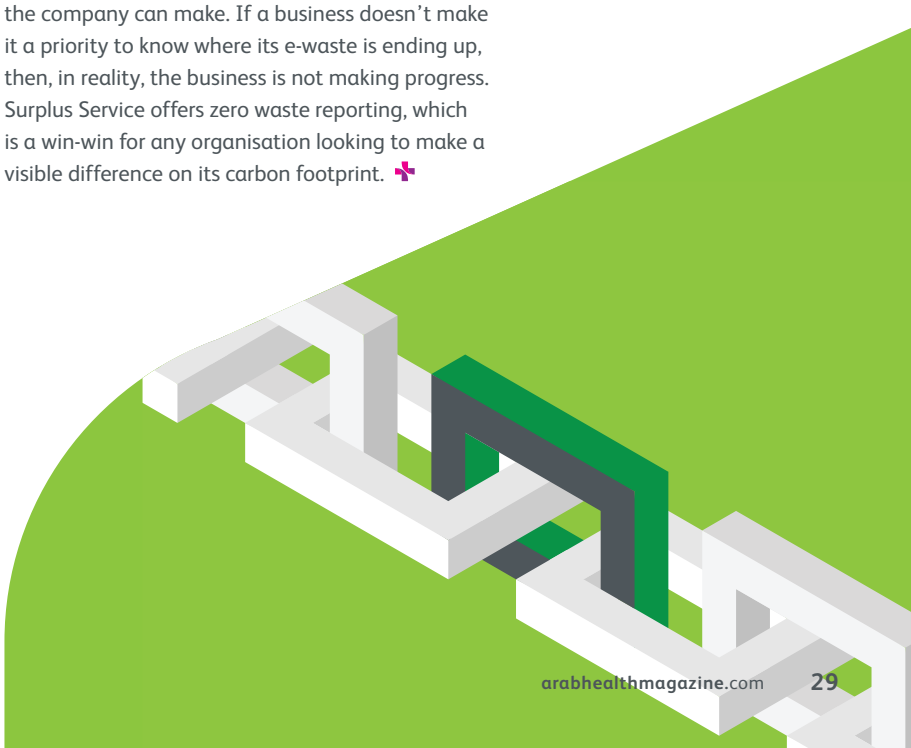
Bringing value

Medical distributors play a key role in the supply chain. From procurement strategies to risk management, they bring real value to the customers. Distributors are the heart of an economy as they bring in key business. When customers trust their distributors, they are likely to place frequent orders with the distributor on a frequent basis.

The problem of medical e-waste is on the rise. Surplus Service - an e-waste management company based out of the Bay Area provides eco-friendly solutions that encourage small and big organisations to reuse electronics instead of dumping them in a landfill that could lead to chemical and environmental damage not just to humans, animals/ birds but the environment as well. By repairing, refurbishing and reusing electronics and medical equipment, the company saves millions of pounds of hazardous, chemical and toxic substances from landfills and the environment in the Bay area.

When businesses are focused solely on profit margins and don't keep track of their true carbon footprint, they often lose sight of the bigger impact the company can make. If a business doesn't make it a priority to know where its e-waste is ending up, then, in reality, the business is not making progress. Surplus Service offers zero waste reporting, which is a win-win for any organisation looking to make a visible difference on its carbon footprint.

If hospitals and physicians are looking to reduce their medical costs and improve quality, then, an efficient supply chain is a must to improve the delivery of their healthcare services.



Critical changes in U.S. medical market place with physician compensation and healthcare delivery

By Carlo Koren, Corporate Vice President, Stratum International LLC, and Bobby Stamper, Valuation Consultant, Pinnacle Healthcare Consulting, Centennial, Colorado

Gain-sharing is a contractual arrangement that sets up a formal reward system in which participating workers share in cost savings resulting from increased efficiency.

The U.S. medical market place has seen significant changes in the last number of years with those changes accelerating with each new year. These changes have affected every segment but especially reimbursement for physicians and physician practices, hospital reimbursement and hospital delivery processes and life science companies – all with an impact on the ultimate market place participant, the patient. Controlling costs and streamlining healthcare delivery have entered into a new age of options, needs and expectations. Understanding those changes are critical both for the delivery of healthcare and becoming more efficient and cost effective.

As reimbursement moves from fee-for-service to pay-for-value, health systems are engaging physicians to help manage patients and processes across the continuum of care. Several programmes developed by the Center for Medicare & Medicaid Innovation specifically discuss compensating physicians for the services they provide. Health systems, however, continue to struggle with how to compensate physicians who refer patients to the health system while still complying with laws that restrict paying physicians more than fair market value (FMV).

Regulatory movement to control cost and quality

We have conducted extensive industry research to ascertain key factors related to shared savings, value-based, pay-for-performance arrangements, and associated physician payments. The U.S. Affordable Care Act (ACA) focuses on moving the healthcare system toward payment models that hold healthcare providers more accountable for the costs and quality of the care they provide, thereby encouraging greater efficiency and improved outcomes. The gain-sharing model is one variant of these systems emphasised under healthcare reform. Gain-sharing is a contractual arrangement that sets up a formal reward system in which participating workers share in cost savings resulting from increased efficiency.

Gain-sharing models were developed in healthcare because of the misalignment of incentives between hospitals and physicians. In the traditional hospital setting, physicians are independent agents who not only use hospital facilities, but can directly or indirectly, knowingly or unknowingly, affect hospital costs. Specifically,

- Reimbursement trends continue to transition from fee-for-service models to quality and cost-focused models.
- Current financial incentives for physicians to practice efficiently in traditional hospital settings are limited.
- Hospitals are seeking innovative ways to partner with physicians in the midst of changing reimbursement.
- Arrangements developed to improve quality/efficiency should have defined at-risk performance metrics.
- Determining compliant fair market value (FMV) physician compensation plans for value brought through clinical co-management or hospital efficiency arrangements is a challenge for hospitals.

physicians may unknowingly increase hospital costs through unnecessary use of supplies (e.g., disposable surgical supplies), use of expensive devices (e.g., stents and implants), and inefficient use of hospital resources (e.g., operating room time). Furthermore, physicians may also knowingly increase hospital costs by, for example, ordering additional testing. Additional tests could be duplicative and/or inefficient.

Gain-sharing and other shared savings-focused programmes offer one potential solution to remedy misalignment of hospital and physician incentives. Gain-sharing works by providing physicians with a financial stake in controlling hospital costs. Specifically, in a hospital-physician gain-sharing programme, hospitals offer physicians a share of cost savings achieved by the hospital as a result of the physicians' behaviour or decisions. Therefore, gain-sharing differs from a pay-for-performance or incentive programme, in which payments are made for a certain behaviour (e.g., meeting certain quality standards or adhering to quality protocols). However, recent industry information and trends indicate that models combining both cost savings incentives (i.e., gain-sharing) and quality incentives are becoming increasingly prevalent. Notably, the recent Sustainable Growth Rate (SGR) legislation added the words "medically necessary" to modify the term "services" cited in 42 U.S.C. 1320a-7a(b)(1). As a result, the gain-sharing civil monetary penalty (CMP) only applies to payments that induce the reduction or limitation of "medically necessary" services. This change arguably makes gain-sharing programmes between hospitals and physicians less restrictive than previously.

OIG Advisory language

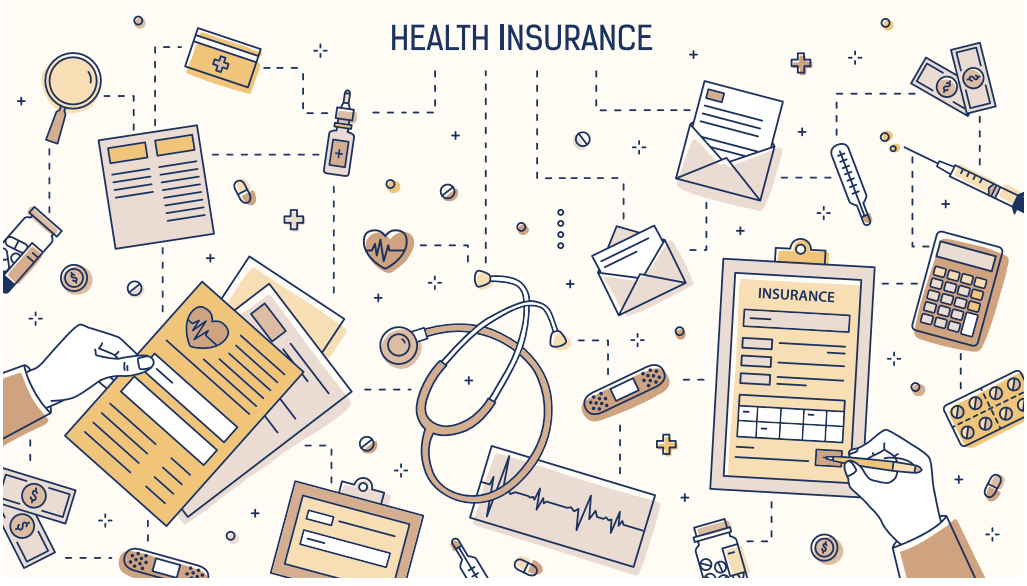
Given the trend toward arrangements based on cost and quality, we also recently reviewed Advisory Opinions issued by the Office of the Inspector General (OIG) pertaining to an arrangement involving incentive payments for physician services (in that instance, co-management services). Although such guidance pertains only to the particular parties requesting the advisory opinion, information contained therein provides helpful insights related to similar arrangements. In the instance reviewed in Advisory Opinion 12-22, physicians were to receive incentive compensation for their management services for three years as part of an arrangement with an acute care hospital. The physicians' remuneration for such services included performance-based payments at graduated levels depending upon the pre-defined metrics achieved.

As part of its analysis in this Advisory Opinion, the OIG identified several key considerations that are particularly pertinent for these types of arrangements, including the following:

- Incentive compensation arrangements are designed to align incentives by offering physician

Recent industry trends indicate that models combining both cost savings and quality incentives are becoming increasingly prevalent.

Properly structured arrangements may increase efficiency and reduce waste, thereby potentially increasing a hospital's profitability.



compensation in exchange for implementing strategies to meet quality, service, and cost savings targets.

- Properly structured arrangements that compensate physicians for achieving hospital cost savings can serve legitimate business and medical purposes. Specifically, properly structured arrangements may increase efficiency and reduce waste, thereby potentially increasing a hospital's profitability.
- However, such arrangements must be evaluated in light of applicable regulations and the potential for abuse. Furthermore, such arrangements should not influence physician judgment to the detriment of patient care.

Reimbursement determination for shared savings

To assess the FMV attributable to assisting a hospital in achieving quality improvements in outcomes and patient satisfaction, we have reviewed various quality bonus programmes currently offered by public and private insurance payers to providers. With the establishment of the Medicare Shared Savings Program (MSSP), general industry sentiment is that reimbursement will continue to move from fee-for-service to some form of hybrid payment based on volumes and quality with certain models geared toward population health management. Furthermore, when the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) was passed, the sustainable growth Rate (SGR) to the Medicare physician fee schedule was repealed. As a result, in 2019 MACRA requires CMS to use a new adjustment, the Merit-Based Incentive Payment System (MIPS). The MIPS will shift payments to physicians who meet payment requirements based on quality and value and move reimbursement away from the fee-for-service model.

Other new payment models

In addition to gain-sharing, Medicare is testing several different payment models both independently and with non-governmental insurance companies. These models include:

- Accountable Care Organizations (ACO);
- Oncology Care Model (OCM);
- Bundled Payments for Care Improvement Initiative (BPCI); and
- Comprehensive Care for Joint Replacement Model (CCJR).

Each of these models was developed with the goal of reducing the cost of healthcare. ACOs are compensated based on the ACO's ability to generate savings for patients insured by Medicare through the management of each patient's care. The OCM, BPCI, and CCJR programmes pay a fixed amount for care (i.e., a bundled payment), which requires the providers receiving the payment to operate efficiently and at a high-quality level to maximise profits. Under each of the models, hospitals and physicians must work together to succeed in maximising profits while still providing quality care to patients.

Under each of the models, hospitals and physicians must work together to succeed in maximising profits while still providing quality care to patients.

Contracting with providers to enhance efficiency and quality

Many hospitals have engaged physicians through clinical co-management (CCM) agreements to help the hospital operate a specific programme (e.g., cardiology, orthopaedic surgery) efficiently

to improve quality and reduce costs. CCM agreements pay for time spent providing actual management services and additional compensation for achieving improvements in reducing costs, improving quality, and realising efficiency. A number of hospitals that have engaged physicians through CCM agreements have employed the physicians subject to the CCM agreement.

