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Middle East HEALTH

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November - December 2019

Prevent diabetes

New study shows healthiest lifestyle reduces risk of type 2 diabetes by 75%

Evidence-based hospital design

Reduce running costs, improve quality of care

Home-grown health tech

UAE students win award for developing AI-powered Vita-Cam

In the News:

- UAE's Al Futtaim Group launches HealthHub
- American Hospital Dubai plans to expand
- Large 5-year trial supports polypill to prevent CVD
- Double-sided tape for tissues could replace surgical sutures

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Prognosis

Evidence-based design

There is a clear link between a hospital's physical design and the quality and safety of care it delivers. This has been demonstrated in several studies. Hospital planners are now able to consult so-called evidence-based design which describes how the physical design of healthcare environments affects patients and staff. Key characteristics of evidence-based design in hospital settings include single-patient rooms, use of noise-reducing construction materials, easily accessible workstations, and improved layout for patients and staff. In our focus on hospital design in this issue we look at these characteristics and how they can reduce costs for hospitals and improve the quality of care.

Also, in this issue, in our focus on lifestyle diseases, we look at an interesting recent study which shows that the healthiest lifestyle is linked to a 75% reduction in diabetes risk. It is estimated that there are now more than half a billion people worldwide living with type 2 diabetes, so this study is particularly timely. In essence the study concludes that caregivers and health ministries should promote an *overall* healthy lifestyle, rather than focussing on particular lifestyle factors.

Curating news for each issue is generally quite a difficult task as there are so many interesting developments from which we have to select but a few. One particularly positive development (initiated by the US National Institute of Allergy and Infectious Diseases) is the recent formation of a collaborative influenza research network whose aim is to develop a universal flu vaccine. Over the years we have regularly covered research in this field and I have spoken to researchers in different parts of the world doing similar research, but unaware each other's work – so the formation of this collaborative network is a great step in the right direction.

Also of interest in the news are two reports published recently in *The Lancet* which note that cancer is now the leading cause of death in high-income countries, having taken the lead from cardiovascular disease (CVD). The report states that although CVD remains the leading cause of mortality among middle aged adults globally this is no longer the case in high-income countries, where cancer is now responsible for twice as many deaths as CVD. There are several implications of this finding, in particular there should be a realignment of health policies where this is the case, as is noted by one of the researchers.

There is more news where this came from, as well as informative reviews and interviews. Read on…

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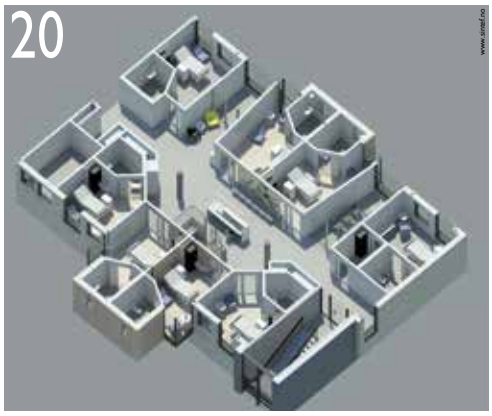

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middle east monitor

Update from around the region

UAE students develop AI-powered healthcare solution

A team of Arab nationals have won this year's United Arab Emirates national James Dyson Award for their Vita-Cam invention.

Vita-Cam is a mobile application built on a convolutional neural network, an artificial intelligence technology, and offers an affordable way to prevent common health complications. It intelligently analyses images of body parts – including eyes and nails – and uses a growing depository of medical records to identify both vitamin and mineral deficiencies. The application also provides nutritional recommendations for optimal health, and can be made available by health authorities or healthcare providers to users for free, or used by healthcare professionals as a simplified tool.

The winners were recognised by His Excellency Khalfan Belhoul, CEO of Dubai Future Foundation, during the awarding ceremony hosted at Youth x Hub Dubai. "This solution is a testament to the UAE's efforts to empower the youth and in creating an environment that promotes innovation and creativity. I am extremely proud of the talented Arab students behind Vita-Cam, as well as of the rest of the nominees, and hope to see many more similar successes from the region."

Electrical engineering students at Ajman University – Ahmed Saif, Mohamed AitGacem, Saifeddin Alghlayini and Wissam Shehieb – are the minds behind Vita Cam.

"As engineers, we would like to fill current gaps in order to enhance people's quality of life, and address mounting universal challenges. By connecting disparities within the global healthcare system with an applied AI solution, we have invented an interactive prevention tool that is within reach of smartphone users around the world," explained Saif.

Winning the national leg of the James Dyson Award will inject AED9,300 into the Vita-Cam project, allowing the budding inventors to develop an advanced version of the application.

It took three full software prototypes and countless programming amendments to develop Vita-Cam, owing to the complexity of integrating different programming tools in one compact application. There was also an initial medical research phase, which was facilitated by one of the team members who also has a medical degree.

The Vita-Cam will progress to the international stage of the James Dyson Award. The winners aim to commercialise this product for global use.

- Find out more about Vita-Cam here: *www.jamesdysonaward.org/en-NZ/2019/project/vita-cam/*

Al-Futtaim Group launches HealthHub

Al-Futtaim has launched Al-Futtaim Health and its HealthHub which will bring specialised care to residents across the UAE. Launching with 10 clinics initially, the HealthHub roadmap includes 26 multispecialty clinics, day surgical centres, super-specialized centres of excellence and two hospitals, with regional and international expansion planned over the next two years. The HealthHub was launched at a private event in the presence of HE Humaid Al Qutami, Chairman of the Board and Director General of the Dubai Health Authority, HE Marcy Grossman, Council General of Canada, Omar Al Futtaim, Vice-Chairman of the Al-Futtaim Group and Dr. Haidar Al Yousuf, Managing Director of Al-Futtaim Health.

As a hub for continuous care, the HealthHub provides accessible, integrated health management supported by smart solutions in a casual, happy and insight-driven environment. With a family doctor who knows each patient and their medical history, patients can feel confident that they are dealing with a true family doctor.

Commenting on the launch, Al Qutami, said: "It gives us great pleasure to see large market players like Al-Futtaim investing in the private health sector of Dubai and UAE and becoming significant investors in this vital economic sector. This is in line with the Dubai strategic plan and the vision of HH Sheikh Mohammed bin Rashid Al Maktoum in making the health sector in the UAE one of the best in the world."

Of the first 10 clinics being opened at launch, five of these are publicly facing and situated in Silicon Oasis, Al Warqa, Discovery Gardens, Al Qusais and International City, with more planned to go live in the coming months in Al Barsha, Jebel Ali, Al Nahda and Bur Dubai as well as in Al-Futtaim operated properties Dubai Festival City and the upcoming Festival Plaza which will be launching in December. The other five will be staff clinics.

Omar Al Futtaim, Vice-Chairman of

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the Al-Futtaim Group said: "This is Al-Futtaim's first investment in the healthcare sector, which is another milestone in our group's business diversification efforts. We are focused on building a significant, sustainable portfolio that aims at adding value to the healthcare sector and contributes to building a world-class healthcare system in the UAE. Medical tourism is a booming global industry and it's projects like these that will contribute to putting the UAE on the map as a hub for medical tourism."

Micro-elimination efforts in UAE key to accelerate elimination of Hep C by 2030

To support the World Health Organization's targets of eliminating the hepatitis C virus (HCV) by 2030, as well as the efforts by the United Arab Emirates (UAE) Ministry of Health and Prevention (MOHAP), regional health authorities and the Emirates Gastroenterology and Hepatology Society to achieve this goal, Gilead Sciences Middle East stresses the importance of micro-elimination.

An effective concept in the fight against HCV, micro-elimination is a strategy that pursues national elimination by targeting one population segment at a time through multi-stakeholder initiatives. By tailoring interventions to the needs of these populations, elimination efforts are made simpler, more achievable and less-costly than full-scale, country level initiatives. Presently, global efforts to eliminate HCV are picking up, with micro-elimination strategies proving very effective for the hardest to treat patients.

"Micro-elimination is the most realistic way to achieve elimination goals while being able to allocate appropriate resources and provide support to local medical professionals who can tailor interventions to suit the need of a particular segment. Through micro-elimination, we can target the most at risk populations such as those people who inject drugs, people who are incarcerated, patients who frequently receive blood transfusions or regions with relatively higher HCV prevalence, amongst others, and work in a more strategic manner to make a difference," commented Cary James, CEO of the World Hepatitis Alliance, London U.K.

In 2016, the World Health Assembly endorsed the Global Health Sector Strategy (GHSS) on viral hepatitis, calling for the elimination of HCV as a public health threat by 2030. The strategy aims to reduce new infections by 90% and mortality by 65%. 71 million people are infected with HCV worldwide with over 21% of them (15 million) in the Middle East region – this is the highest prevalence of the infection globally.

"The prevalence rate in the UAE is between 0.24% to 1.64%, and there have been several initiatives driven by the government in collaboration with the private sector to make strides towards early detection, treatment and the prevention of the virus," commented by Dr Samir Alawadi, President of the Emirates Gastroenterology and Hepatology society.

"While prevalence rates in the UAE are low, multi-stakeholder collaboration between governments, primary care providers, other healthcare specialists, policy makers and pharma companies is key to achieving the WHO HCV elimination targets. While efforts so far have proven to be successful, simplifying the approach by creating a strategic plan to break down national elimination goals into smaller achievable goals for individual populations and working collaboratively will really support to maintain momentum of elimination efforts," added Dr Maryam Alkhatry, Head of Gastroenterology & Hepatology Department, Ibrahim Bin Hamad Obaidulla Hospital , Ras al-Khaimah.

American Hospital Dubai announces expansion plans

American Hospital Dubai, one of the leading pioneers of private healthcare in the Middle East, has revealed its expansion strategy with a focus on making quality healthcare accessible and closer to patients.