Other organisations have shied away from engaging physicians specifically in management services and are developing hospital efficiency programmes (HEPs) through which a pool of funds is distributed when certain targets around the care of patients or the operations of the hospital are met. These HEPs often include requirements for physicians to participate in committee meetings to define, measure, and implement various efficiency and quality goals of the HEP, as well as a set of management-type duties more focused on clinical functions that are often completed during the course of the day-to-day activities of the physicians.

When determining the amount of funds in the pool available to compensate participating physicians, most professionals will determine an FMV hourly compensation for the specialty of the physician who provides the services and the number of hours necessary to provide the services. Except for committee participation, quantifying the number of hours under a HEP is difficult at best.

Typical goals and/or metrics of HEPs often include, but are not limited to:

- Reducing supply costs per inpatient discharge,
- Improving episodic care management capabilities,
- Improving hospital 10-day readmission rates, and
- Reducing the incidence of hospital acquired infections.

Much like the industry is now seeing fee-for-service evolve into value-based payment and CCM into HEPs, HEPs are likely to further evolve into other integrated programmes designed to achieve reduced costs, improve efficiency, and enhance quality of care across the continuum, such as clinically integrated networks.

Conclusion

One continuing challenge is determining compensation to physicians for the value brought through these hybrid services in accordance with OIG guidance and FMV standards. Working to quantify this value should consider numerous factors including, potential cost savings; health impacts on patient populations; impacts on government pay for performance models; and physician time and work effort. Ultimately, the transition from fee-for-service models to quality and cost-focused models continues across the healthcare system. This transition has brought about the need for innovative yet compliant payment models to encourage engagement and improvement for all stakeholders across the continuum of care.

The transition from fee-for-service models to quality and cost-focused models continues across the healthcare system.

The challenges of implementing healthcare analytics

By J. Bryan Bennett, Executive Director, Healthcare Center of Excellence

Healthcare analytics has the potential to help identify possible health risks, promote better health and deliver more accurate diagnosis and treatment plans. There are several challenges that must be overcome before healthcare can deliver on that promise.

Let's first agree on the kind of healthcare analytics we are discussing. It's a broad term and can mean different things to different people. In fact, companies have been performing some kind of healthcare analytics for years, primarily around revenue cycle and claims data. For purposes of this discussion, we are looking at predictive analytics that is the basis for real-time or near real-time decision support. This kind of analytics is still rare among healthcare organisations. In fact, Heather Fraser from IBM's Institute for Business Value, states that "many organisations say they have some kind of strategy for implementing predictive analytics, but most are not looking at it from an enterprise standpoint or as an enabler to corporate strategy." This siloed approach will make it difficult for them to share information across the entire healthcare system if they can't share within their four walls.

There are two levels to healthcare predictive analytics. The first one, or what could be considered the 'low hanging fruit', is using risk factors to determine a patient's propensity for certain health problems. These are the one-to-one or two or three risk factors that may lead to the problem based on lifestyle, ethnicity, family history or health condition. For instance, if a person is a smoker there is strong evidence that they may develop lung cancer or cardiovascular disease. This kind of analysis is fairly easy and can usually be performed in most of the major EHR software solutions.

The second level is much more challenging. This is the kind of analysis that involves hundreds or thousands of patients with similar profiles and health conditions, which alerts the provider to the likeliness of a patient developing or having a particular health problem. The challenge here not only comes from incorporating all the other non-identifiable patient data, but also the volume of data that may be required for each patient. Additionally, at this point, no one really knows which data elements would be the most predictive. In other industries, you can start with a FICO score or life-stage or other segmentation and build upon that. In healthcare, we have several factors from demographics to healthcare condition, each with potentially hundreds of variables, which could be predictive. The computing power to manage this will be tremendous.

That leads to another challenge – the data warehouse. Most healthcare organisations are pretty weary from implementing and paying for their EHR solution, but that's only the beginning of the technology transformation. The next step is getting the clinical data from the EHR, the claims data, the operations data and ambulatory data into one place where it can be analysed. To some, this may sound easy, but the volume of structured and unstructured data, regularly extracted and loaded will be a huge burden for many. It is a level of data an order or magnitude that most people can't comprehend. Fortunately, there are companies that help make the process a lot easier with data loading and analysis processes. They are usually able to scale their process to large and small healthcare organisations so that we don't end up with the system of haves (large groups) and have nots (small groups).

This is not to say that predictive analytics for real-time decision support shouldn't be pursued. Some companies like the ones I've previously mentioned as well as others are making some progress. Many organisations are already seeing some progress in predicting strokes, congestive heart failure and other health problems through their applications. This is not an overnight transformation; it is something that will take years. Whenever it gets here though, it will be a game-changer, which will help us all live a longer, healthier life.

Many organisations are already seeing some progress in predicting strokes, congestive heart failure and other health problems through their applications.

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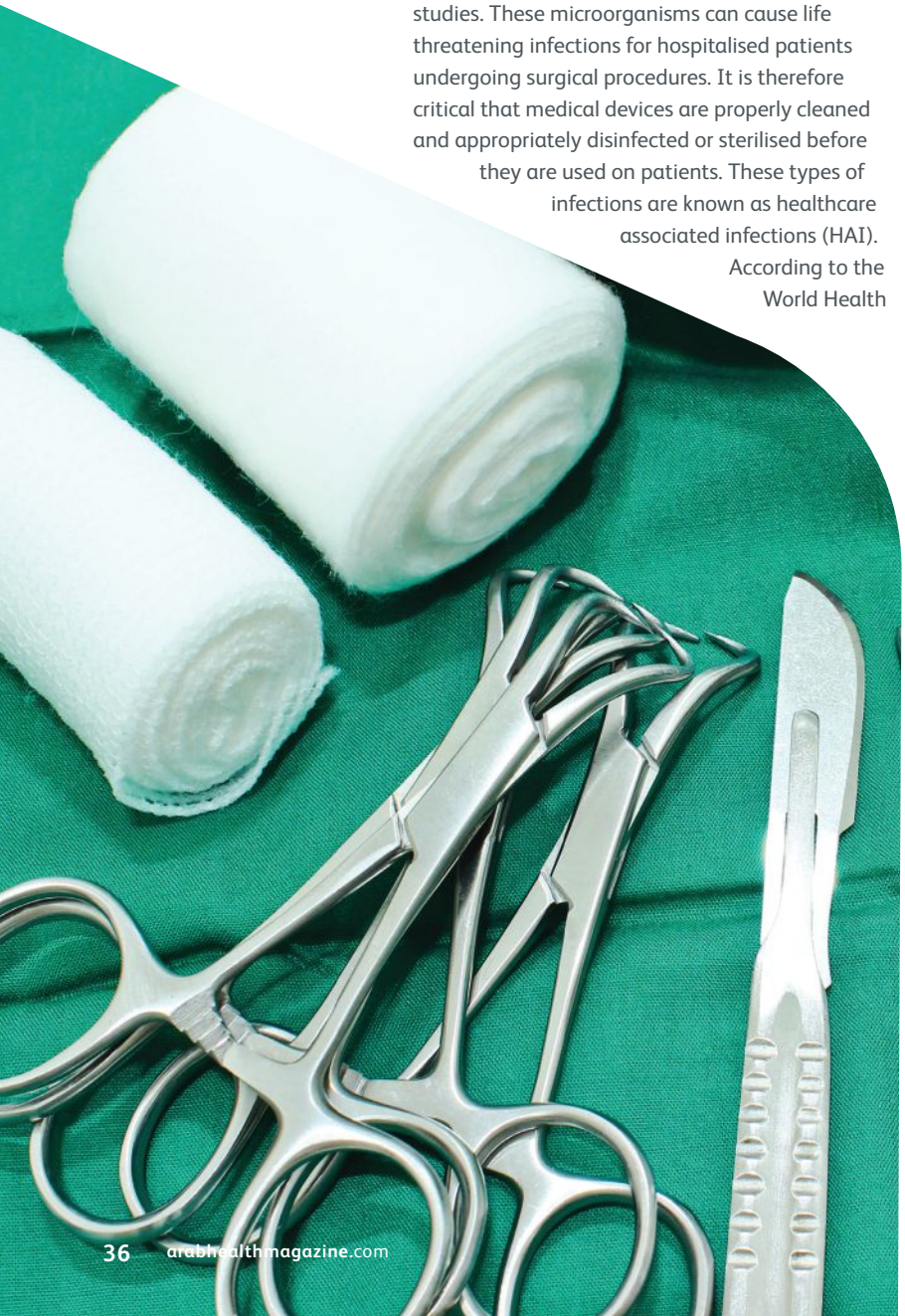
How can we reduce risk and improve medical device reprocessing in low- and middle-income countries?

By Michelle Mutch, Gauteng CFSA Chairperson, and Xana Jardine, National CFSA Chairperson, South Africa

What is the risk?

The potential transmission of pathogenic micro-organisms (disease causing micro-organisms) such as Hepatitis B and C, Pseudomonas, Tuberculosis and Carbapenem-resistant Enterobacteriaceae have been reported in a variety of published studies. These microorganisms can cause life threatening infections for hospitalised patients undergoing surgical procedures. It is therefore critical that medical devices are properly cleaned and appropriately disinfected or sterilised before they are used on patients. These types of infections are known as healthcare associated infections (HAI). According to the World Health Organisation (WHO), surgical site infections are the most frequent type of HAI in low- and middle-income countries. The WHO also states that between 1.2 to 23.6 per cent per 100 patients undergoing surgical procedures develop surgical site infections in lower- and middle-income countries.



The ability of a microorganism to cause an infection in a patient depends on how virulent it was, how many were present, how susceptible the patient was and if there was a portal of entry into the patient. A contaminated medical device could facilitate a portal of entry for a pathogenic microorganism. If a patient develops a HAI it places a significant burden on the healthcare system. It will affect the patient's length of stay in hospital, which could result in increased medical costs for the patient and his family, and it could cause long term disabilities or death of the patient.

The prevalence of HAI in sub-Saharan Africa is much higher (between 6.7 and 28 per cent) than in Europe. A patient with a predisposed infection like human immunodeficiency virus (HIV) or tuberculosis (TB) who undergoes a medical or surgical procedure with a poorly decontaminated instrument will, therefore, have an even greater chance of developing a HAI.

An important point to consider is that approximately 81 per cent of the 7 billion people in this world live in low and middle-income countries. Low and middle-income countries have resource constraints, which often prevent them or inhibit them from following international recognised repossessing guidelines.

Preventing HAI associated with contaminated devices should be a priority for all countries especially low and middle-income countries with resource constraints.

What is the solution?

One solution is to follow manufactures instructions for use and create Standard Operating Procedures. Not all medical devices are cleaned and sterilised in the same manner, which is why it is important

to follow the MIFU (manufacturer's instructions for use). If the MFIU are not followed correctly it could result in direct harm to the patient and could also result in damage to the device itself. Some medical devices require more reprocessing steps than others, which could include the reprocessing instructions for brushing, flushing and ultrasonic cleaning for example.

Another way to prevent outbreaks of infection associated with contaminated medical devices is to ensure that those persons tasked with decontaminating devices are well trained or educated in their field. It is the responsibility of the healthcare institution to train their staff, and the training should be based on various manufacturers' instructions for decontamination.

In the South African context, groups and pockets of Central Sterile Services Department (CSSD) staff (those responsible for decontamination) took it upon themselves to come together in various regions to share their knowledge and experiences. In addition, they organised presentations by device manufacturers that were able to assist the healthcare institutions by providing in-service education and training materials.

The CFSA

In 2013, the pockets of CSSD staff were united into a national organisation known as the CFSA (CSSD forums of South Africa). Prior to the formation of the CFSA, CSSD departments were like lost souls, with each unit trying to do the best they could with the knowledge that had been collected over the years with in service training and reading.

The first national event was a congress hosted at the Africa Health in 2013. Partnering with Africa Health has facilitated a basis for learning, being exposed to local and international best practices. As noted by the author "it felt as if we all had purpose and we realised that we did not have enough information or proper reference guides to do our work optimally".

Regular regional CSSD forums are hosted throughout South Africa every year. CSSD's now have a network through which they could communicate and share knowledge, uniting staff from different hospital groups in both the private and provincial sector. The CFSA standard operating procedures where written and CSSD practices are based on scientific knowledge and not just on assumption.