With a strong emphasis on healthcare and medical expertise, American Hospital Dubai has announced infrastructure upgrades at the main campus located in Oud Metha, with the first phase of the revamp to begin this year. It is notable that the hospital expanded its state-of-the-art modular operation theatres and dialysis facilities in the campus earlier this year.

The expansion plan includes the out-patient area, which will be revamped in different phases in order to ensure continuity of the hospital services. The new services planned to be announced after the upgrades will increase access and choices for patients, such as a new IVF facility.

Expansion is also planned in its comprehensive patient-centred cancer care unit, which is being prepared to offer new services, high level expertise, and extended space. The cancer centre is certified for its high-quality cancer care.

After the successful launch of the second American Hospital satellite clinic in Barsha, Galleria Mall, American Hospital Dubai is now expanding its network of facilities and medical groups by opening six new medical centres in 2020 which includes Dubai Hills, Last Exit in Al Khawaneej and Mira. This expansion aims to offer patients across the city quality yet affordable healthcare, in their proximity.

Sherif Beshara, Group CEO of American Hospital, said: "Our vision of making the region healthier and more sustainable through quality care, innovation, and medical excellence, we are driving expansions and strategic alliances that seek to help people to look after their health at every stage of life."

He added: "Through strategic partnerships, our health plans will offer comprehensive support to patients. Our partnership with the flagship Mayo Clinic will allow thousands of individuals to receive life-changing medical services, while keeping healthcare affordable."

American Hospital is in the process of signing strategic alliances with quality

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healthcare providers internationally, that will open new service lines to the hospital and add value to the patient experience with cutting-edge healthcare solutions.

A premier private healthcare provider in the Middle East, American Hospital Dubai was established in 1996 with the goal of providing world-class medical service to the community. The 252-bed, acute care, general medical/surgical private hospital has state-of-the-art facilities and an experienced team of healthcare professionals specialised in more than 40 medical and surgical specialties assuring comprehensive care. All physicians at American Hospital Dubai are American Board Certified or equivalent ensuring that patients receive international standard of care in the UAE.

American Hospital Dubai also operates two dedicated clinics – in Dubai Media City and Al Barsha.

Expert calls on parents to protect children from diabetes stigma

While research shows reports of stigmatisation are prevalent among all age groups with diabetes, the situation is particularly harmful to vulnerable young patients, says a diabetes expert from Imperial London College Diabetes Centre (ICLDC).

Dr. Amani Taha Osman, consultant paediatric diabetologist at ICLDC

Dr Amani Osman, a consultant paediatric diabetologist, explains that diabetes is a very visible disease, with identifiable characteristics such as blood glucose monitoring, insulin injections, dietary restrictions, and hypoglycaemic episodes, all of which can contribute to the experience of stigma.

"In younger people, who often feel pressure to be accepted by their peers, these aspects create a sense of 'otherness' and make it difficult for them to blend in."

A recent study published by the American Diabetes Association, found that a majority of respondents with type 1 (76%) and type 2 (52%) diabetes reported that diabetes comes with stigma.

Dr Amani says the source of the stigma is usually ignorance; many people do not know that there are different types of diabetes, with different treatments, and the best way to deal with stigmatisation is to improve public awareness.

"Awareness campaigns such as ICLDC's Diabetes.Knowledge.Action are helping by educating the public alongside the patients and their families," she says.

Sometimes stigmatisation is enforced by the parents themselves. Dr Amani says that earlier in her career she found one set of parents took their child off the insulin pump she had prescribed. When she asked why, it was because they were concerned about public perceptions.

"Parents worry that their child won't be able to get married or have children, for example. I reassure them that the child can still live a normal life, have children of their own, play, and have fun."

Dr Amani says stigmatisation has serious implications. "Studies looking into the consequences of this stigmatisation have shown patients with diabetes experience feelings of fear, guilt, anxiety, embarrassment, blame, and low self-esteem and these negative emotions can affect overall mental health," she says.

"This is a problem as these children are already at risk for depression associated with negative diabetes-related health outcomes and complications."

She advises parents to look out for signs of depression in children with diabetes, particularly if they last more than two weeks. Examples include a depressed or sad mood, sleeping or eating too much or too little, lack of concentration, falling grades or getting into trouble in school.

"Both fear of stigma and depression can affect how well young people manage their conditions, so it is vital for parents to monitor their progress carefully." MEH

Leaky mitral valves fixed with MitraClip®

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The transcatheter mitral valve repair (TMVR) programme at Royal Brompton and Harefield hospitals is one of the most experienced and comprehensive in the world. Dr Robert Smith, consultant interventional cardiologist, runs the most experienced MitraClip team in the UK. He has treated more than 250 leaky mitral valves with MitraClip® therapy.

The mitral valve is very complex with thin valve leaflets attached to the heart wall via multiple string-like chords. Opening with every heartbeat, the valve is susceptible to wear and tear.

As the heart beats, the mitral valve and tricuspid valve control blood flow from the atria to the ventricles. Mitral regurgitation (MR) occurs when the mitral valve's two leaflets do not close completely, thus allowing blood to flow backwards at high pressure through the valve into the left atrium.

Mitral regurgitation causes the heart to work harder to push blood around the body. Symptoms include fatigue, shortness of breath and worsening heart failure. In severe cases, it can result in fluid congestion of the lungs.

The condition can be related to age, coronary artery disease, underlying heart muscle disease (cardiomyopathy) or a birth defect.

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Conventionally, degenerative MR is treated by open-heart surgery. However, where the risk of surgery is too high, or when the regurgitation is due to a weak heart muscle, open-heart surgery may not be appropriate.

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The MitraClip® procedure is guided by both x-ray and transoesophageal echocardiogram (TOE) to ensure the best possible outcome.

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The procedure immediately reduces MR. Patients are likely to feel a change to their quality of life quickly afterwards, once the anaesthetic has worn off.

Dr Smith explains: "After 48 hours, they have a significant improvement. MitraClip® is associated with symptomatic improvement in 90 to 95% of patients. It's proven to be good at relieving symptoms and can generally be performed at low risk of serious complication."

In addition to MitraClip, Dr Smith's team are continually pushing the boundaries, undertaking many new and innovative transcatheter procedures to treat both mitral and tricuspid valve disease.

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worldwide monitor

Update from around the globe

US NIH forms new collaborative influenza vaccine research network to develop universal flu vaccine

The US National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, has initiated the Collaborative Influenza Vaccine Innovation Centers (CIVICs) program, a new network of research centres that will work together in a coordinated, multidisciplinary effort to develop more durable, broadly protective and longer-lasting influenza vaccines. NIAID will provide up to approximately $51 million in total first-year funding for the program, which is designed to support the CIVICs program centres over seven years.

"To more effectively fight influenza on a global scale, we need better influenza vaccines that are more broadly protective," said NIAID Director Anthony S. Fauci, M.D. "With the CIVICs program we hope to encourage an exchange of ideas, technology and scientific results across multiple institutions to facilitate a more efficient and coordinated approach to novel influenza vaccine development."

Seasonal influenza causes hundreds of thousands of hospitalizations and tens of thousands of deaths in the United States alone each year, according to the Centers for Disease Control and Prevention. While current seasonal influenza vaccines are widely available and provide important public health benefit, they could be improved. Notably, they do not always protect against all strains of circulating influenza viruses. Each year, months ahead of the flu season, scientists must make their best prediction as to which circulating viruses will be dominant. New seasonal influenza vaccines must be manufactured, distributed and administered to keep up with constantly evolving influenza viruses. This process can be slow, and if a drifted seasonal influenza virus emerges, that can impact the effectiveness of the vaccine against that virus. The relatively long timeline for vaccine production and the rapidly changing nature of influenza viruses poses a unique and difficult public health challenge for these reasons.

The CIVICs network will develop so-called universal influenza vaccines, which could provide longer-lasting protection than current vaccines and against a wider variety of influenza viruses. The CIVICs centres will conduct multidisciplinary research that supports the development of vaccine candidates through testing in preclinical studies, clinical trials and human challenge studies. The CIVICs network also will explore approaches to improve seasonal influenza vaccines, such as by testing alternative vaccine platforms or incorporating new adjuvants (substances added to vaccines to boost immunity). These advances could substantially reduce influenza hospitalizations and deaths in the future.

The CIVICs program will include three Vaccine Centers, one Vaccine Manufacturing and Toxicology Core, two Clinical Cores, and one Statistical, Data Management, and Coordination Center (SDMCC).

The Vaccine Centers will focus on designing novel vaccine candidates and delivery platforms with an emphasis on cross-protective vaccine strategies that could be used in healthy adults as well as populations at high risk for the most serious outcomes of influenza, such as children, older adults, and pregnant women. The Vaccine Centers also will focus on new ways to study influenza viruses and the human immune response to them through computer modelling, animal models and human challenge trials.

The most promising candidate vaccines will advance to clinical trials conducted by the Clinical Cores. Vaccine candidates will first be evaluated for safety and immunogenicity in small Phase 1 clinical trials conducted among healthy adult participants. Successful vaccine candidates may eventually be advanced to larger Phase 2 clinical trials in healthy adults, or in specific age groups or at-risk populations. The Vaccine Manufacturing and Toxicology Core will work with the Vaccine Centers to develop and manufacture the vaccine candidates for clinical testing.

The CIVICs centres will regularly consult the SDMCC for assistance in designing statistically sound preclinical experiments and clinical trials. The SDMCC also will perform data analyses, make results available across the CIVICs program and ensure that data is available in publicly accessible databases. In doing so, the SDMCC will ensure that the network functions as a collaborative unit, with standardized study protocols and reporting procedures at every step.

Springer Nature, Projekt DEAL sign world's largest open access agreement

A Memorandum of Understanding (MoU) signed 22 August this year between Max Planck Digital Library Services, on behalf of Projekt DEAL, and Springer Nature sets the scene for the world's most comprehensive open access (OA) agreement.