The CFSA has become a formidable body that grows every year in association with Africa Health. We are exposed to the latest scientific information and research and with our national chairperson attending international congresses and bringing the knowledge home.

Although we have come a far way in our practices we need to grow even further, this can only be done together as a collective society. As the CFSA grows in strength we hope to share our knowledge with all who want to learn from us on the African continent and beyond.

References available on request.

Another way to prevent outbreaks of infection associated with contaminated medical devices is to ensure that those tasked with decontaminating devices are well trained or educated in their field.

Considering e-patients in the age of digital consumerism

By Vanessa Carter, e-Patient and hcsm Consultant

As our world becomes increasingly connected to the Internet, more citizens using these technologies are relying upon them daily. Whether we use our smartphone to summon a taxi, reserve a flight, book that last-minute accommodation, manage our finances, order food, purchase a bestseller, search for our soul mate, apply for a job or claim fame through a self-made video channel, no matter where we are globally none of us can deny that the Internet has changed our lives. This is the age of digital consumerism. We are all becoming ever-demanding digital consumers who expect more from our service providers than ever before and who can manage almost every aspect of our daily lives on a phone.

The question is, "Could digital consumerism have an impact on the way we manage our health?" Consumer technologies can and are already benefiting healthcare in numerous ways. A valuable example is telemedicine platforms where patients and doctors use video to consult virtually, saving them both time and money as well as the heavy burden of travel for the sick patient.

Telehealth can also be a means to reduce congestion in overcrowded health facilities. In low-to-middle income countries (LMICs) this is particularly important in rural areas where the distance to travel to a hospital can take hours, if not days. A further example is the development of health-specific platforms, which curate resources for patients. These resources could include disease education, patient communities or tools to track their condition. One such example is *www.inspire.com*, which offers a much more controlled environment for patient groups to network compared to public websites like Facebook. Considering the dynamics of searching for reliable, fragmented medical information on the web, platforms like Inspire also empower patients by providing them with access to content much faster because it is curated in a central place.

The first website, Tim Berners-Lee's description of the World Wide Web project, went public 28 years ago on August 6, 1991, and as the web expanded globally it gave patients access to a plethora of medical information. The latest estimates from organisations such as the International Telecommunications Union (ITU) suggest there are now 3.2 billion people using the Internet in 2019. This caused some chaos in healthcare as patients began to self-diagnose or question their doctor's opinion often based upon dubious information. Because of this phenomenon, the term cyberchondriac was coined, which was a combination of two words: "cyber and hypochondriac" as then documented in the Oxford Dictionary during this era in the 1990's. The idea of patients having access to medical data online was disputed for years afterwards and continues today almost three decades later, even though technology is improving for patient empowerment exponentially.

Modern e-health innovators are providing online solutions that address the quality of information and tools patients use.

Evolution of the e-patient

Whilst the world wide web is still populated with both accurate and inaccurate content, otherwise known as "fake news", modern e-health innovators are providing online solutions that address the quality of information and tools patients use. The medical web is becoming more sophisticated and will continue to do so along with patients who are using them. Would it make sense then to continue classifying every digital patient as a cyberchondriac? Dismissing the data that they collect electronically, especially when these types of Internet connected devices extend to wearables and mobile applications, which they engage with daily? Connected devices that transfer data back to their Electronic Health Records (EHRs) so their medical providers can make more informed decisions? Telling these patients to stop collecting data because they are cyberchondriacs would be counterproductive to e-health.

Many alternative terms have been used to explain digital patients since the emergence of the word cyberchondriac, which include patient 2.0, but theoretically this only describes the type of web technologies the patient is using, which in this circumstance is web version 2.0. During

the next generation of the web (web 3.0), that would evolve to the term patient 3.0. It doesn't describe this digital health citizen in terms of the many other dynamics required for good health outcomes, including the behaviour of the patient and relationship with their care providers, which has been a cornerstone of practicing modern medicine for centuries.

In 1999, a few short years after the word cyberchondriac emerged, the term e-patient was coined by Tom Ferguson, MD, to describe individuals who were equipped, evaluating, enabled, educated, empowered and engaged in their health and healthcare decisions. He began work on a white paper, commissioned by the Robert Wood Johnson Foundation to describe this phenomenon. During his research, he documented how patients were using the Internet to empower themselves. He also categorised them into different patient population groups based on varying criteria, which considered factors like their digital divides and medical circumstances, which affected the way they participated online. Never had such an in-depth study been conducted. Whilst Dr. Ferguson had defined healthcare consumerism as a means to improve medicine using technology, he believed e-patients could further partner with their healthcare providers in various ways including through medical research and shared-decision making. He believed that recognising this new digital stakeholder as an equal partner in the system was important to improving health outcomes and the future of digital medicine.

In the real world, consumerism has been defined in different ways including that it is a social and economic order that encourages the purchase of goods and services in ever-greater amounts and it generally only values the interests of the buyer (i.e. consumer). In this digital age, people are exposed to mass consumerism and product placement in the media or even in their daily lives. The line between information, entertainment, and promotion of products has been blurred so people are more reformulated into consumerist behaviour. Therefore, something to consider is whether calling a recipient of healthcare a 'consumer' as opposed to a 'patient' could have distinct connotations and therefore result in differential behaviour.

Whilst healthcare can learn from these digital consumer trends, the e-patient concept helps to ground those consumerism ideologies. For example, many platforms are developed with very limited consideration for what the patient truly needs and therefore, some leading organisations including pharmaceutical companies have created partnerships with patients to co-create their innovations and in doing so have been able to deliver more meaningful solutions.

Such an example is the 'Speak your Migraine' platform, developed in partnership with Novartis Europe and patient groups, which also offers a mobile application to track migraines. Whilst consumerism is heavily focused on all the "bells and whistles", "the faster, the bigger, the cheaper, the better", patient empowerment is focused more critically on meeting the patient's individual human needs. E-patients are not about consumer-centred innovation, it is about patient-centred innovation, and that's far more personal. Going back to the question then, "Could digital consumerism have an impact on the way we manage our health?"

As an e-Patient activist and from a personal perspective I would say yes, consumerism can teach us lessons as healthcare enters digital transformation, but I think we shouldn't lose sight of what we have achieved as human beings in modern-medicine before trying to commercialise and industrialise it completely.

E-patients are not about consumer-centred innovation, it is about patient-centred innovation, and that's far more personal.

Entirely new healthcare models offer global investment opportunity in telemedicine

By Lizette Alvarez MBA, Chief Operating Officer & Steve Stumpf, Ed.D, Founder, Health Core Possibilities, www.healthcorepossibilities.com

Conventional wisdom for capitalising on telehealth suggests joining forces, partnering, and acquiring innovative practice groups to create leading edge mergers and start-ups.

"Invest in innovative technologies where systems own a piece of a technology platform. This enables the organisation to have a say in the software development and ensures that it is customised to their needs. As a result, organisations are showing ROI and not an ongoing expense for payment of subscription fees," says Christopher J. Donovan in T*elemedicine Investors Roundtable Focuses on Progress, Barriers, and ROI, Health Care*

Law Today Blog.

What if any investment in buying or creating new technology was prerequisite to occupying a prime seat in the radical overhaul of how healthcare will be conducted? What if the move was to simply utilise social media to transform healthcare by employing what are ordinary and commonplace communication platforms for most people?

Consider the February 2019 acquisition of asynchronous provider Sherpaa Health by synchronous provider group Crossover Health. Joining forces, partnering, acquiring practice groups like Sherpaa present opportunities for mergers and start-ups.

Investment opportunities in telemedicine/telehealth's past have faced a steep uphill climb. Over the past two decades, the more radical the change in how healthcare might be conducted the steeper the slope to adoption by legacy healthcare entities. That hill is flattening out. More opportunities with a corresponding rise in entirely new healthcare models are presenting themselves. One of the most transformative new treatment models is asynchronous care.

Asynchronous care

"Asynchronously means in which the patient and the clinician need not be communicating at the same time. This contrasts with synchronous technologies, in which patient and clinician must communicate at the same time," says Chan, Torous, Gratzer, Yellow from Curr Psychiatry Rep. 2018 Aug Review of Use of Asynchronous Technologies Incorporated in Mental Health Care.

The definition is simple. The understanding is seismic. The patient and the physician communicate with each other without speaking or otherwise communicating simultaneously. To be simple and clear, interaction between the provider and the patient can take place at different times using platforms exactly like those that are commonplace in social interaction: texting, Instagram, websites, Facebook, Tumblr…you get the picture.

Two companies currently reaping the financial benefits by fully embracing asynchronous communication are Crossover Health and Sherpaa Health. Both are located in the U.S. Crossover Health is located in San Clemente, California, and was founded in 2019. They design and deliver membership based primary health care services to self-insured employers. Built on non-fee for-service business model, it serves some big-name large employers such as Apple and Facebook. Crossover purchased Sherpaa in February 2019.

The Sherpaa Health platform was developed by Jay Parkinson, MD, in 2012. Using text, Sherpaa delivered healthcare consultations to subscribers using asynchronous communication between patients and providers.

The Crossover Health model has been widely adopted across many providers and insurers. It is commonplace for established provider groups and insurers to provide a web portal so that the insured and the provider may communicate about appointments, lab reports, patient requests and patient/MD feedback. The new acquisition signals the newest model in delivering services, "in person, online and anytime," a report in Cision PR Newswire highlighted.

"The ability to leverage the trust achieved by Crossover Health in its physical health centre model, and seamlessly to extend that trust through the digital practice capabilities of Sherpaa, creates a singular care delivery vehicle able to offer primary care anywhere," says Dr. Parkinson, Founder of Sherpaa Health.

Challenges

Telemedicine/telehealth has used asynchronous models for decades by taking advantage of the ability to transfer images over the web. For example, any service that relies on imaging such as dermatology, ophthalmology, radiology has benefited from posting media to secure platforms. A "charting" module often accompanied the image so the physician could make notes and grade severity. Since the early 1990s such was considered a radical up ahead of the mainstream; long before Facebook, Instagram and similar popular and standard communication platforms took over daily lives. The jump to conducting primary care communication, however, via apps, messaging, and SMS presents a move towards embracing the social mainstream.

A big hurdle in investing in telehealth/telemedicine in the past was that in the minds of providers and payors; telemedicine platforms targeted patients and providers in remote areas, "distant" medicine. Investment meant funding sufficient Internet bandwidth – the "pipeline" – that was often absent. More costs without the returns was an inhibitor. The Sherpaa and Crossover team demonstrates that having to deliver health services remotely is not the main consideration. SMS and phone apps can be used effectively by healthcare companies. Parkinson has stated that 70 per cent of health concerns can be treated under the Sherpaa asynchronous model. Synchronous communication is no longer essential to provide quality care.

Asynchronously means in which the patient and the clinician need not be communicating at the same time. This contrasts with synchronous technologies, in which patient and clinician must communicate at the same time.

Opportunities

A current opportunity for investment in this model comes with the announcement by the Centers for Medicare & Medicaid Services (CMS). As the single largest payer for healthcare in the U.S., anything (CMS) does to expand payments to new technologies is seismic.

"Telehealth/Telemedicine services can be billed by code HCPCS code G2010, which outlines reimbursement for "remote evaluation of recorded video and/or images submitted by an established patient." HCPCS G2012 outlines reimbursement for "brief communication technology-based service, e.g. virtual check-in." George McLaughlin sees this new CMS policy stimulating telemedicine and remote patient monitoring which, he believes, will skyrocket in 2019.

Behavioural health, post-acute care, senior housing and chronic care management… all areas expected to see significant growth in telemedicine.

Investing in sectors of healthcare

Globally, the most likely sectors in which healthcare groups should invest are "behavioural health, post-acute care, senior housing and chronic care management…all areas expected to see significant growth in telemedicine."

These are the medical domains which will attract asynchronous care because these do not require real time responses. Parkinson realised this in 2012. Seven years later his company – and his idea – were bought out. He is now the Chief Designer at Crossover Health.

Conclusion

As early as 2017, the UAE's telehealth investment strategy was to begin with on demand or synchronous care and with time a solid foundation to expand to asynchronous care. Also, a different combination of payment models was offered such as membership or pay as you go.

For instance, HealthatHand offers patient to doctor video consultations. Founded in 2016 and based in UAE, Founder and CEO Charlie Barclay says, "unlike the U.S. or other international markets, the Middle East's telehealth landscape is relatively immature in terms of both regulation and competition."