Reaching such an understanding has been possible through acknowledgement of the common commitment of both parties to the principle of open science: Projekt DEAL's vision and enablement of open access to German research on a large-scale and Springer Nature's position as the largest OA publisher and their expertise as a pioneer of transformative deals. The agreement is expected to see well over 13,000 articles a year from German researchers published OA, meaning they will be freely and universally available for the world's students, scholars and scientists to read, share, use and reuse from the moment of publication.

The transformative two-part agreement will encompass a fully OA element and a Publish and Read (PAR) element. This will enable eligible authors to publish OA in both Springer Nature's fully OA journals, the largest OA portfolio in the world with over 600 titles, and Springer Nature's collection of 1,900 hybrid journals, which collectively already publish one in four of all OA articles. In addition, the model provides the academic community of the participating institutions with permanent reading access to content in Springer, Palgrave,

Adis, and Macmillan academic journals published during the term of the contract.

Key elements of the MoU:

- The final contract will run from 2020 to 2022 with an option to extend to 2023.
- For 2020, the PAR component is based on OA publication of at least 9,500 articles and grants participating institutions with permanent reading access to 1,900 journals in the Springer, Palgrave, Adis and Macmillan portfolios. The costs for reading access and OA publishing in the PAR component will be reflected in a per-article PAR fee of €2,750.
- Springer Nature will offer a 20% discount on the list price for OA publishing in BMC and SpringerOpen titles for all institutions; list price increases of article processing charges will not exceed 3.5 % per journal title per year calculated based on the 2020 list price.
- The PAR element does not include Nature and Nature branded subscription journals or purely professional journals as well as magazines, such as Scientific American or Spektrum der Wissenschaft.
- Participating institutions will have complimentary backfile access to issues of included journals during the contract period back to 1997.
- Springer Nature and Projekt DEAL also aim to close the gaps in access to archive content from all Springer Nature journals covered by the MoU.

Commenting on the initiative, Daniel Ropers, Chief Executive Officer of Springer Nature said: "It is a real privilege to be working with Projekt DEAL to transform research publishing in Germany. This arrangement has taken 3 years to finalise which reflects its scale and complexity, but we highly appreciate the leadership the German research institutions have shown, and in partnership we've been able to conclude this journey with a ground-breaking solution. The shared belief, commitment and openness of both parties has facilitated an understanding which is sustainable for both partners: for German research, as it enables scientists in Germany, whether from small or large institutes, whether from the physical, natural, applied or social sciences, and whether grant funding has been available or not, to publish OA with us. And for Springer Nature, as it facilitates faster growth, allowing us to benefit from our leading role in the open access migration as a partner to the research community."

The Max Planck Society, as a member of the Alliance of Science Organisations behind Projekt DEAL, instituted Max Planck Digital Library (MPDL) Services, an affiliate of the Max Planck Digital Library, as a 100% subsidiary of the Society specifically as the contracting party for the DEAL contracts and to facilitate implementation of the agreements among German institutions.

Funds awarded to advance reference sequence of the human genome

New grants totalling approximately $29.5 million will enable scientists to generate and maintain the most comprehensive reference sequence of the human genome. The awards, made over five years pending the availability of funds, are managed by the National Human Genome Research Institute (NHGRI), part of the US National Institutes of Health.

The currently available reference sequence of the human genome is becoming obsolete. The funds are necessary for making advances in DNA sequencing technology and computational methods possible. As a result, NHGRI will fund two centres as a part of a new Human Genome Reference Program (HGRP).

"It has grown more and more important to have a high-quality, highly usable human genome reference sequence that represents the diversity of human populations. The proposed improvements will serve the growing basic and clinical genomics research communities by helping them interpret both research and patient genome sequences," said Adam Felsenfeld, Ph.D., NHGRI program director in the Division of Genome Sciences.

Almost all biomedical research studies that use or analyze human genomic data rely on the established reference sequence of the human genome. In the same way that people use the puzzle picture to help assemble jigsaw puzzles, researchers use the reference genome sequence to assemble genome sequences from individuals. By advancing the quality of the available reference sequence of the human genome, the HGRP will enable researchers to find disease-causing variants and specify their genomic locations with markedly increased accuracy. An improved reference sequence will also allow scientists to report results in a way that other scientists can use in their analyses of genome sequence data.

The two centres will work with international collaborators and develop a multi-genome reference sequence that is as universal and complete as possible. Known as a 'pan-genome,' the more-complete reference sequence will represent 350 genomes from the human population. Over time, researchers hope that the pan-genome will reflect all human diversity, enabling analyses of any human DNA sequence.

The sequencing of the human genome was a landmark achievement in the history of science. The Human Genome Project provided a near-complete human genome sequence as a public reference. This reference has been maintained and improved since the end of the Human Genome Project by an international group, the Genome Reference Consortium. The consortium is now poised to take a bold step forward as part of the new program.

The second component – the Human Reference Genome Sequencing Center – aims to sequence up to 350 additional diverse human genomes using state-of-the-art technologies to incorporate high-quality sequences that are more broadly representative.

Additional information about NHGRI can be found at: *www.genome.gov.*

Cancer now leading cause of death in high-income countries

Two reports from the Prospective Urban and Rural Epidemiologic (PURE) study published in *The Lancet* and presented together at the ESC Congress 2019 provide unique information on common disease incidence, hospitalisation and death, and modifiable cardiovascular risk factors, in middle-aged adults across 21 High-Income, Middle-Income, and Low-Income Countries (HIC, MIC, LIC).

Cardiovascular disease (CVD) remains the leading cause of mortality among middle aged adults globally, accounting for 40% of all deaths, but this is no longer the case in HIC, where cancer is now responsible for twice as many deaths as CVD. It was estimated that 55 million deaths occurred in the world in 2017, of which approximately 17·7 million were due to cardiovascular disease (CVD).

The PURE study is the only large prospective international cohort study that involves substantial data from a large number of MIC and LIC, as well as HIC, and employs standardised and concurrent methods of sampling, measurement and follow-up.

Common diseases in transition

The first report, which followed 162,534 middle-aged adults (aged 35 - 70, 58% women) in 4 HIC, 12 MIC and 5 LIC over a median of 9.5 years (between 2005 – 2016), found that CVD related deaths were 2.5 times more common in middle-aged adults in LIC compared with in HIC, despite LIC experiencing a substantially lower burden of CVD risk factors compared with wealthier countries. Authors suggested that higher CVD related mortality in LIC may be mainly due to lower quality of healthcare, given that the report found first hospitalisation rates and CVD medication use to be both substantially lower in LIC and MIC, compared with in HIC.

"The world is witnessing a new epidemiologic transition among the different categories of non-communicable diseases (NCD), with CVD no longer the leading cause of death in HIC," said Dr. Gilles Dagenais, Emeritus Professor at Laval University, Quebec, Canada and lead author of the first report. "Our report found cancer to be the second most common cause of death globally in 2017, accounting for 26% of all deaths. But as CVD rates continue to fall, cancer could likely become the leading cause of death worldwide, within just a few decades."

While the study found the incidence of CVD per 1000 person years to be 7·1, 6·8 and 4·3 in LIC, MIC, and HIC respectively, it conversely found cancer, pneumonia, COPD and injuries to be least common in LIC and most common in HIC. Overall mortality rates were twice as high in LICs compared with MIC, and four times higher in LICs compared with HIC, though rates of deaths from cancer were similar across all country income levels.

CVD prevention

Dr Salim Yusuf, Professor of Medicine, McMaster University, and Principal Investigator of the study remarked: "While long-term CVD prevention and management strategies have proved successful in reducing the burden in HIC, a change in tack is required to alleviate the disproportionately high impact of CVD in LIC and MIC. Governments in these countries need to start by investing a greater portion of their Gross Domestic Product in preventing and managing non-communicable diseases including CVD, rather than focussing largely on infectious diseases."

A further report from the PURE study, also published in *The Lancet* and presented simultaneously at the ESC Congress 2019, explored the relative contribution (population attributable factor, or PAF) of 14 modifiable risk factors to CVD, among 155,722 community-dwelling, middle-aged people without a prior history of CVD, within the same 21 HIC, MIC and LIC.

Overall, modifiable risk factors, including metabolic, behavioural, socioeconomic and psychosocial factors, strength and environment, accounted for 70% of all CVD cases globally. Metabolic risk factors were the largest contributory risk factor globally (41.2%), with hypertension (22.3%) the leading factor within this group.

However, the relative importance of risk factors for CVD cases and death varied widely between countries at different stages of economic development. For deaths, the largest group of PAFs overall were for behavioural risk factors (26.3%), but in MIC and LIC, the importance of household air pollution, poor diet, low education, and low grip strength were substantially larger compared to their impact in HIC. In line with the findings of the first report, metabolic risk factors including high cholesterol, abdominal obesity or diabetes, played a larger role in causing CVD in HIC, compared with in LIC.

"We have reached a turning point in the development of CVD prevention and management strategies," said Annika Rosengren, Professor of Medicine from Goteborg, Sweden. Sumathy Rangarajan, who coordinated the study. "While some risk factors certainly have large global impacts, such as hypertension, tobacco, and low education, the impact of others, such as poor diet, household air pollution, vary largely by the economic level of countries. There is an opportunity now to realign global health policies and adapt them to different groups of countries based on the risk factors of greatest impact in each setting."

Countries analysed in these two reports from the PURE Study include: Argentina, Bangladesh, Brazil, Canada, Chile, China, Colombia, India, Iran, Malaysia, Pakistan, Palestine, Philippines, Poland, Saudi Arabia, South Africa, Sweden, Tanzania, Turkey, United Arab Emirates, Zimbabwe.