A partnership of established healthcare such as Abu Dhabi Telemed Centre, and the Swiss tech company Medgate became a powerful trio by accepting the UAE's leading private insurance Daman Health.

It is beautiful to see the myriad of possibilities in telehealth's asynchronous care model. Why be limited by the Uber on demand model while there is a common market that waits, and needs the care minutes, days or when they desire later. Not at this second.

Opportunity abounds in merging readily available models by merging them with established healthcare and a good digital platform that not only streamlines but accelerates the service delivery without having to be remote, on demand, or just privately paid for as in the past.

Will your healthcare investment become the next Crossover/Sherpa, myhealthathand.com or Abu Dhabi Telemed Centre/Medgate success story?

References available on request.

Invest in the future, invest in healthcare

By Abhishek Sharma, CEO, Foundation Holdings

As with any industry, investing in healthcare is multifaceted. With companies seeking to expand into new verticals, the one sentiment that continues to echo is that healthcare is a fundamental need, and as such, it deserves strategic, sustainable and well-planned investments.

Abhishek Sharma

Investing in healthcare, including hospitals, insurers and MedTech firms, make for excellent "all weather" investments i.e. investments that achieve capital gains in all types of investing environments. Fundamental forces have long made healthcare such a compelling investment: an ageing population, the rising prevalence of chronic disease, the continuous development of innovative drugs and devices, and a still fragmented delivery system that is ripe for innovation, disruption and consolidation.

The population of the GCC region is estimated to jump by 6.6 million to 61.6 million people, 17 per cent of whom will be 50 years old and above, by 2022. This will exert pressure on the existing healthcare system, and therein lies the opportunity for healthcare companies to rapidly scale up their offerings and meet the demand.

Healthcare expenditure in the Middle East amounted to US$76.1 billion (AED279.5 billion) in 2017 and is expected to reach US$104.6 billion (AED384.2 billion) in 2022, according to a report by Alpen Capital. In the GCC region, healthcare spend is projected to rise by 6.6 per cent year-on-year – faster than the global average – with the UAE forecast to account for 25 per cent of this growth by 2022. Unsurprisingly, the region is attracting attention from industry leaders, investors and corporate buyers globally.

Strong fundamentals

Historically, the governments of the GCC have provided strong leadership in continuing to evolve the provisioning of healthcare services in the GCC to address gaps in supply and quality. However, many governments have come to realise that continued heavy investment in healthcare is an economic ordeal, as costs continue to outpace GDP. In times when sustainable investment opportunities are limited, new avenues are always welcome.

The UAE and Saudi Arabia are likely to dominate the sector with a projected combined share of over 80 per cent of the regional healthcare expenditure in 2022. The governments of the two countries have demonstrated their intent to improve their respective healthcare spaces in their national transformation plans, the UAE Vision 2021 and the Saudi Vision 2030, respectively. This top-down focus on healthcare has provided an impetus for growth. Government programmes ranging from public private partnerships to regulations are designed to foster the inclusion of private sector providers to both relieve the burden on the public sector and become a source of diversification and growth of a knowledge-based economy.

Risks and returns

The intensifying public discussion on healthcare and the complex web of regulations across the region make it a challenging investment field. Investors cannot go in blindly – they require a technical understanding of the scientific and regulatory developments in the respective markets.

In a high-valuation environment, investors and PE funds can't rely on multiple expansion alone to generate returns. When funds can execute a credible plan for margin growth immediately after they acquire a target, they can create a virtuous cycle of value creation.

Apart from playing the long game, investing in the healthcare space is also not completely about returns. Certain investments could fall under impact investing – that is, investing in companies, organisations or funds with the intention to generate measurable social or environmental benefits in addition to financial returns.

As indicated by the earnings per share growth across the sector in the region, which currently stands at 24 per cent, healthcare is poised to remain a high-yield investment domain. Historically, stocks in the sector have performed favourably in the regional indices, recording an average return of double digit returns over a multi-year period.

The exit opportunity

Identifying the right time to exit is the cornerstone of any investment strategy. Traditionally, private equity firms have made way for corporate buyers and other healthcare groups seeking expansion, whether geographical or sectoral.

For instance, the acquisition of Abu Dhabi-based Al Noor Hospitals Group by South Africa's Mediclinic in 2015 boosted underlying revenues to AED1.77 billion in one year, representing a 35.54 per cent growth. Similarly, NMC Health acquired a 70 per cent stake in CosmeSurge and related businesses for US$170 million from Emirates Healthcare Group, and an 80 per cent stake in Riyadh-based Al Salam Medical Group for US$37 million.

Keeping an eye on the growing consolidation will enable funding institutions to diversify their investments across the sector, thus staying relevant and competitive.

References available on request.

Telerehabilitation in resource constrained countries

By Sona Ayanikalath Ph.D., Supervisor of Speech Language Pathology, Sheikh Khalifa Medical City, Abu Dhabi, UAE

TR has considerable potential in resource constrained countries to address the treatment gaps.

Telerehabilitation (TR), which is the use of digital technologies to provide rehabilitation services from a remote location, a solution for the increasing demand being placed on the healthcare sector, constitutes a small part of the literature on telemedicine, with very few studies being reported in resource constrained countries.

The literature indicates that while telemedicine offers great opportunities to healthcare in general and for rehabilitation services, it could be particularly beneficial for resource constrained countries, where access to basic healthcare is compromised by lack of services and skilled professional care, by providing access to medical services in any part of the country or the world.

With an increase in the various disorders such as cerebro-vascular accidents, traumatic brain injury, developmental delays in paediatrics, etc., that require rehabilitation interventions like physiotherapy, occupational therapy, speech language pathology and the like in resource constrained countries, and considering their dearth, a new method such as TR needs to be considered for their intervention.

Despite increased reporting about TR research, many clinicians are still not using it, which may be due to the lack of knowledge, technical skills, understanding or its accessibility. Clinicians who have used video-conferencing, Skype, email and telephony for work have been driven by local need and the availability of infrastructure. TR has considerable potential in resource constrained countries to address the treatment gaps, but while this is theoretically feasible, attempts to implement it in public sector facilities have not been very successful.

In 2014, the Abu Dhabi Telemedicine Centre launched a round-the-clock telephone service that connects patients to nurses and doctors throughout the region. The Department of Health- Abu Dhabi currently has regulations setting minimum standards for telemedicine.

The Dubai Health Authority (DHA) has also taken an important step towards modernising the Emirate's healthcare industry with the passing of Administrative Resolution No. 30 of 2017 concerning the Regulation of Telehealth Care Services (the "Telehealth Regulations"), which sets out minimum standards and requirements for the provision of telehealth services across Dubai. Consideration has to be given for health insurers and health maintenance organisations to

cover the cost of healthcare services provided through telerehabilitation on the same basis as those provided through in-person visits, which can further supplement the implementation of TR.

Benefits of TR

The main benefit of TR is that treatment can now be accessed from patients' homes or primary healthcare centres in remote areas. This is done by improved online infrastructure and increasing Internet connectivity or by making the country digitally empowered in the field of technology, with three core components of digital infrastructure, delivery of services digitally and digital literacy with increased connectivity in under-served areas with high-speed internet networks, which will make TR possible for people throughout a country.

In addition, treatment through this new mode has now become cost effective since it reduces the need for patients to travel to the hospitals to meet a physician or to a centre for various rehabilitation services. It is convenient for patients who experience constraints that affect their ability to travel. Another benefit is the continuity of care technology provides. The professional can access the patient from where he/she is and vice versa, if they are moving places within the country or outside the country. TR will be welcomed by patient and/or their caregivers as it will give them access to healthcare services that are not locally available, and which they might not otherwise have benefited from. Parents will feel empowered while doing speech language therapy through TR and will want to learn and interact more during the sessions.

Technology used

Skype or other applications such as Hangout and Facetime on iPhone are the most commonly used internet applications used by TR personnel. However, there are many TR platforms (video-conferencing space that allows a professional to host a session) available in business in the U.S. and also various companies that specialise in providing TR.

Challenges of TR

One of the major concerns that have emerged in relation to telemedicine in general, is the potential risk associated with the digital transmission of patient records. As such, creating reliable safeguards for the protection of sensitive patient data was one of the primary objectives for introducing a modern legal framework. Accordingly, there needs to be adequate measures taken by telemedicine and TR care providers to ensure the protection of patient data and privacy.

Another issue is if TR will be accepted by other professionals. It has been identified that service provision through TR was not widely accepted by health professionals in some countries. One main reason was that a physician would not want to liaise with another, which may be due to professional rivalry as well as a lack of awareness regarding its effectiveness.

Concerns over the severity of a patient's condition are evident, which can affect the effectiveness of TR. Paediatric cases with attention deficit or poor eye contact posed a challenge using TR; however, a trained aide can be used at the site of the patient to assist in such situations. The most common issues faced during TR sessions can be power failures, low bandwidth and poor Internet connectivity, with power outages in resource constrained countries. While remote TR personnel may have good Internet connectivity and no power failures, this may not be the case for the patient. This is compounded by old devices, such as the laptop or a personal computer, which can hinder the audio-visual clarity at both ends. In addition, the computer literacy of patients and caregivers can also pose as a challenge.

TR in education

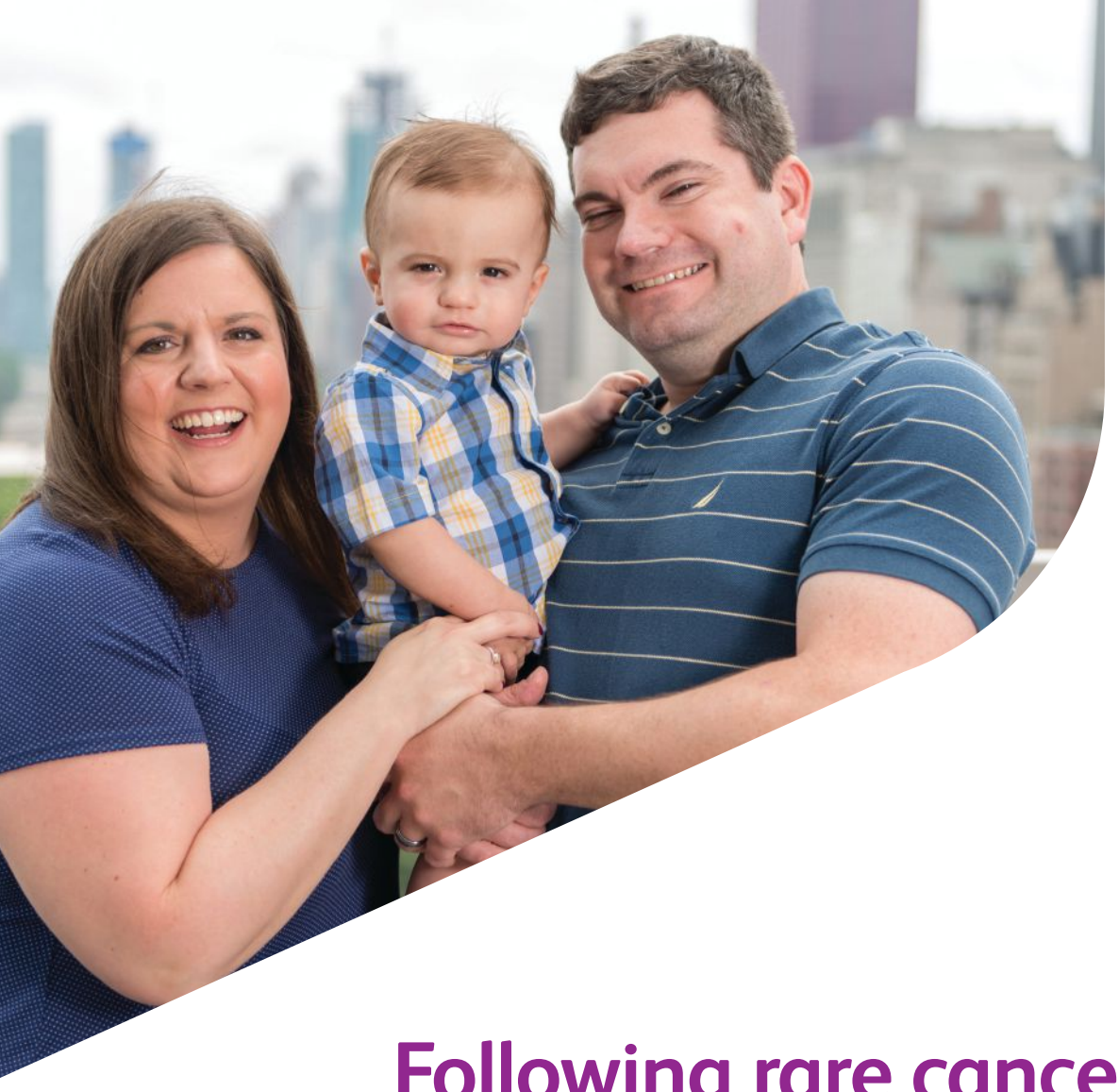
To successfully implement TR in a resource constrained country, there needs to be awareness of TR and its scope of practice. As in many such countries, the academic teaching departments are largely unaware of TR. It provides new ways to assist rehabilitation skill development – supporting ongoing learning for students and clinicians working with patients.

TR guarantees exposure to certain experiences and also aids non-technical skills training, which is an opportunity to build confidence. It can help overcome challenges of workplace isolation, such as lack of on-site mentors, limited local professional development and lack of local available cases for advanced learning and practice. It provides opportunity for massed and varied repetition, reflective practice and interdisciplinary learning. But this requires trained users to ensure optimisation of use and workplace change and investment in required technology.

A good government infrastructural support appears to be the main element influencing the effectiveness of a new intervention system such as TR. The major constraints in infrastructure could be the political and regulatory risks such as formulating government level rules and regulations to govern TR services, which would lead to its streamlining and obstacles to access financing or funding. Nevertheless, TR seems to be the future and one of the most innovative solution for the growing needs for rehabilitation services.

The main benefit of TR is that treatment can now be accessed from patients' homes or primary healthcare centres in remote areas.

Sona Ayanikalath



Jessica Blackford-Cleeton and her husband, Brandon Cleeton, with their son Avery.

Following rare cancer diagnosis, a couple now faces the future with hope

Article provided by UChicago Medicine

Blackford-Cleeton was diagnosed with mesothelioma, a rare and aggressive cancer that affects the linings of organs.

One year into their marriage, Jessica Blackford-Cleeton and her husband, Brandon Cleeton, were busy planning a future together. That included building their careers, having children and raising a family in Springfield, Illinois. However, cancer had a different plan for the couple.

It started with pain in Jessica's lower abdomen – sometimes so severe that she twice landed in the emergency room.

A CT scan showed a small spot on her abdomen. The subsequent biopsy revealed cancer, "and it was everywhere," Blackford-Cleeton said.

Blackford-Cleeton was diagnosed with mesothelioma, a rare and aggressive cancer that affects the linings of organs. Mesothelioma most often affects the lungs, where it is linked to asbestos exposure.

Her cancer was in the lining of her abdomen (peritoneal mesothelioma). Only about 3,000 people are diagnosed with mesothelioma in the U.S. each year; peritoneal mesothelioma is even rarer, with just 500 to 800 cases a year.

"I was so scared," Blackford-Cleeton remembered. "When I did research on the Internet, it was all grim and bad. I had very little hope."

Also looking grim were the couple's chances of having children, which they were trying to do at the time of her diagnosis.

"We thought, 'Of course it isn't going to happen,' because the cancer was all over my ovaries," Blackford-Cleeton said.

Her oncologist in Springfield referred her to the University of Chicago Medicine, where specialists at the Comprehensive Cancer Center have been dedicated to mesothelioma research and care for more than 25 years. Her care team included gastrointestinal oncologist and mesothelioma expert Hedy Kindler, MD, and surgical oncologist Kiran Turaga, MD.

"When we met with Dr. Turaga, we had so much more hope about the disease and how to move forward," Blackford-Cleeton said. "We knew we would have a future at that point."

Her treatment included surgery to remove the cancer, followed by a procedure called HIPEC (hyperthermic, or heated, intraperitoneal chemoperfusion), which targets and kills cancer cells that remain after surgery. HIPEC has fewer side effects than traditional chemotherapy because the medicine targets specific areas rather than circulating throughout the whole body. Also, the heated medicine causes blood vessels to expand, allowing the chemotherapy to penetrate deeper and more effectively.

Cleeton remembered his wife's 14-hour procedure as being "one of the longest days of my life and probably the most terrifying."

The surgical team successfully removed hundreds of tumors in Blackford-Cleeton's body. They also removed an appendix, parts of her intestines and diaphragm, and an ovary. One ovary.

Going into surgery, Blackford-Cleeton and Turaga discussed the procedure's potential impact on her fertility. "We talked about the fact that when we put heated chemotherapy inside her belly, it could change her life forever - especially her ability to have kids," said Turaga.

She begged Turaga to save at least one ovary so she and her husband would have a chance to have a baby in the future.

"He found a way," Blackford-Cleeton said.

One year after surgery, Blackford-Cleeton was cleared to begin in vitro fertilisation. In August 2017, the couple welcomed their son, Avery. Or, as the couple jokes, "Brandon's mini-me."

For three years, her test results have shown no evidence of tumors.

"It is a testament to how much the body can endure," Turaga said, calling Blackford-Cleeton's story "remarkable." "She reminds us every day of how vital she is, of how her spirit is so strong. Cancer can't compete with the human spirit."

Blackford-Cleeton finds strength from her support group, including her parents, who cared for her full-time while Brandon worked and often made the six-hour round-trip drive between Springfield and Chicago for her follow-up appointments. She also connected with new friends and resources through the Mesothelioma Applied Research Foundation.

Above all, she is grateful to Brandon for helping her navigate "a new normal" and taking on extra responsibilities.

"We had to switch roles from husband and wife to patient-caregiver, where he did 99 per cent of the work just because I couldn't," Blackford-Cleeton said. "It's definitely a team effort, with him being the captain and the player."

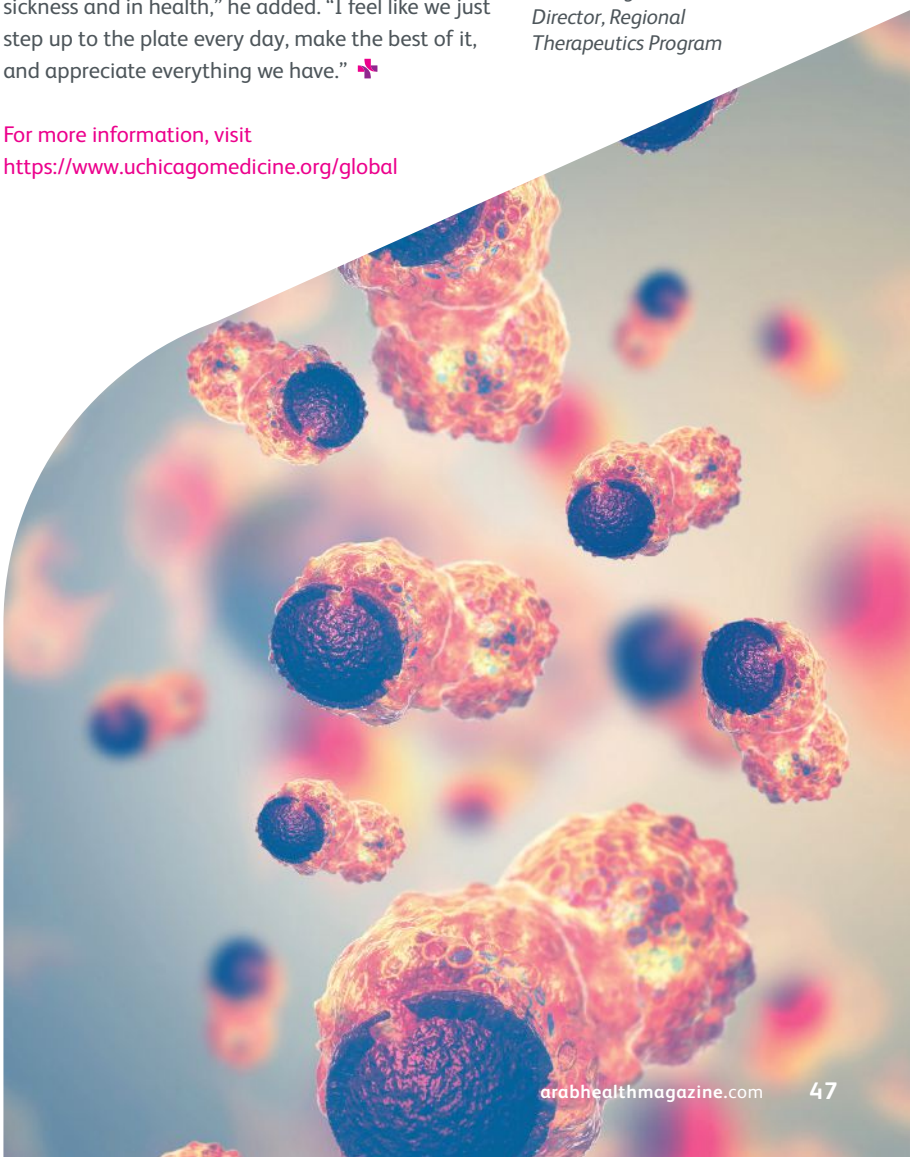
Meanwhile, Cleeton finds his motivation in his growing family: "That little boy's smile certainly makes me want to jump up and go that extra mile," he said. "If I feel like I don't have a drop of energy left in me, he's my motivator — and so is Jessica."

"We took the vows for better or worse, in sickness and in health," he added. "I feel like we just step up to the plate every day, make the best of it, and appreciate everything we have."

For more information, visit
https://www.uchicagomedicine.org/global

Hedy Lee Kindler, MD
Medical Director, Gastrointestinal Oncology
Director, Mesothelioma Program

Kiran K. Turaga, MD, MPH
Director, Surgical GI Cancer Program
Director, Regional Therapeutics Program



Achieving Infection Control Best Practices in Blood Banks and Laboratories

ITL BioMedical

ITL BioMedical: Enabling clinical safety and efficiency

ITL BioMedical is a leading provider of medical devices and systems that enhance the safety and efficiency of biological sampling and clinical procedures.

ITL develops innovative products for the clinical, blood banking and laboratory markets, and specializes in products for the laboratory blood culture testing market.

With a focus on safety and efficiency, ITL BioMedical is transforming the blood culture testing market through advanced products and systems for safer sample collection and transfer.

The company seeks out user feedback to optimize end-user safety and efficiency, and effectively meet stringent clinical demands and regulatory requirements worldwide.

Its products are held to the highest quality and regulatory standards in the industry and are trusted by healthcare professionals around the world.

ITL BioMedical products are used to achieve best practice in infection control in blood banks and labs around the world.

The importance of infection control in healthcare

Safety and efficiency in sample management are at the forefront of ITL BioMedical's mission to protect the lives of patients and healthcare workers through excellence in infection control and prevention.

Each year around 1 in 10 healthcare workers – from laboratory and blood banking staff to nurses and physicians – are affected by needlestick or sharps injuries worldwide. The underreporting of sharp injuries by employees has also been documented, with studies showing that the rate can be anywhere from 22% to 99%.

Dozens of blood-borne pathogens can be transmitted from needlestick injuries including hepatitis B, hepatitis C, and human immunodeficiency virus (HIV). These types of injuries can have a significant financial impact on the healthcare industry and a major psychological impact on the workers involved.

The two most common causes of needlestick injury in the workplace are two-handed recapping and the unsafe collection and disposal of sharps waste. Transferring blood between containers can also be a hazardous practice for needlesticks.

The need to utilize products that promote best practices and processes in blood banks and labs has never been more important.

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- Efficient design reduces the number of procedure steps
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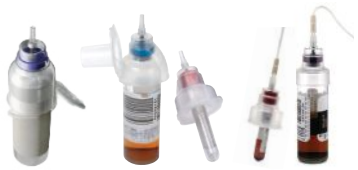

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Reduces risk of needlestick injury when collecting blood culture samples with the SampLok Adapter Caps.

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Safety Subculture Units:

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Safely transfer positive blood culture samples with the Safety SubCulture Units.

- Integrated filter cap that limits potential exposure to culture discharge
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ITL BioMedical 1.888.411.2851 sales@itlbiomedical.com itlbiomedical.com

Facilitating patient-specific care with 3D printing

By Deepa Narwani, Editor

One of the UAE's first specialist providers of 3D printed healthcare products, Sinterex recently made headlines when the company collaborated with the Dubai Health Authority (DHA) to use titanium 3D printing to save the jaw of a patient with a tumour. In an interview *with Arab Health Magazine*, Julian Callanan, Managing Director, Sinterex, shares how 3D printing is all set to revolutionise the healthcare industry.