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Pushing the boundaries of brain tumor treatment

Rohan Ramakrishna, MD

Surgical neuro-oncologist Rohan Ramakrishna, MD, and his colleagues at the Weill Cornell Brain and Spine Center are pushing the boundaries of treatment for patients with gliomas, metastatic disease, skull base lesions, and pituitary disorders, employing the newest techniques and technologies available. These include awake mapping, imaging techniques, and microsurgery to ensure maximal tumor removal and achieve the safest surgical outcomes.

"A number of significant therapeutic advances have emerged for the treatment of brain tumors in just the last year," says Dr. Ramakrishna, Director of the Brain Metastases Clinic at Weill Cornell Medicine. "One area we are particularly excited about is the use of high-intensity focused ultrasound [HIFU] for the treatment of deep subcortical tumors. Maintaining quality of life is one of our primary goals in brain tumor surgery. Oftentimes, these subcortical tumors are not accessed for the purpose of total removal using traditional means because of the potential for collateral neurologic damage. Typically, we are forced either to do a limited biopsy or treat those lesions with laser therapy or radiosurgery, and all of those alternatives have some drawbacks."

High-intensity focused ultrasound therapy, pioneered by neurosurgeon Michael G. Kaplitt, MD, PhD, Director of the Weill Cornell Brain and Spine Center, enables a surgeon to lesion the abnormally functioning area of the brain completely noninvasively with MR thermometry. In 2016, the FDA approved its use for the treatment of essential tremor.

Dr. Ramakrishna and Dr. Kaplitt are currently collaborating to pilot this technique for patients with gliomas and other subcortical tumors. "We know that total or near total removal of the glioma results in better patient outcomes from the standpoint of survival and responsiveness to other therapies, such as chemotherapy and radiation," says Dr. Ramakrishna. "Ideally you want to try and remove as much tumor as you can prior to starting the journey with these other therapies. With this new technology we have the ability to ablate the entire tumor noninvasively in a conformal way, providing the same benefit as removal without the collateral neurologic deficit." Their study proposal is currently under IRB review; the physicians hope to begin using this approach for subcortical tumors in the spring.

Weill Cornell physicians are also using ultrasound experimentally in the laboratory to disrupt the blood-brain barrier. "Most chemotherapies do not get into the brain effectively. By using ultrasound technology, we can temporarily disrupt the blood-brain barrier so that chemotherapies are now potentially in play for patients with these hard-to-treat tumors," says Dr. Ramakrishna. "This approach may someday obviate the need for convection-enhanced delivery. We're currently putting together a clinical trial for this purpose and expect it to begin in early 2019."

Weill Cornell is also participating in the ongoing DNAtrix clinical trial that is using oncolytic virus immunotherapies for patients with either a first of second recurrence of glioblastoma for whom surgery is not possible or planned. "In this trial we inject a modified cold virus into the tumor and then follow that injection with immunotherapy. We don't have the results yet, but so far the trial is going well and remains open," says Dr. Ramakrishna, adding that discussions are underway to expand the viral oncolytic trials therapy portfolio to include patients with newly diagnosed glioblastoma.

> One area we are particularly excited about is the use of high-intensity focused ultrasound for the treatment of deep subcortical tumors.

"Another area where we are pushing boundaries pertains to minimally invasive access to skull base tumors using endoscopes to obtain biopsies," adds Dr. Ramakrishna. In a paper published in the Journal of Neuro-Oncology in November 2018, Weill Cornell investigators assessed the use of a tubular retractor-based minimally invasive biopsy technique to provide improved tissue yield. "We found doing the biopsy in this way is equally as safe as needle biopsies, but also enables us to obtain much more tissue for genomic profiling testing that we consider standard of care today."

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the laboratory

Medical research news from around the world

Exercising before eating breakfast improves how the body responds to insulin

According to a new study, published in the *Journal of Clinical Endocrinology* and Metabolism health scientists at the universities of Bath and Birmingham found that by changing the timing of when you eat and exercise, people can better control their blood sugar levels.

The six-week study, which involved 30 men classified as obese or overweight and compared results from two intervention groups (who ate breakfast before / after exercise) and a control group (who made no lifestyle changes), found that people who performed exercise before breakfast burned double the amount of fat than the group who exercised after breakfast.

They found that increased fat use is mainly due to lower insulin levels during exercise when people have fasted overnight, which means that they can use more of the fat from their fat tissue and the fat within their muscles as a fuel. To test proof-of-principle the initial study involved only men, but future studies will look to translate these findings for different groups including women.

Whilst this did not lead to any differences for weight loss over six weeks, it did have 'profound and positive' effects on their health because their bodies were better able to respond to insulin, keeping blood sugar levels under control and potentially lowering the risk of diabetes and heart disease.

Building on emerging evidence that the timing of meals in relation to exercise can shift how effective exercise is, the team behind this study wanted to focus on the impact on the fat stores in muscles for individuals who either worked out before or after eating and the effect this had on insulin response to feeding.

Dr Javier Gonzalez of the Department for Health at the University of Bath explained: "Our results suggest that changing the timing of when you eat in relation to when you exercise can bring about profound and positive changes to your overall health.

"We found that the men in the study who exercised before breakfast burned double the amount of fat than the group who exercised after. Importantly, whilst this didn't have any effect on weight loss, it did dramatically improve their overall health.

"The group who exercised before breakfast increased their ability to respond to insulin, which is all the more remarkable given that both exercise groups lost a similar amount of weight and both gained a similar amount of fitness. The only difference was the timing of the food intake."

Over the six-week trial, the scientists found that the muscles from the group who exercised before breakfast were more responsive to insulin compared to the group who exercised after breakfast, in spite of identical training sessions and matched food intake. The muscles from those who exercised before breakfast also showed greater increases in key proteins, specifically those involved in transporting glucose from the bloodstream to the muscles.

For the insulin response to feeding after the 6-week study, remarkably, the group who exercised after breakfast were in fact no better than the control group.

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Scientists create new viral vector for improved delivery of gene therapy for sickle cell disease

Researchers at the US National Institutes of Health have developed a new and improved viral vector – a virus-based vehicle that delivers therapeutic genes – for use in gene therapy for sickle cell disease. In advanced lab tests using animal models, the new vector was up to 10 times more efficient at incorporating corrective genes into bone marrow stem cells than the conventional vectors currently used, and it had a carrying capacity of up to six times higher, the researchers report.

The development of the vector could make gene therapy for sickle cell disease much more effective and pave the way for wider use of it as a curative approach for the painful, life-threatening blood disorder. Sickle cell disease affects millions of people worldwide.

"Our new vector is an important breakthrough in the field of gene therapy for sickle cell disease," said study senior author John Tisdale, M.D., chief of the Cellular and Molecular Therapeutic Branch at the National Heart, Lung, and Blood Institute (NHLBI). "It's the new kid on the block and represents a substantial improvement in our ability to produce high capacity, high efficiency vectors for treating this devastating disorder."

Researchers have used virus-based vehicles for years in gene therapy experiments, where they have been very effective at delivering therapeutic genes to bone marrow stem cells in the lab before returning them to the body. But there's always room for improvement in their design in order to optimize effectiveness, Tisdale noted. He compared the new virus-based vehicle to a new and improved car that is also far easier and cheaper for the factory to produce.

The study was supported by the NHLBI and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK),

> It's the new kid on the block and represents a substantial improvement in our ability to produce high capacity, high efficiency vectors for treating this devastating disorder.

both part of the NIH. It was published online in Nature Communications.

Sickle cell disease is an inherited blood disorder caused by a mutation in the beta-globin gene (or ß-globin gene). This mutation causes haemoglobin to produce sickle-shaped cells that can stick to the walls of blood vessels, causing blockage, pain, anaemia, organ damage, and early death. With gene therapy, doctors modify the patient's bone marrow hematopoietic stem cells in the lab by adding a normal copy of the beta-globin gene through the use of a viral vector. They then reinfuse the modified stem cells into the patient to produce normal, disc-shaped red blood cells.

For the past 30 years, researchers have been designing these beta-globin vectors in a reverse structural orientation, meaning the therapeutic genes incorporated into the virus are translated from right to left by the viral vector-making machinery-much like reading an English sentence backwards. The reason for the reverse orientation is the sensitive expression of a key molecular component of the vector called intron 2. This segment is required for high-level beta-globin gene expression but gets clipped out during the normal vector preparation process if it is left in the natural, forward direction. Gene therapy trials using reverse-oriented vectors for sickle cell disease and beta-thalassemia have largely been encouraging, the researchers said, but this complicated gene translation process has made vector preparation and gene-transfer efficiency more difficult.

About 10 years ago, Tisdale and Naoya Uchida, M.D., Ph.D., a staff scientist in his lab, searched for an improved delivery vehicle and decided to undertake a radical redesign of the beta-globin vector. They came up with a unique work-around design that left intron 2 intact and created the new forward-oriented beta-globin vector. In contrast to the old vector, the gene sequence of the new beta-globin vector is read from left to right making the gene translation approach less complicated, Tisdale explained.

The researchers tested the new vectors in mice and monkeys and compared the results to reverse-oriented vectors. They found that the new vectors could transfer a much higher viral load – up to six times more therapeutic beta-globin genes than the conventional vectors – and had four to 10 times higher transduction efficiency, a measure of the ability to incorporate corrective genes into repopulating bone marrow cells. The new vectors also showed a capacity for longevity, remaining in place four years after transplantation. Researchers also found that they could be produced in much higher amounts than the conventional vectors, potentially saving time and lowering costs associated with large-scale vector production.

"These findings bring us closer to a curative gene therapy approach for haemoglobin disorders," Tisdale said.