Julian Callanan

1. Tell us about Sinterex. When was it established, how has the journey been?

Sinterex specialises in 3D printed medical products. We are a still a young business, in fact it was just over two years ago in February 2017 that we printed our first product. In this time though we have achieved some notable milestones. We were the first company to commercially deploy a metal 3D printer in the UAE and the first to 3D print teeth in the UAE.

We have seen a good measure of progress on the journey so far, but it has been by no means straight forward or easy. The machinery and equipment that we deal with are highly complex requiring strong technical knowledge. There is a lack of locally available materials or staff to support the type of work we are doing, so we have relied on international imports and invested in training our team. Furthermore, because we are leading with new technologies and concepts, we have had to educate the market about the benefits of our methodologies and then prove the performance over time.

2. How does the company's product range help the healthcare industry?

What we do that is different to most other medical device manufacturing businesses is that all our products are completely patient specific, meaning that they are produced solely for one particular patient. This patient specific approach has benefits

for the healthcare industry. It gives the patient a better solution for their problem, it supports the clinician with better diagnosis and comprehension of the patient's situation, and it can save time and complexity during medical procedures.

Our current product range is split into three focus segments; Dental, Craniomaxillofacial, and Anatomical. Under the Dental market segment, we are 3D printing teeth and dentures, correcting misaligned teeth through 3D printed clear aligner treatments, and guiding implants to an accuracy of 0.5mm through 3D printed drill templates. For our Craniomaxillofacial customers, we are providing Virtual Surgical Planning to predict the outcome of a surgery before it starts, 3D printing bone cutting and drilling guides, and titanium 3D printing patient specific implants. For our Anatomical customers we are 3D printing parts of the anatomy such as hearts, kidneys, and vascular structures.

3. What, according to you, is the impact of innovation in the delivery of healthcare?

With so much at stake, healthcare has and always will be a hotbed for innovation and invention. At the moment, 3D printing is one of the fastest developing emerging trends within healthcare. This is not to say that 3D printing will transform all of the healthcare industry. But in certain healthcare verticals, 3D printing, working hand-in-hand with digital planning software, is starting to really change how we approach and think about complex procedures.

Take knee replacements for example. Patients have traditionally been supplied with new knees 'off-the-shelf' with the surgeon choosing the best approximate size and design for the patient's weight and lifestyle. Now, through the production efficiencies offered by 3D printing, it is possible to have a completely bespoke knee designed and produced, which considers the exact requirements of the patient.

4. Could you shed light on your future plans.

In the short-term we are focused primarily on the UAE. This is our home market and we need to use the network and momentum we have here to deepen the quality of our current products whilst testing and developing new exciting concepts. That said, we already have an international customer base stretching from Saudi Arabia to South Africa, so we definitely see the potential for international expansion.

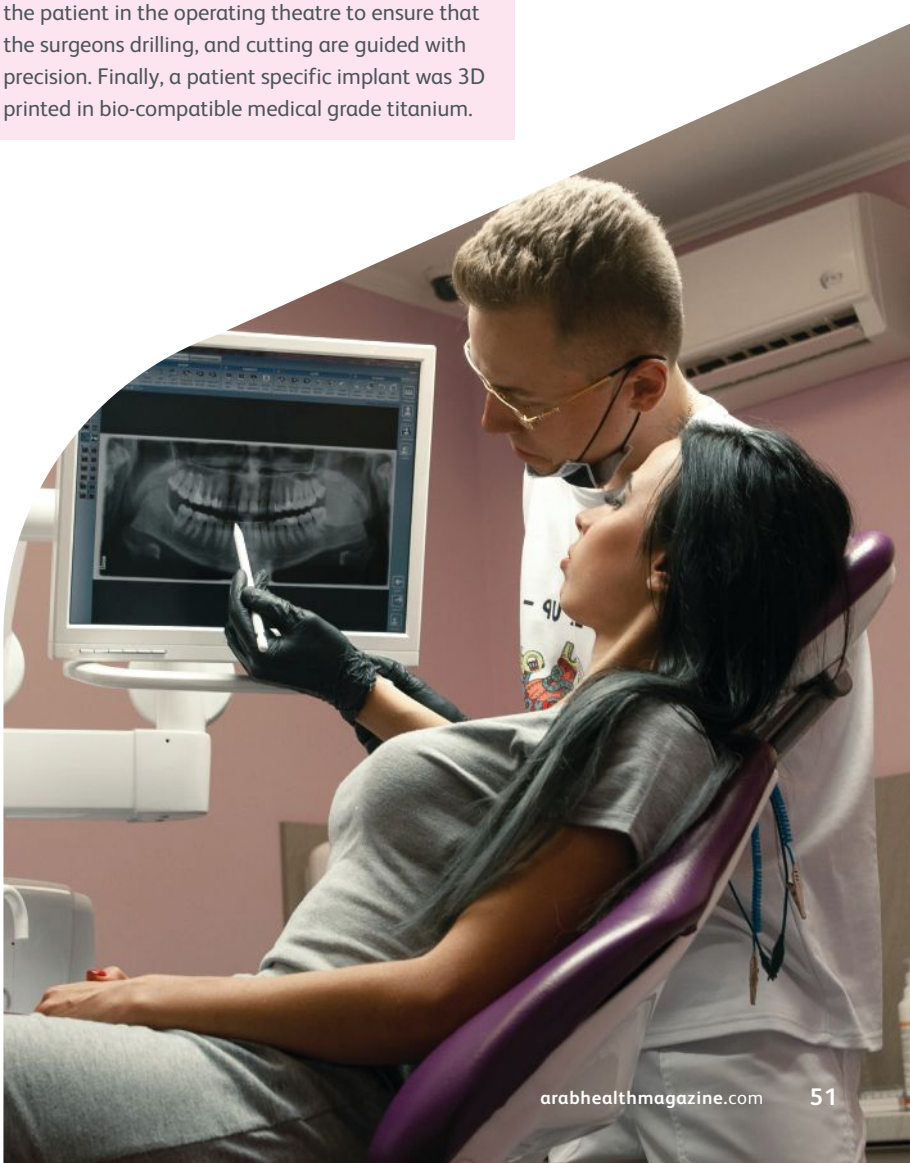
For future projects, we are working on some really exciting concepts around 'Patient Experience'. I can't say too much at this stage but hopefully in the next few months we will be able to share a new concept, which will change how patients and doctors view and interact with their data.

Tell us about your collaboration with the DHA in the recent case where a patient's jaw was saved using 3D printing.

The patient, a 17-year-old girl in high school, was admitted to hospital after discovering she had a large, fast growing tumour of the right jaw. Unfortunately, due to the growth of the tumour, the jaw had to be partially removed. Our work involved supporting the surgeon, Dr. Khalid Ghandour, with the reconstruction of the jaw.

The workflow started with the patients CT scan, which was segmented and converted into a 3D printed physical model. This model allowed Dr. Ghandour, and his team of surgeons, to visually inspect the patient's situation and to develop a treatment plan. After finalising the treatment plan, we 3D printed a Surgical Guide, which was fitted to the patient in the operating theatre to ensure that the surgeons drilling, and cutting are guided with precision. Finally, a patient specific implant was 3D printed in bio-compatible medical grade titanium.

3D printing, working hand-in-hand with digital planning software, is starting to really change how we approach and think about complex procedures.



Cosmetic Dentistry – what you need to know

By Dr. Tareq Y Shabani, General Dentist, Marina Medical Centre, King's College Hospital London in the UAE

Dr. Tareq Shabani, Dentist

Cosmetic dentistry has become more common than it once was, from the wide variety of treatments available to the technologies that are used to dramatically change your smile in a relatively short period of time.

However, what is cosmetic dentistry and what does it really involve? Simply put, cosmetic dental procedures are largely unessential and usually concern the alignment of teeth, their shape and colour. The most common procedures in the UAE are bleaching or tooth whitening, alignment and veneers. Generally, the risks associated with cosmetic dentistry remain low, however, it is important to remain informed about what these procedures involve, and the risks associated.

Teeth Whitening

Most people drink tea and coffee at least once a day. Unfortunately, over time these drinks and some foods can stain your teeth giving a yellow appearance. However, there are now simple solutions to get the natural white glow back. The most commonly used solution is a laser treatment, which takes 15 minutes under the supervision of a dentist. Alternatively, patients can also use a 'take-home' bleaching kit, which takes 30 minutes to one hour, but needs to be repeated to prolong the results.

Although not common, teeth whitening can have side effects and cause tooth sensitivity. The level of sensitivity depends on how well one takes care of their teeth afterward. Brushing twice-a-day and avoiding the build-up of plaque can reduce the level of sensitive post-treatment. Generally, any minor damage resulting from tooth whitening will heal over time, however if the laser beam is not aligned properly, it can burn gums, and if this damages the tooth it may not be able to heal. Similarly, the home bleaching kit can also damage teeth, if the trays are used for too long.

Aligners are developed through personalised 3D printing, to make sure they perfectly fit the teeth.

Alignment

Most adults opt for clear aligners, as a discreet method to make relatively mild changes. These aligners are developed through personalised 3D printing, to make sure they perfectly fit the teeth. Imaging technology is also used to show what teeth will look like after completing the course. Once the set of retainers are printed, the patient will need to change them every two to three weeks. For successful realignment, they should be worn for 22 hours a day, and only removed for eating.

There are very few risks associated with using aligners, however, they may be unsuccessful if the patient does not take care of their teeth or use the retainers properly. This may mean that some patients have to wear retainers for a longer time to realign their teeth.

Veneers

Veneers are commonly used to fix colour and alignment of teeth. They are shells that are bonded to the front of the tooth to change shape, size, colour, or to close gaps. Usually, a small portion of the tooth is removed, a dental lab then creates a thin layer or porcelain which is then bonded to the teeth. Depending on the size of teeth, for example, if one has bulkier teeth, they may not need to remove part of the tooth, specifically the enamel. Some dentists will guide the patient as to what will complement their face and can round corners of teeth or make them flatter.

Veneers are more invasive than teeth whitening or alignment, due to the removal of some of the tooth. This also means that the risks are higher and can be more difficult to resolve, such as; increased tooth sensitivity, permanent dental damage, changing the bite alignment, which will result in pain when eating. Therefore, it is important to do some research beforehand about the process to choose, in order to feel comfortable throughout the consultation process.

References available on request.

Five revolutionary technologies in the dentistry world

By Dr. Mohammed Naji, Executive Director, Liberty Medical Group

Dr. Mohammed Naji

Technology continues to change our lives every day. Increasingly, dentists are choosing to use cutting-edge tools and new innovations in technology to take care of our oral health. Depending on the type of treatment we require, dentists are now able to successfully treat many common dental conditions in a gentle, minimally invasive manner.

Below are five technologies that are changing the world of dentistry rapidly. Using this technology with the right expertise can reduce treatment pain up to 95 per cent and reduce duration of the treatment from multiple visits during a week, to few minutes in a single visit.

1. The NNN Veneers technology: This versatile cosmetic professional treatment allows dentists to give their patients a natural looking beautiful smile, without pain, drilling, or injections. Because of the non-invasive nature of this treatment, patients always have the option of going back to their natural teeth at any time.

2. QuickSleeper: This state-of-the-art technology provides painless injections. A massive innovation in the field of anaesthetics, QuickSleeper can be used to anesthetise the tooth without the patient feeling the needle. It only anesthetises the tooth itself without the surrounding structures, which means when dentists' use it on the patients, their lips and tongue will not feel any numbness. They will have full sensation in their mouth and only the tooth will be anesthetised.

3. iTero Element 5D scanner: This technology is a one-of-a-kind hybrid dental imaging system that simultaneously records 3D, intraoral colour and Near Infrared Imaging (NIRI) images and enables comparison over time using iTero Time-lapse technology. The scanner allows the dentist to see a calculated prediction of the results before the orthodontic treatment begins, giving the patients an opportunity to preview the potential results of the treatment.

It is also the first scanner to use the NIRI System, which enables dentists to detect cavities without an x-ray, which means there is no requirement for radiation, thus, making it 100 per cent safe for pregnant women or patients with cancer who are already receiving radiation doses.

4. Waterlase Dental Laser: This laser system is a gentle alternative to traditional dental tools. Using laser energy and water spray, Waterlase can perform many procedures like drill teeth, cut gum and bone, make a root canal treatment and lighten the colour of the gum, all without pain or bleeding. Waterlase is virtually painless, it is a dental laser that enables the trained dentist to use minimal and, in some cases, even no anaesthetic or drills to perform many routine dental procedures.

5. Shape Trios Scanner: It is not uncommon to hear that patients need to take multiple trips to their dentists to get one treatment – this piece of technology has completely changed that. Shape Trios is a 3D scanner, which is used for producing dental crowns and bridges in a single visit and in less than an hour using a 3D printer to print out the tooth for the patient on the spot. Compared to the usual way of making this procedure, this machine does the job of three dental clinic visits in one.

Using laser energy and water spray, Waterlase can perform many procedures like drill teeth, all without pain or bleeding.

Reaping the benefits of Keto

Dr. Ali Irshad Al Lawati, an episodic Type 1 Diabetic, shares how the Ketogenic/LCHF diet transformed his life.

By Bronwyn MacRitchie, Health Coach, ingfit.ae

Within five months of doing keto, Dr. Ali's proteinuria entirely disappeared, and his weight loss continued, leaving him at a healthy weight for his age and height.

The evidence on the effectiveness of a low carbohydrate, high fat or ketogenic diet as an effective treatment for Type 2 Diabetes is gaining ground and regularly being documented in both peer reviewed studies and personal accounts.

However, the incidents of Type 1 Diabetics using the diet to live a life far less dependent on insulin and with the capacity to manage their own medication, health and weight with ease are also increasing. Almost too good to be true, surely?

In fact, there is a doctor practicing right here in the Gulf who has lived this experience himself. He now spends his time both treating patients and spreading the word of his own personal lived and ongoing success throughout the world, in order for two things to begin to occur. For other diabetics like himself to realise this solution and no longer be a slave to medication and for the doctors who so readily prescribe it to sit up, take note, and realise that their patients don't have to end up with nerve damage, on dialysis, with amputations, or blindness. There is another way.

Success story

Dr. Ali Irshad Al Lawati's story started when he was seven years old and diagnosed with Type 1 diabetes. His parents followed the doctor's advice and treated him with insulin and a low-fat, high-carb diet as prescribed. By the time he was 15 years old, carrying all the extra weight the excess insulin had encouraged, Dr. Ali noticed that one of his grandfather's friends who had previously been extremely overweight with many health complaints and severe pain, had lost the weight, looked years younger and was smiling for the first time in years. He asked the man what he had done, and was handed a pamphlet on the low-carb, high fat diet (keto).

Of course, he was at first extremely sceptical and believed his grandfather's friend was playing a risky game with his health. However, the more he researched it, the more convinced of the diet's healthfulness and power he became.

He visited endocrinologist after endocrinologist, and (this being 17 years ago, although it could very well be today) every one of them told him this was an extremely dangerous path to follow and he would end up dying of heart disease before his T1D killed him.

Not to be dissuaded, he was so convinced by his research and desperate to lose the excess weight that he chose to do this alone. He followed the guidelines as he had understood them from the studies he found. His results were outstanding.

He started with HBA1C readings around 8/9 per cent, on a daily dose of insulin of 84iu. His blood glucose values were completely erratic, and he suffered frequent hyper and hypo glycaemic episodes, making his life almost unmanageable. He also had the first signs of nephropathy in the form of proteinuria for two full years and compromised kidney function.

As soon as he began the low carb diet, he reduced his insulin dose. Initially by half, and within three months to a total daily dose of 30iu. His HBA1C reduced to 6 and eventually to a solid and safe 5.

Within five months of doing keto, his proteinuria entirely disappeared, and his weight loss continued, leaving him at a healthy weight for his age and height.

He will always be a T1D, but he is no longer a slave to his blood glucose. His lifestyle and overall health have dramatically improved, as well as his self-confidence. All because he took the time to do his own research, read the mounting science and handled his health with wisdom rather than pills and needles.

Dietary intervention

During his residency training he was able to travel to the U.S. to study with Dr. Bernstein, the leader in the field on this dietary approach to Type 1 Diabetes. Dr. Bernstein's works include *Dr Bernstein's Diabetes Solution, The Diabetes Diet, Diabetes Type 2: Living a Long, Healthy Life Through Blood Sugar Normalization, Diabetes: The Glucograf Method for Normalizing Blood Sugar.* He was also fortunate to study with Dr. Eric Westman, a giant in documented science and peer reviewed studies on the power of the low carb/keto approach to reversing T2D and managing T1D, and founder of the HEAL Clinics in the U.S. He also co-authored *The New Atkins for a New You* with Drs Phinney and Volek, and more recently *Keto Clarity* with Jimmy Moore.

Carbohydrate restriction is easily grasped by patients: because carbohydrates in the diet raise the blood glucose, and as diabetes is defined by high blood glucose, it makes sense to lower the carbohydrate in the diet.

"By reducing the carbohydrate in the diet, we have been able to taper patients off as much as 150 units of insulin per day in 8 d, with marked improvement in glycaemic control-even normalisation of glycaemic parameters," Dr. Westman has been quoted saying.

Armed with this invaluable experience, Dr. Ali returned to Oman to complete his internal medicine specialty and has since opened the Lifestyle Clinic where he is able to advise patients with conditions such as T2D, T1D, epilepsy, and Alzheimer's on a dietary intervention that is changing their lives.

He has had some incredible successes; in fact all his T1 and T2 patients have reduced their medications and improved their quality of life. However, he does note how regretful it is that in terms of completely reversing T2D, the most success is seen when there is early dietary intervention, before the disease has had enough time to do lasting damage to the body.

Dr. Ali is living the quote he keeps on his wall by Thomas Edison: "The doctor of the future will give no medicine but will interest her or his patients in the care of the human frame, in a proper diet, and in the cause and prevention of disease."

Dr. Eric Westman

Dr. Bernstein

Dr. Ali

Building the future of healthcare

GSD Healthcare brings together pioneering scientific research and first-class care for patients to the UAE

Gruppo San Donato (GSD) is by far **Italy's leading private hospital group** and among the largest in Europe, with 19 hospitals, 5300 beds, over 4000 specialist physicians and more than 4.7 million individual patients treated per year.
GSD Healthcare is a branch of GSD, dedicated to providing both **educational and consulting services** worldwide. Given our broad experience in the medical and healthcare field, we put our best efforts into delivering outstanding results for clients ranging from young private clinics striving to achieve excellence up to national healthcare system regulators looking for efficiency improvements.

At GSD we believe in **building the future of healthcare**, be it improvements of our own group and services, developing relationships with governments, spreading medical expertise or helping other organizations grow in different environments. GSD Healthcare revolves around the last two mentioned, specializing in bringing and **teaching our success methods and best practices** to all our customers, with the overall target of **raising the global level of healthcare, accessibility and service quality**.

The GSD Healthcare organizes high quality, **CME-accredited courses** in a number of locations across Dubai, UAE and whole Middle-Eastern Region. We provide short, specialized courses, with hands-on training, conducted by highly qualified professors that excel in the healthcare field.
GSD Healthcare's custom programs rely on matching the knowledge of the faculty with the **individual needs** of the client.

GSD Healthcare, through its network of Universities and partners, **designs consultancy and advisory solutions in the healthcare field**, with a systematic, practice-oriented and holistic approach. We link strategic goals with analysis and implementation of solutions.
The high level of customization is one of our main features: **we create value through tailoring programs to different needs of healthcare systems**, taking into consideration markets and various organizational contexts.

www.gsdinternational.com

Masimo Announces FDA Clearance of Radius™ PPG, the First Tetherless SET® Pulse Oximetry Sensor Solution

Article provided by Masimo

Radius PPG, a tetherless sensor solution powered by Masimo SET® represents a significant breakthrough in patient monitoring. Radius PPG eliminates the need for a cabled connection to a pulse oximetry monitor, allowing patients to move freely and comfortably while still being continuously monitored reliably and accurately. Via wireless connection, measurements are displayed on Masimo host devices or third-party multi-parameter monitors with integrated Masimo technology, making Radius PPG immediately available for approximately two million monitors around the world. Coupled with the proven benefits of Masimo SET® Measure-through Motion and Low Perfusion™ pulse oximetry, Radius PPG is suited for use anywhere patients can benefit from mobility.

Radius PPG gives patients freedom of movement without interrupting continuous monitoring. Wireless connection to a host device is simple to establish and each Radius PPG can easily pair with multiple devices (maintaining connection to any one device at a time), simplifying transfers between care areas. Radius PPG works with its integrated battery for about four days and stores up to four days (96 hours) of patient data; in the event of wireless interruption, Radius PPG provides seamless retransmission once the connection is restored. Automated by Masimo's connectivity solutions, patient data can be used for remote clinician notifications of changes in patient condition and automatically transferred to the patient's EMR.

Masimo Radius PPG™

Studies have shown that patient mobility is a key factor in more rapid patient recovery.[1,2] In addition, the removal of cables has been shown to contribute to greater patient comfort, convenience, and patient satisfaction compared to tethered patient monitoring.[3] Radius PPG allows patients to move throughout the hospital room, to the bathroom, and to other care areas without the need for physical disconnection and reconnection. In places like the neonatal ICU, care providers and parents can hold infants without interrupting monitoring or risking an uncomfortable tug on the patient. Radius PPG not only offers patients improved comfort and convenience but improves clinician workflows.

Radius PPG harnesses the power of clinically proven Masimo SET® technology to provide accurate measurement even while patients move. Over 100 independent and objective studies have shown that SET® outperforms other pulse oximetry technologies during conditions of motion and low perfusion.[4] When used in conjunction with Patient SafetyNet™*, continuous monitoring using SET® in post-surgical wards has been shown to reduce rapid response team activations and transfers back to the ICU.[5-7] Masimo SET® has also been shown to help clinicians reduce severe retinopathy of prematurity (ROP) in neonates[8] and improve critical congenital heart disease (CCHD) screening in newborns.[9] Today, Masimo SET® is estimated to be used on more than 100 million patients in leading hospitals and other healthcare settings around the world,[10] and is the primary pulse oximetry at 9 of

the top 10 hospitals listed in the 2018-19 *U.S. News and World Report* Best Hospitals Honor Roll.[11]

Joe Kiani, Founder and CEO of Masimo, said, "We are excited to announce the Radius PPG tetherless, wearable SET® pulse oximetry sensor solution. Accurate, high-quality monitoring data can now travel from an ambulating patient to a variety of monitoring platforms, allowing a patient's physiological status to be continuously monitored when it's needed most."

About Masimo

Masimo (NASDAQ: MASI) is a global medical technology company that develops and produces a wide array of industry-leading monitoring technologies, including innovative measurements, sensors, patient monitors, and automation and connectivity solutions. Our mission is to improve patient outcomes and reduce the cost of care. Masimo SET® Measure-through Motion and Low Perfusion™ pulse oximetry, introduced in 1995, has been shown in over 100 independent and objective studies to outperform other pulse oximetry technologies.[4] Masimo SET® has also been shown to help clinicians reduce severe retinopathy of prematurity in neonates,[8] improve CCHD screening in newborns,[9] and, when used for continuous monitoring with Masimo Patient SafetyNet™ in post-surgical wards, reduce rapid response team activations, ICU transfers, and costs.5-7 Masimo SET® is estimated to be used on more than 100 million patients in leading hospitals and other healthcare settings around the world,[10] and is the primary pulse oximetry at 9 of the top 10 hospitals listed in the 2018-19 *U.S. News and World Report* Best Hospitals Honor Roll.11 Masimo continues to refine SET® and in 2018, announced that SpO_2 accuracy on RD SET™ sensors during conditions of motion has been significantly improved, providing clinicians with even greater confidence that the SpO_2 values they rely on accurately reflect a patient's physiological status. In 2005, Masimo introduced rainbow® Pulse CO-Oximetry technology, allowing noninvasive and continuous monitoring of blood constituents that previously could only be measured invasively, including total hemoglobin (SpHb®), oxygen content (SpOC™), carboxyhemoglobin (SpCO®), methemoglobin (SpMet®), Pleth Variability Index (PVi®), RPVi™ (rainbow® PVi), and Oxygen Reserve Index (ORi™). In 2013, Masimo introduced the Root® Patient Monitoring and Connectivity Platform, built from the ground up to be as flexible and expandable as possible to facilitate the addition of other Masimo and third-party monitoring technologies; key Masimo additions include Next Generation SedLine® Brain Function Monitoring, O3® Regional Oximetry, and ISA™ Capnography with NomoLine® sampling lines. Masimo's family of continuous and spot-check monitoring Pulse CO-Oximeters® includes devices designed for use in a variety of clinical and non-clinical scenarios, including tetherless, wearable technology, such as Radius-7®, portable devices like Rad-67™, fingertip pulse oximeters like MightySat® Rx, and devices available for use both in the hospital and at home, such as Rad-97™.