The new vector, for which the NIH holds the patent, still needs to undergo clinical testing in humans. Already an estimated 27 people with sickle cell disease have undergone experimental gene therapy using conventional vectors. Through its Cure Sickle Cell Initiative, NIH is working to accelerate the development of these and other new genetic therapies, including gene editing, with the goal of finding a cure for the disease.

- Cure Sickle Cell Initiative: *www.nhlbi.nih.gov/science/cure-sickle-cell-initiative*

Large five-year randomised trial supports use of polypill to prevent cardiovascular diseases

A once-daily polypill safely reduces the risk of major cardiovascular events such as heart attack, stroke, and heart failure by more than a third over five years compared with lifestyle advice alone (202/3,421 [6%] vs 301/3,417 [9%]), according to the first large randomised trial of its kind involving almost 7,000 individuals aged 50–75 years in Iran. The effects were seen in a wide range of individuals, including those with and without a history of cardiovascular disease (CVD).

The findings, published in *The Lancet*, demonstrate for the first time the effectiveness of a fixed-dose combination polypill – containing two commonly used blood pressure lowering drugs, a cholesterol-lowering medicine, and aspirin – for both the primary and secondary prevention of CVD in the general population, and indicate that the benefits of widespread polypill use outweigh any known side effects.

Crucially, participants who took the polypill as directed (at least 70% of the time) saw the strongest protective effect against future cardiovascular events – cutting their risk by more than half (57%) compared with those given lifestyle advice only (86/2,144 [4%] vs 301/3,417 [9%]). Nevertheless, the authors did not observe a corresponding improvement in blood pressure.

This study is the first to have a sufficient sample size and follow-up time to assess the effect of the polypill on long-term fatal and non-fatal cardiovascular events in primary prevention.

"The idea of the polypill has always been appealing, and now we know that a fixed-dose polypill can achieve clinical benefits in practice," said Professor Reza Malekzadeh from Tehran University of Medical Sciences in Iran who led the research. "Because the risks of side-effects from the components are very low, and the potential benefits are very high, the polypill is very safe. In terms of risk

reduction, we can see the people who benefit most are those with high adherence. But the polypill is not an alternative to a healthy lifestyle and should be combined with physical activity, a healthy diet, and smoking cessation."

Co-author Professor Tom Marshall from University of Birmingham in the UK, said: "Polypills are commercially available in a number of countries for secondary prevention, but this is the largest trial confirming the value of the polypill and showing it is effective in primary prevention. Because they have most to gain, the most efficient strategy would be to offer the polypill to those at highest risk of heart disease.

Poor medication adherence is particularly common among patients with cardiovascular disease, with research suggesting that around a third of patients stop taking their medication as early as 90 days after having a heart attack. The polypill concept was first proposed almost 20 years ago as a simpler, cost-saving approach to improve medication adherence and reduce the cardiovascular disease burden. But evidence of the long-term effects of the polypill is lacking, particularly in primary prevention settings, and the polypill is still not widely used.

To provide more evidence, the PolyIran study recruited 6,838 individuals from the Golestan Cohort – a study tracking the health of over 50,000 adults from Golestan, a province in Iran. Between February, 2011, and April, 2013, participants aged 50 years or more living in rural areas were recruited. Around 1 in 10 had a history of CVD (737/6,838 participants), and over three-quarters of these (588/737) were using other cardiovascular drugs at the start of the study [3].

Researchers randomly assigned the villages in which participants lived to either lifestyle advice (116 villages; 3,417 participants) or a once-daily polypill plus lifestyle advice (120 villages; 3,421). They then looked at whether the individuals took the polypill, and how many major adverse clinical events (e.g., stroke, heart attack, or death) participants had over the next five years. Overall, participants showed high adherence to the polypill, with around 63% taking the polypill as recommended (at least 70% of the time).

Compared with lifestyle advice, taking the polypill reduced the risk of major cardiovascular events by 34% overall – and by around 40% in individuals without a history of CVD over five years (136/3,033 [4.5%] vs 229/3,068 [7.5%]), and by approximately 20% in those with previous CVD (66/388 [17%] vs 72/349 [21%]). The effects were similar in both men and women and the old and young. After adjusting for participants taking other cardiovascular drugs, the overall protective effect of the polypill was reduced to 22% (from 34%) but remained statistically significant.

Systolic and diastolic blood pressure did not differ significantly between the groups, but LDL cholesterol was significantly lower in polypill arm.

The findings suggest that 35 individuals would need to be treated with the polypill to prevent one person from having a serious cardiovascular event. In participants with high adherence to treatment (who took the polypill as directed at least 70% of the time), the number needed to treat was 21.

The study was not designed to look at mortality and more research is needed, but the findings indicate that the polypill was not associated with a significant reduction in overall mortality.

Overall, the polypill was well tolerated and adverse events were similar between the groups. Ten (0.3%) participants in the polypill group and 11 (0.3%) in the minimal care group had an intracranial haemorrhage, and there were similar diagnoses of peptic ulcer disease (34 [1.1%] vs 35 [1.2%]) and upper gastrointestinal bleeding (13 [0.4%] vs nine [0.3%]) over the five years. In total, 13% (440/3,421) of participants discontinued the polypill during follow-up – 60% (267/440) for reasons related to the treatment.

"Given the polypill's affordability, there is considerable potential to improve cardiovascular health and to prevent the world's leading cause of death. Over three-quarters of the 18 million people who die from cardiovascular diseases each year live in low- and middle-income countries, and a fixed-dose polypill strategy, if adopted widely, could play a key part in achieving the bold UN target to reduce premature mortality due to cardiovascular disease by at least a third by 2030," said co-author Dr Nizal Sarrafzadegan, Isfahan University of Medical Sciences, Iran.

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Double-sided tape for tissues could replace surgical sutures

Inspired by a sticky substance that spiders use to catch their prey, MIT engineers have designed a double-sided tape that can rapidly seal tissues together.

In tests in rats and pig tissues, the researchers showed that their new tape can tightly bind tissues such as the lungs and intestines within just five seconds. They hope that this tape could eventually be used in place of surgical sutures, which don't work well in all tissues and can cause complications in some patients.

"There are over 230 million major surgeries all around the world per year, and many of them require sutures to close the wound, which can actually cause stress on the tissues and can cause infections, pain, and scars. We are proposing a fundamentally different approach to sealing tissue," says Xuanhe Zhao, an associate professor of mechanical engineering and of civil and environmental engineering at MIT and the senior author of the study, published in Nature.

The double-sided tape can also be used to attach implantable medical devices to tissues, including the heart, the researchers showed. In addition, it works much faster than tissue glues, which usually take several minutes to bind tightly and can drip onto other parts of the body.

Forming a tight seal between tissues is considered to be very difficult because water on the surface of the tissues interferes with adhesion. Existing tissue glues diffuse

Image: Felice Frankel

adhesive molecules through the water between two tissue surfaces to bind them together, but this process can take several minutes or even longer.

To create a double-sided tape that could rapidly join two wet surfaces together, the team drew inspiration from the natural world – specifically, the sticky material that spiders use to capture their prey in wet conditions. This spider glue includes charged polysaccharides that can absorb water from the surface of an insect almost instantaneously, clearing off a small dry patch that the glue can adhere to.

To mimic this with an engineered adhesive, the researchers designed a material that first absorbs water from wet tissues and then rapidly binds two tissues together. For water absorption, they used polyacrylic acid, a very absorbent material that is used in diapers. As soon as the tape is applied, it sucks up water, allowing the polyacrylic acid to quickly form weak hydrogen bonds with both tissues.

These hydrogen bonds and other weak interactions temporarily hold the tape and tissues in place while chemical groups called NHS esters, which the researchers embedded in the polyacrylic acid, form much stronger bonds, called covalent bonds, with proteins in the tissue. This takes about five seconds.

To make their tape tough enough to last inside the body, the researchers incorporated either gelatin or chitosan (a hard polysaccharide found in insect shells). These polymers allow the adhesive to hold its shape for long periods of time. Depending on the application that the tape is being used for, the researchers can control how fast it breaks down inside the body by varying the ingredients that go into it. Gelatin tends to break down within a few days or weeks in the human body, while chitosan can last longer (a month or even up to a year).

This type of adhesive could have a major impact on surgeons' ability to seal incisions and heal wounds. To explore possible applications for the new double-sided tape, the researchers tested it in a few different types of pig tissue, including skin, small intestine, stomach, and liver. They also performed tests in pig lungs and trachea, showing that they could rapidly repair damage to those organs.

The tape also worked well to seal damage to the gastrointestinal tract, which could be very useful in preventing leakage that sometimes occurs following surgery.

Implanting medical devices within the body is another application the MIT team is exploring. Working with Roche's lab, the researchers showed that the tape could be used to firmly attach a small polyurethane patch to the hearts of living rats. In addition to the polyurethane heart patch, the researchers found that the tape could successfully attach materials such as silicone rubber, titanium, and hydrogels to tissues.

Scientists design first test to detect dysphagia in patients with cognitive problems

Researchers from the Mind, Brain and Behaviour Research Centre of the University of Granada (UGR) have designed a test to detect dysphagia, a disorder that prevents people from swallowing when eating. It affects 8% of the world's population.

Dysphagia is prevalent among older people in particular (30%–40% of the elderly people admitted to hospitals or care homes) and patients with neurological or neurodegenerative disorders and diseases such as Alzheimer's, Parkinson's or multiple sclerosis, amyotrophic lateral sclerosis, cerebral palsy, or strokes.

This difficulty in swallowing is due to the fact that the process of passing food or liquids from the mouth to the stomach requires more time and effort for these patients. Many die from aspiration pneumonia as a result of dysphagia. Yet dysphagia remains underdiagnosed, because many of these patients suffer from cognitive disorders and cannot respond to functional evaluation processes.

To address this, the UGR researchers have designed and validated an early detection test for oropharyngeal dysphagia – called EdisfO – for patients with preserved cognitive status (that is, with no cognitive problems) that has also proven valid in patients with impaired cognitive status. This is the first time an assessment measure has been designed that successfully addresses this need.

The overarching aim of this research is to position the EdisfO as a widely-used tool that facilitates the diagnosis of possible dysphagia – a quick, safe, and effective test to screen for this disorder. It is currently being adapted and validated among the Turkish population, thanks to collaboration with Hacettepe University.

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Transforming hospitals – designing for safety and quality

Background

The 1999 Institute of Medicine's landmark report, *To Err is Human: Building a Safer Health System*, exposed the tremendous costs, both in human and financial terms, of medical errors in the United States healthcare system.[1]

Two studies cited in the report indicated that between 44,000 and 98,000 people died each year in the United States as a result of medical errors. The national cost to the economy of these errors was between $17 billion and $29 billion. Since the release of the Institute of Medicine's report, a number of successful initiatives have been launched to help hospitals change their cultures and care processes to produce safer health care environments with fewer medical errors.

A growing body of literature describes the link between a hospital's physical design and its key quality and safety outcomes. Hospital planners are consulting this evidence and incorporating it into their designs for capital construction projects.[2]

Hospital planners have an opportunity to create safer and more effective facilities that enhance patient safety, improve the quality of care, increase workforce satisfaction, and reduce the cost of care.[3] In an era of staff shortages, increased transparency of information about hospital performance, and reimbursement linked to performance, improving healthcare environments may be critical to a hospital's survival.

Hospital executives planning or executing a major capital construction project or minor renovations can use the following information to help identify how evidence-based design can improve the quality and safety of their hospitals' services.

Evidence-based design

Evidence-based design is a term used to describe how the physical design of health care environments affects patients and staff.[4,5] Key characteristics of evidence-based design in hospital settings include single-patient rooms, use of noise-reducing construction materials, easily accessible workstations, and improved layout for patients and staff.[6]

Patient safety

Evidence-based design elements can help hospitals reduce costly and avoidable incidents of patient harm, such as:

- Patient falls.
- Hospital-acquired infections.
- Medication errors.

Patient falls

Patient falls, which are common in hospitals, can result in serious injuries, extend a patient's stay, and drive up the cost of care significantly. By 2020 the estimated annual cost of fall injuries for older people in the US will exceed $30 billion.[7-8].

Patient falls can be avoided. Poor placement of handrails and small door openings are two primary causes of patient falls. Many falls can be reduced through providing well-designed patient rooms and bathrooms and creating decentralized nurses' stations that allow nurses easier access to at-risk patients.[9-11]

Hospital-acquired infections

Single-bed rooms and improved air filtration systems can reduce the transmission of hospital-acquired infections. Infections can also be reduced by providing multiple locations for staff members to wash their hands so they spend less time walking to sinks and have more opportunities to sanitize their hands before providing care.[12]

Medication errors

Poor lighting, frequent interruptions and distractions, and inadequate private space can complicate filling prescriptions. Well-illuminated, quiet, private spaces allow pharmacists to fill prescriptions without the distractions that may lead to medication errors.[13]

Patient rooms that can be adapted for the acuity of a patient can also reduce errors. Acuity-adaptable rooms reduce the need to transfer patients around the hospital and lessen the burden on the staff to communicate information to caregivers in the patient's new location.[14]

Patient satisfaction

Reducing noise, providing more privacy, and making it easier for patients to find their way though the hospital can all improve patient satisfaction.

Frequent overhead announcements, pagers, alarms, and noisy equipment in or near patient rooms are stressful for patients and interfere with their rest and recovery.[15] Single-bed rooms with high-performance, sound-absorbing ceilings and limited overhead announcements can substantially improve the healing environment for patients.[16]

Evidence also shows that patients are more satisfied with their care when they are given adequate space to interact with their families. For example, single-patient rooms make it easier for families to stay with patients.[17] Responding to the overwhelming evidence regarding how single-patient rooms improve patient safety, satisfaction, and quality outcomes, the American Institute of Architecture changed its 2006 construction guidelines to recommend that single rooms for medical, surgical, and postpartum nursing units in general hospitals be the standard.[18-19]

Helping patients effortlessly find their way through hospitals can improve patients' overall care experience and

increase satisfaction by reducing feelings of stress, anxiety, and helplessness for them and their families. Better navigation can be addressed architecturally through useful signage and easily navigable corridors.[20]

Quality outcomes

Several design elements are associated with better quality outcomes for patients. In addition to improving patient satisfaction, reducing hospital noise can improve patient recovery and sleep time and reduce depression. Other factors, such as increased sunlight in patient rooms, views of nature, artwork, and music, also reduce patient stress and can lead to improved outcomes.[21]

Staff satisfaction and workforce retention

Staff shortages and turnover are serious problems for hospitals. Much of this turnover is related to stress, which could be greatly reduced by lessening the physical demands of nursing.[22-23]

One example of how to reduce the physical burden on staff and improve workflow is by using acuity-adaptable rooms, which limit the need to transfer patients within the hospital. By reducing the number of moves, hospitals can increase productivity in delivering patient care and decrease the physical demands on the staff.[24-25]

Another useful design element decentralizes nurses' stations and supply areas to allow nurses to spend less time walking and more time treating patients.[26] Reducing stressful noise; improving light sources for surgical staff; and designing patient beds to reduce back stress, fatigue, and injuries can also improve workforce satisfaction and retention.[27]

Cost effectiveness

The competitive nature of health care, new medical technology that requires facility upgrades, and the need for health organizations to become more efficient and cost effective have driven the recent upward trend in hospital growth. To meet these challenges, hospitals require frequent updates to meet current guidelines and

Health care facility design safety risk assessment toolkit

Patient and staff safety in a hospital or other health care facility can be protected by a properly designed built environment. Assessing safety risks and incorporating preventive measures into the design of health care facilities can minimize such safety problems as health care-associated infections, patient falls, medication errors, and security risks. Unfortunately, design-related vulnerabilities that adversely impact patient safety are sometimes inadvertently built into the physical environment during the planning, design, and construction of health care facilities. These problems are difficult and expensive to address once a facility has been built and occupied.

To support health care facility design that protects patient and staff safety, AHRQ funded the development of a Safety Risk Assessment Toolkit for facility designers. The goal of the toolkit, developed by the Center for Health Design, <*www.healthdesign.org*> is to assist in the design of a built environment that supports workflow, procedures, and capability while ensuring the safety of patients and staff.

- The toolkit is accessible here: *www.healthdesign.org/sra*

regulations and maintain market share.[28]

Although designing an updated facility using evidence-based design principles may add up-front capital costs, this investment ultimately decreases medical and financial complications that can result from a poorly designed facility.[29-31] The Center for Health Design modeled and analyzed the increased capital costs and downstream cost-savings of well-designed facilities by using a "fable hospital" that included many common evidence-based design elements. While these features added $12 million to the cost of the hospital construction, those costs were projected to be recovered in one year through operational savings and increased revenue.[32]

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What do patients need to feel comfortable during a hospital stay?

When it comes to a hospital stay, new research shows patients and family members care deeply about privacy, accessibility and comfort in their rooms – things that they say can help them recover from illness or surgery.

"When we're sick and feeling vulnerable, it's especially important to feel in control of our surroundings – privacy, room temperature, lighting, window blinds and having our things within reach," said Emily Patterson, an associate professor in The Ohio State University College of Medicine, School of Health and Rehabilitation Sciences.

Patterson was first author on a study to identify what's most important to patients and caregivers about the way hospital patient rooms are designed. With input from hospital staff, the team developed five room designs and asked study participants for their reactions. Results from the study were recently published by the Journal of Health Environments Research and Design – doi: 10.1177/1937586717696700

The study involved 61 patients and family members who had experienced at least one three-day stay in a hospital medical-surgical unit during the last 12 months. Small groups of participants walked through full-scale hospital rooms, each 300 square feet. They were also surveyed about general patient room design characteristics, such as outlet placement and bathroom doors.

"We included a number of features we thought would be beneficial for patients, based on earlier interviews about challenges patients and caregivers had to overcome during their stay," Patterson said.

The team analyzed the comments and data collected to develop codes they could group based on physical room space, or need. From this, the researchers developed a theoretical design framework showing the key expectations for hospital room elements.

Privacy

To help patients feel more comfortable, the study found they need to have control of their privacy, including avoiding being 'on display' to people in the hallway by having a privacy curtain at the room door which they control. Inside the room, patients want to use the bathroom without being seen or heard by visitors.

Patients also need a sense of security – knowing who's entering the room and their role, a safe for valuables in the room and independent access to their belongings within reach.

"We heard that often those belongings are stored in a tray table that gets moved out of reach by caregivers or family," Patterson said.

For those who may be hospitalized longer than five days, researchers found maintaining a strong sense of connection to people is important. Patients need visitors to sit close enough to easily touch and have eye-level conversations, easy access to phones and personal computing devices and easy-to-reach outlets for charging those devices.

This research is part of a larger effort to examine both patient and hospital staff needs when it comes to room design and function for optimal caregiving and healing. The team believes their findings will inform the planning, design and renovation of medical-surgical patient rooms in hospitals.

"Some of the findings are inexpensive and possible to incorporate, even without changing architectural design," Patterson said. "Each change can improve the patient and family experience by reducing unnecessary stress and anxiety and enhancing the healing process."

Patterson also said meeting patient and family needs in room design is anticipated to improve responses on patient satisfaction surveys.

Patterson acknowledges the findings don't meet the needs of all patients, such as those with cognitive or mobility challenges, and bariatric patients who may need larger furnishings, equipment and space for caregiving. MEH

Interview

Enhancing patient care with a floor that tracks movement and alerts to falls

Middle East Health speaks to **Christl Lauterbach**, CEO of Future Shape, about their innovative Sensfloor that can be used to track patient movements and provide alerts if a patient falls as well as many other ingenious uses.