Masimo hospital automation and connectivity solutions are centered around the Iris® platform, and include Iris Gateway™, Patient SafetyNet, Replica™, Halo ION™, UniView™, and Doctella™. Additional information about Masimo and its products may be found at *www.masimo.com*. Published clinical studies on Masimo products can be found at *www.masimo.com/evidence/featured-studies/feature/*.

ORi and RPVi have not received FDA 510(k) clearance and are not available for sale in the United States.

**The use of the trademark Patient SafetyNet is under license from University HealthSystem Consortium.*

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Forward-Looking Statements

This press release includes forward-looking statements as defined in Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934, in connection with the Private Securities Litigation Reform Act of 1995. These forward-looking statements include, among others, statements regarding the potential effectiveness of Masimo Radius PPG™ and SET®. These forward-looking statements are based on current expectations about future events affecting us and are subject to risks and uncertainties, all of which are difficult to predict and many of which are beyond our control and could cause our actual results to differ materially and adversely from those expressed in our forward-looking statements as a result of various risk factors, including, but not limited to: risks related to our assumptions regarding the repeatability of clinical results; risks related to our belief that Masimo's unique noninvasive measurement technologies, including Masimo Radius PPG and SET®, contribute to positive clinical outcomes and patient safety; as well as other factors discussed in the "Risk Factors" section of our most recent reports filed with the Securities and Exchange Commission ("SEC"), which may be obtained for free at the SEC's website at www.sec.gov. Although we believe that the expectations reflected in our forward-looking statements are reasonable, we do not know whether our expectations will prove correct. All forward-looking statements included in this press release are expressly qualified in their entirety by the foregoing cautionary statements. You are cautioned not to place undue reliance on these forward-looking statements, which speak only as of today's date. We do not undertake any obligation to update, amend or clarify these statements or the "Risk Factors" contained in our most recent reports filed with the SEC, whether as a result of new information, future events or otherwise, except as may be required under the applicable securities laws.

Cleveland Clinic on applying AI to medicine

Aziz Nazha, MD, to lead efforts as Director of the new Center for Artificial Intelligence

Article provided by Cleveland Clinic

Researchers and clinicians are using concepts rooted in artificial intelligence (AI) to improve healthcare delivery in areas such as diagnostics, disease prediction and treatment planning. AI projects across several institutes at Cleveland Clinic have been underway for quite some time, but a new Center for Clinical Artificial Intelligence will concentrate these efforts, bringing together specialists from several departments including pathology, imaging, information technology, oncology, genomics and quantitative health sciences.

The center will serve as a platform for collaboration and communication between physicians and data scientists; provide programmatic and technology support for AI initiatives; and conduct research in several areas of medicine that can solve clinical problems using machine learning, deep learning and other AI technologies.

Aziz Nazha, MD, hematologist and medical oncologist at Cleveland Clinic Cancer Center, has been appointed director of the new center and Associate Medical Director for AI. The center will be a hub of collaboration between physicians, researchers, computer scientists and statisticians across the United States and globally to advance the application of AI in healthcare. The center will also facilitate collaboration between academia and industry.

Aziz Nazha, MD

Projects underway

Researchers in the center are building machine learning models for several projects that use AI technologies in diagnostics, prognosis, treatment decision-making and patient outcomes. Projects already underway include building machine learning models to identify patients with high risk of death within 48-72 hours of admission; predict inpatient length of stay; and predict readmission risk, all with a higher degree of accuracy than existing models.

Additionally, several cancer-focused projects are ongoing. Dr. Nazha has led projects to improve prognostic scoring systems and hematopoietic stem cell transplantation (HCT) outcomes in patients with myelodysplastic syndromes (MDS). Machine learning and other AI concepts helped him address the lack of precision in prognostic scoring systems for the disease.

AI in MDS

The International Prognostic Scoring System (IPSS-R) categorises patients into one of five groups, from very low risk to very high risk, based on risk of mortality and transformation to acute myeloid leukemia (AML). But, Dr. Nazha says, "We often found a significant gap between what we predicted in terms of survival for our patients, based on those models, and what actually happened to our patients."

"So that triggered us to think, 'Can we do a better job predicting the actual survival of the patient?' Because prognosis in oncology, I would argue, is the most important part of our job. All oncology patients want to know how long they are going to live."

Dr. Nahza and colleagues decided to create a new system that incorporates individual patient genomic and clinical data using a machine-learning algorithm to better predict an individual patient's outcome. Their system outperformed other models for overall survival (OS) and acute myeloid leukemia (AML) transformation. They also created a system that successfully predicted outcomes in patients with MDS who undergo HCT.

Application of various AI concepts made both of these projects possible, and with the infrastructure and resources of the new center, many more projects of this nature will benefit research, education and patient care.

UVC disinfection method in hospital environment

Mediland Hyper Light - A chemical-free method for HAI

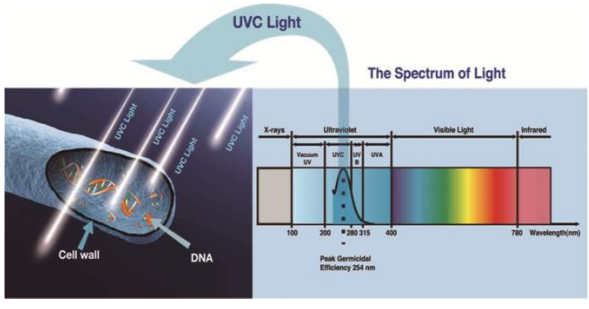
Healthcare-associated infections caused by multidrugresistant pathogens are significantly associated with increased mortality, morbidity and excessive healthcare costs. Thorough cleaning of hospital environment is crucial in limiting transmission of pathogens and reducing healthcare-associated infections (HAI). However, up to one half of room surfaces were found to be inappropriately cleaned by traditional manual methods of disinfection using various assessment tools (e.g., visual observation, adenosine triphosphate bioluminescence, aerobic colony counts). Therefore, in addition to traditional interventions, some novel, no touch methods are warranted to improve terminal room disinfection.

Clinical trial for outstanding effectiveness in killing bacteria, mycobacterium and fungi, journal on ScienceDirect

Clinical trial conducted by National Taiwan University Hospital in Taiwan in three uncleaned rooms previously admitted by patients harboring MRSA, VRE and other nosocomial pathogens with at least a 7-day hospitalization. Placed Hyper light 5 min at 3 sites (total 15 min) and inspect the before-after effect by the samples collected from 7 high touch spots in the 3 rooms separately. Report shows a significant reduction in the median number of total bacteria colony counts after UV-C irradiation of 15 min was demonstrated after 24 h incubation (35 CFUs vs 0 CFUs, $p = 0.0005$) and 48 h incubation (165 CFUs vs. 0 CFUs, $p < 0.0001$) of the samples respectively. (ref. Table3)

Efficient and non-toxic practice for both medical staff and patients

We all know that hospital wards, operating rooms are both critical for the environment hygiene. Therefore, by utilizing ultraviolet-C (UV-C) radiation with wavelengths 254nm for 15 minutes in a general size of operating theater or wards(around 55.74 m²), Hyper light can efficiently shorten the preparation, working time of disinfection procedure, moreover, without any waiting period for volatilization after disinfecting. Applying to solely 254nm of the UVC spectrum makes Hyper light an ozone-free, chemical-free and eco-friendly disinfection system, providing no risk for asthma patients and medical staff, and can immediately enter the space after disinfection procedure.



For more information, please contact Mediland
https://www.mediland.com.tw/mediland/index.aspx

Table 3 Analytical data and comparison of bacteria colony counts on different surfaces in 3 patients' rooms before and after UV-C irradiation with incubation for 24 and 48 h.

UV-C irradiation	Incubation time (hours)	No. of samples	Median CFU (IQR)	Min	Max	P value
Before UV-C	24	20	35 (2.5–135)	0	1700	0.0005
After UV-C	24	20	0 (0)	0	90	
Before UV-C	48	20	165 (72.5–302.5)	0	4370	<0.0001
After UV-C	48	20	0 (0–27.5)	0	550	

No.: number; CFU: colony-forming units; IQR: interquartile range; Min: minimum; Max: maximum.

Heart talk

By Dr. Arun Goyal, RAK Hospital

Driven by an unhealthy lifestyle and eating habits, cardiac health has been a cause of concern for many UAE residents. The disease continues to be a leading killer in the UAE, having penetrated the younger population as well with incidences of people in their teens facing heart issues as per media reports.

Among the most common causes of cardiovascular diseases is Atherosclerosis, a condition where fatty deposits fill in the inner wall of the arteries, blocking the supply of oxygen- and nutrient-filled blood from reaching the heart. The fatty deposits build gradually over the years, narrowing the passage until they manifest themselves in heart attacks, strokes, and in some cases instant death. Unfortunately, until the symptoms become apparent, most cardiac patients remain unaware of this condition. This is why, doctors often insist on regular cardiac screening particularly once a person crosses the age of 30. Similarly, doctors also warn that when experiencing chest pain – a squeezing sensation in the chest that may travel to arm, shoulder, back or jaw – people should consider it a Cardiac Angina Pectoris until proven otherwise and consult a specialist at the very earliest.

Having said that, it's also important that we understand the root cause of cardiovascular diseases, and the blame squarely lies on an unhealthy lifestyle. This is why it's all the more important that we focus on controlling the risk factors in order to avoid any heart issues. In this regard, the first and foremost step is to take stock of our lifestyle and identify the various factors that can be the potential causes of cardiac issues.

For example, by choosing what we're eating carefully, we're already feeding our heart with the right kind of food. So the first priority should be to introduce wholesome and healthy foods into our diet and eliminate those that are detrimental to our cardiac health. Moreover, it's essential to avoid smoking and stress since smoking and high blood pressure are two of the biggest causes of cardiac issues. Similarly, diabetic patients, too, need to manage the disease wisely in order to avoid heart complications. In this regard regular workout, such as walking and jogging, and even breathing exercises, need to be factored into the routine as a compulsion since they not only improve blood circulation but also help to relieve stress.

Typically, critical coronary artery disease is managed through medication, angioplasty and bypass surgery. In cases of bypass surgery, surgeons create a new route for the blood flow, interposing a healthy piece of blood vessel from the aorta to the healthy part of the coronary artery.

As one of the premium healthcare institutions in the northern emirates, RAK Hospital also offers the best possible treatments for cardiac issues. The hospital uses Off-pump coronary artery bypass (OPCAB) technique for bypass graft surgery. The procedure is far less invasive and results in faster recovery, lesser blood transfusion and fewer cognitive and neurological consequences. It further eradicates the need to use heart-lung machine; instead, it uses certain stabilisers on the heart beat to enable surgeons to carry out the procedure on a beating heart. The technique offers long-term good results and fewer heart rhythmic problems.

Moreover, as a staunch advocate of prevention rather than cure, RAK Hospital has undertaken several CSR initiatives to educate the UAE residents on the perils of cardiac issues and ways to avoid them. While raising awareness, the hospital has also offered free cardiac screening on many occasions giving people the opportunity to assess their cardiac health.

RAK Hospital also boasts of a state-of-the-art fully equipped cardiac catheter lab available round-the-clock, allowing the handling of critical and emergency situations and the ability to perform complex surgeries successfully. The facility comprises of a full team of cardiologists, cardiac surgeons, technicians and nurses.

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Radius-7®

Tetherless Continuous Patient Monitor

Radius-7 for the Root® Patient Monitoring and Connectivity Platform allows for patient mobility while enabling continuous monitoring.

- Breakthrough Measurements
  - Masimo SET® Measure-through Motion and Low Perfusion™ pulse oximetry and rainbow® technology
  - rainbow Acoustic Monitoring™ with Acoustic Respiration Rate (RRa®)
  - rainbow® Pulse CO-Oximetry with noninvasive and continuous hemoglobin (SpHb®)
- Standard RD connector allows for streamlined transitions in patient care
- Small, lightweight, and wearable for tetherless monitoring and ambulation
- Integration with Masimo Patient SafetyNet™* for continuous supplemental remote monitoring and clinician notification

Each Radius-7 Kit comes with two rechargeable, "hot-swappable" modules with short-range communication to Root.

For more information, visit:
www.masimo.com/products/continuous/radius7

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