***Middle East Health*: SensFloor is a floor underlay that makes the floor sensitive to patient movements in hospitals and nursing homes. Can you explain what SensFloor is exactly?**

Christl Lauterbach: SensFloor is a large-area sensor underlay. It is installable beneath nearly any kind of flooring and is invisible and discreet.

***MEH*: What is it made of?**

CL: It is made of a metallized polyester fleece with an overall thickness of 2.5 mm, featuring integrated sensors and radio modules.

***MEH*: How does it work?**

CL: SensFloor is based on a capacitive proximity measurement, quite similar to the touch screen of a mobile phone. Persons walking across the floor trigger signals which are sent wirelessly to a transceiver which uses intelligent algorithms to identify different situations and trigger events or alarms, accordingly. This system can calculate the number of persons on the floor, their direction and speed. Further, it possesses a very high reliability in fall detection. Several standard-interfaces are available for client-specific data analysis infrastructure, indoor call systems, and home automation systems.

***MEH*: What are some of the main uses of SensFloor?**

CL: SensFloor offers a variety of applications in health care, Ambient Assisted Living, home automation, retail, security and multimedia.

In health care it is used to optimize workflows, by indicating movements in hospital or nursing rooms, where people with a high risk of falling are living. Falls are prevented, when the nurses can rush to help before a fall occurs. For home care and assisted living scenarios SensFloor offers safety, because falls or longer inactivity will lead to emergency alerts to avoid a person lying helplessly alone for a long time.

***MEH*: Reading some of the literature about SensFloor – it is noted that it can be installed under various types of floors, such as carpet, vinyl, wood and even stone tiles. How can it be sensitive through stone tiles?**

CL: The reason is the measurement principle, which is not pressure-based, as explained before but proximity sensing like a touch pad. It is sensitive against electrically conductive materials, including liquids.

***MEH*: The company Future-Shape was set up in 2005 to develop SensFloor. Can you tell us a bit about Future-Shape?**

CL: Future-Shape is located near Munich in Germany. I founded the company and it is privately owned. Future-Shape has many years of experience in material science, sensor technology, and radio systems. Its main product is SensFloor. Future-Shape develops leading edge algorithms for data analysis, that will be extended towards self-learning systems and artificial intelligence in future applications.

All products are developed and made in Germany.

***MEH*: When was SensFloor developed and first used commercially?**

CL: The SensFloor was developed by Future-Shape starting in 2005 and first installed in a large project – a nursing home with 70 rooms, including bathrooms – in 2012 in France. At that time the fall detection and the switching of orientation alerts were the main functions of the system.

Since then, the emphasis in the development was placed on sophisticated software algorithms to detect many more events in the domain of care, such as inactivity, wandering, leaving the bed or the room at night. Recently, development was started to equip the system with self-learning capabilities such that deviations from the profile of daily routines can be detected. Those deviations are often caused by changes in a person's health status.

***MEH*: SensFloor won the Innovation Award from the German Ministry of Economics and Energy for a second time in 2017. This must have been a big boost for the company. How widely is the floor used?**

CL: So far, SensFloor Care systems have been installed in more than 50 nursing homes, senior residences and hospitals. Besides Germany, we serve clients all over Europe. Outside of this region, we work with highly specialized distributors in other countries, such as the USA, Australia and New Zealand. The partners have been qualified by Future-Shape to enable them for distribution, installation and maintenance of the SensFloor system.

More than 40 living labs at universities

and private institutes in Europe have been equipped with SensFloor, providing an interesting base for research and development.

***MEH:* Are there facilities in the Middle East where it is installed?**

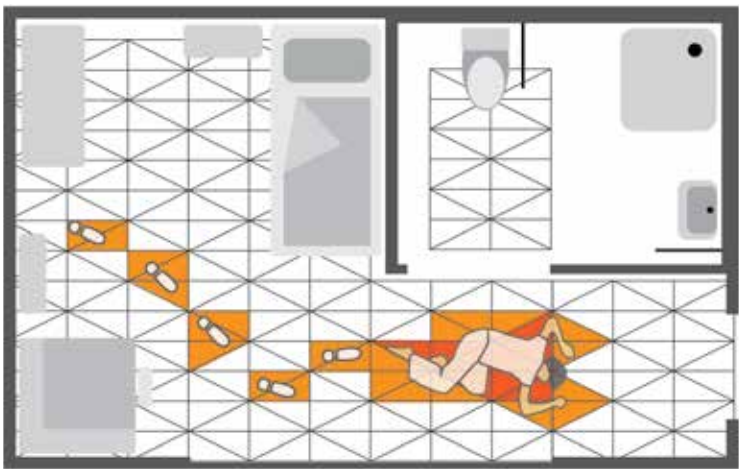
CL: The product was showcased first time in the Middle East during the Arab Health exhibition in 2018 and there was a lot of interest and excitement about it. Despite that, there has been no health care project in the Middle East, so far. There are however a couple of evaluation setups in the region which we hope will develop to full scale projects. The awareness of our product has to grow and we are in the process of developing this market. The high-quality level of clinics and new clinic developments make us hopeful that we will reach this goal. Our product adds an entirely new layer of health care and service quality to the industry.

***MEH:* Do you have representatives in the Middle East?**

CL: We have a company called 7 Dwarfs in Dubai who represents our products and supports clients from the very early stages of evaluation to the integration of the product. 7 Dwarfs has been working with SensFloor since 2015 utilizing it in the event and exhibition industry for interactive applications. Doing these kind of temporary installations, they have gathered a lot of deep technical and mechanical knowledge about this product and we decided in 2017 to sign a contract with them. The benefit we see is that they have the product knowledge paired with the knowledge of local construction and the interior fit-out industry. This combination appeared to be much more valuable to us than a partnership with a distributor who specializes in the medical and healthcare sector. They come with the technical competence to make SensFloor projects in the Middle East a success.

***MEH:* Can SensFloor also be used in private homes?**

CL: Yes, it is possible to use it in private homes. It is even possible to install it on top of the existing flooring (wood, stone, vinyl), because we use a double-sided adhesive foil for installation. This layer structure can be removed without any trace, when the SensFloor is no longer needed.



In private homes SensFloor offers new support for home care and safety. "Out of bed alarm" for fall prevention and fall alarms are improving the quality of care and help to keep the health status of the residents stable. In case of patients suffering from dementia, leaving home alerts are crucial for keeping them save at home.

Through presence detection SensFloor can operate lights and air-conditioning. The control of automatic doors is more efficient than with movement detectors, because they will open only when someone is standing in front of it and not when just passing by. In combination with intrusion alarms the SensFloor system is able to trace the movement and presence of intruders and make it accessible over an internet browser.

***MEH:* Who would do the monitoring in a home setup?**

CL: There are different methods of setting the alarm in home scenarios. These include from using potential-free relays to communicate with alarm systems, to cloud-based solutions for setting up alert chains. It is also possible to display the activity remotely and send alarms through a secure channel over the internet such that the current health status of persons can be checked by relatives or care providers.

***MEH:* How long does it take to install?**

CL: Usually, we calculate a necessary installation time of one hour for 2-4 square metres, depending on intended floor construction.

***MEH:* How much does it cost to install?**

CL: Usually the cost of the Sensfloor installation is less than 4% of the overall costs of an apartment – not much, considering the improvement in the quality of care.

***MEH:* The floor is very sensitive, it will even detect spilled liquid. The system will presumably record every movement on its surface and accumulate a lot of data of the movements of patients, doctors, nurses, hospital carts, items dropped on the floor or drinks spilled, for example. How does the system filter out irrelevant data?**

CL: First of all, no data is irrelevant. If there are spilled liquids on the floor, they will give a signal, and if they are in the size of a body lying on the floor, a fall alarm is given. However, the puddle should be removed anyway to avoid slipping of the patient.

***MEH:* What can it do with the all the data that is captured?**

CL: All data captured in a room will be available at the ward terminal for 48 hours. There are history functions in the software, which will enable the nurse to recall what happened in the room. For instance: When did the person get in/out of bed. How often did he use the toilet during the night? Did the new medication he received change his behaviour or sleep rhythm? MEH

Quado – the small bedside cabinet full of great ideas

The new bedside cabinet Quado by Stiegelmeyer is compact and mobile while still offering plenty of room for personal items.

The Quado can be attached to almost all current Stiegelmeyer hospital beds for joint transport.

Stiegelmeyer introduces a mobile compact miracle with a modern design

Modern hospital beds determine the image of the Stiegelmeyer showroom at the company's headquarters in Herford, Germany. Puro, Evario and Vertica clinic stand in front of bright light boxes and impress visitors with their clear lines. Now, a new member can be seen among the hospital products, which is the smallest in terms of dimensions, but in terms of functionality will play a major role: the new bedside cabinet Quado, the compact miracle.

Quado is significantly slimmer and lighter than conventional bedside cabinets but offers a comparable level of comfort – and makes work on wards much easier. What were the reasons for Stiegelmeyer to develop such a small modern bedside cabinet?

Large storage space on a small area

"First of all, limited space is available in many hospital rooms," explains Product Manager Lars Schröder. "Quado fits next to every bed, even in narrow spaces." Experience has shown that patients put a lot of personal belongings in their bedside cabinet. Even a smaller model must therefore offer enough storage space. During the development of Quado great effort was put into making the best possible use of the available space. Two open compartments and a drawer can be reached from both sides and provide room for e.g. two bottles of 1½ liter volume. The optional lockable drawer is also suitable for larger wallets.

Quado also offers other spaces to accommodate a lot. As standard, a rail protects the upper table top, so that glasses and cups can be safely put down. The damped foldable overbed table is suitable for enjoyable meals. Schröder reaches under the overbed table and shows how many practical details are in the Quado: On both sides of the table small bookrests can be extended, on which one can e.g. store a smartphone to comfortably watch a video. To change the height of the entire bedside cabinet, just press a button on the rail and pull or push the cabinet's body into the desired position. This works with one hand and little effort.

Reliable hygiene with little effort

Made of large plastic elements, the Quado is very easy and thorough to clean – both automatically and manually. "The compartments have large radii and the overall design is clear with as little niches as possible. You can reach every area well," explains Schröder. If several Quado cabinets are stored before or after cleaning, they can be pushed together and require even less space.

The compact miracle Quado also convinces with its second great strength: it is also very mobile. If the bed is moved to another room or to another ward, the light Quado can simply be attached to the head or footboard of most Stiegelmeyer hospital beds for joint transport. This is especially useful when a patient is transferred: "If you were to clean up the patient's things and put them away in another bedside cabinet, the nurse would have to document each item in writing. With Quado you just take the bedside cabinet with you, without the need for going back or a second person to push it," says Schröder.

All in all, the Quado with its excellent price-performance ratio is a profit calculation for every hospital. The hospital saves space, costs, physical effort caused by transport and cleaning and even paperwork. It gains comfort for its patients and an elegant piece of furniture that gives the rooms a modern, pleasant look. MEH

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- Optional integrated scales
- Intuitive LCD handset or integrated control panel for operating the bed
- Optional suitability for automatic reprocessing
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Interview

On a mission to improve quality and reduce cost of healthcare globally

Middle East Health speaks to **Dr Denise Basow**, President & CEO, Clinical Effectiveness, Wolters Kluwer, Health, about the company's advanced clinical healthcare solutions designed to assist doctors, pharmacists and patients.

***Middle East Health*: Can you give us a bit of background about Wolters Kluwer?**

***Denise Basow*:** Wolters Kluwer is a large multinational company based in the Netherlands. It has four main verticals in the health, tax and accounting, governance risk and compliance, and legal and regulatory fields. The one thing that unites all these types of businesses is that we provide best-in-class information that helps professionals do their jobs better. Within the health division, which accounts for about a quarter of the overall revenue, we have three main businesses. One is called health learning, research and practice which is our global books and journals business. The second is a small business that manages our clinical terminology and surveillance tools. And third is the clinical effectiveness for health business.

Our mission is to improve the quality and reduce the cost of healthcare globally, by trying to reduce the problem of unwanted variability in care. We do this with four main products: UpToDate, which is a clinical decision-support resource primarily for doctors. It's sold around the world and is designed to help clinicians answer clinical questions in an evidence-based way. We also have two products under what we call 'clinical drug information systems' aimed at helping doctors, pharmacists and nurses reduce prescription errors which are a big problem globally. Our fourth product is called Emmi, which is a multimedia tool with patient interaction to help patients engage with their healthcare.

***MEH*: Looking at these four healthcare solutions, do you continue to develop them?**

***DB*:** Yes. UpToDate has been around since 1992. It's our largest product in terms of customers and is sold in 180-plus countries. Although it is very well established, it is in a sense still in development as we continue to innovate and build new products around it. For example, just over a year ago we launched UpToDate Advanced, which doesn't replace UpToDate, but provides next generation clinical pathways, based on our UpToDate content, to continue to help drive clinical decision making. Lexicomp and Medi-Span, which are in our clinical drug information sector, have been around for almost as long as UpToDate. Emmi has been around for more than 15 years, however, as the patient-engagement market in general has been slow to evolve, it is the smallest in terms of customers. It is only sold in the United States.

***MEH*: Are you planning to expand Emmi to other countries?**

***DB*:** We are, although we don't have a specific timeline.

***MEH*: How are the solutions provided to your customers?**

***DB*:** UpToDate and Lexicomp are fully software service solutions. We often package these together, although they can be bought separately. Medi-Span is a package of embedded drug data which sits within the Electronic Medical Record (EMR) and, for example, if a physician prescribes a drug it performs automatic screening for drug interactions and correct dosage. So this requires implementation that we sometimes do in combination with EMR vendors. Emmi is a very different solution and it requires implementation with customers.

***MEH*: What is the difference between Lexicomp and Medi-Span as they both deal with drug information?**

***DB*:** Lexicomp we call our drug reference. It is like UpToDate for pharmacy. It's been embedded in UpToDate for many years. That information is accessed through a simple search interface on the web and mobile devices. Medi-Span has similar content, but instead of being searchable with a web or mobile interface, it's a series of data files that are embedded in EMR systems and operates in the background, so that our customers are often unaware of it, because they simply get an alert if there is a problem with the drug they are prescribing.

***MEH*: Are you working with clients in the Middle East?**

***DB*:** Yes. We have a strong footprint in the Kingdom of Saudi Arabia (KSA) and the UAE. We do business in other countries in the region as well. Lexicomp is growing in these countries. Medi-Span has a very strong presence in KSA. As countries begin to implement EMRs, often one of the first decision support systems they put in their EMRs are solutions like Medi-Span. While all types of medical records are important, studies show that what really enhances their effectiveness is when you embed decision-support systems in them. So, as these countries adopt EMR, Medi-Span tends to grow along with that, as it is a very natural addition to an EMRs. We've seen very good success in KSA and we are developing relationships with EMR vendors in other countries in the Middle East. Medi-Span requires us not only to have relationships with hospitals, but also with EMR vendors so we are very active in developing these relationships.

For example, among others, we work with

> As countries begin to implement EMRs, often one of the first decision support systems they put in their EMRs are solutions like Medi-Span. While all types of medical records are important, studies show that what really enhances their effectiveness is when you embed decision support systems in them.

a company called Easy Care Tech in KSA. They're from South Korea and specialise in implementing EMRs. Medi-Span is being used by the National Guard hospitals in KSA, among others. In the UAE, King's College Hospital and Mediclinic Middle East are also using UpToDate.

We're actively expanding our business in the Middle East. We recently held a think tank in Dubai attended by company CEOs and hospital administrators who showed great interest in our products. The UAE healthcare scenario is interesting. It is changing rapidly and there is a lot of funding enabling it to develop in leaps and bounds. The think tank had a focus on innovation and it was a lively discussion. What came out of it was that although innovation is key, it is important not to lose sight of basic healthcare and keeping the patient at the centre of care while improving patient engagement. In other words it is important to strike a balance between innovation and sticking to the core of healthcare – taking care of the patient. MEH

About UpToDate

Doctors need help sifting through all the evidence and keeping up with new information. That is where UpToDate comes in: we synthesize the evidence and provide original topic reviews. UpToDate places the new information in context and provides graded, evidence-based treatment recommendations.

More than 6900 doctors from 50 countries, all of whom are leading experts in their fields, serve as UpToDate authors and editors. They seek out and evaluate the latest evidence presented in more than 435 peer-reviewed journals, online medical resources, and guidelines published by major international societies. The editorial team updates content continuously and is transparent about the rigorous editorial process: all topics include the authors' and editors' names, specialties and academic affiliations. In addition, UpToDate accepts no advertising or sponsorships.

With UpToDate, doctors can quickly answer even their most difficult clinical questions and determine how to best care for their patients.

UpToDate at Dr Sulaiman Al Habib Medical Group

Dr Sulaiman Al Habib Medical Group (HMG) operates several regional facilities in the Kingdom of Saudi Arabia, United Arab Emirates, and the Kingdom of Bahrain

Dr Bilal Ahmad Bhatt, Medical Administrator for HMG, currently manages the physicians in one hospital and one medical centre located in the UAE, with a total of 200 beds and 135 clinicians. In October of 2018, Dr. Bhatt supervised the integration of UpToDate for use by all of HMG's facilities across the region.

Commenting on the integration of UpToDate, Dr Bhatt said: "We believe that UpToDate provides a vast amount of evidence-based information, and it is also really user-friendly. Physicians are able to access best practices and acquire the relevant evidence required for any clinical scenario that they may have in order to optimize patient care.

"Personally, this is how I benefit mostly from UpToDate, as I am able to get the right information easily, and I am able to transfer my knowledge to other people in the hospital - which ultimately results in the patient receiving the best care."

He added: "If a doctor is using UpToDate he will provide the most appropriate care. Ultimately UpToDate can help improve healthcare quality by avoiding complications, re-admissions, and length of stay in the hospital – all of which helps to minimize healthcare costs."

UpToDate Research

Because it is so widely used, UpToDate is one of the most studied clinical decision support resources. In fact, more than 80 studies from around the world demonstrate the benefits of using UpToDate, which include improved patient care and hospital performance. All UpToDate research can be reviewed at: *www.uptodate.com/research*

1. A 2011 study by researchers at Harvard University, published in the *Journal of Hospital Medicine*, showed an association between the use of UpToDate and improved outcomes. UpToDate hospitals demonstrated:

- Lower mortality – 11,500 lives saved over a three-year period
- Shorter lengths of stay – 372,500 hospital days saved per year
- Improved hospital quality – better quality performance for every condition on the Hospital Quality Alliance metrics.

2. In a retrospective study in Japan published 2018 (doi: 10.1016/j.ijmedinf.2017.09.010) study authors identified 100 patients who visited an outpatient department in a community-based hospital from July 2014 to June 2015. Half the patients were seen by physicians equipped with UpToDate and half were seen by physicians without UpToDate access. They compared diagnostic error rates between the two groups. The diagnostic error rate for the patients seen by physicians equipped with UpToDate was 2%, while for those seen by physicians not equipped with UpToDate it was 24%.

3. A study conducted by the Mayo Clinic is of particular interest to academic medical centers committed to training the next generation of doctors: the researchers found that use of UpToDate for 20 minutes a day resulted in knowledge acquisition equivalent to the benefit of a year of residency training, as measured by a standardized examination (Internal Medicine In-Training Examination (IM-ITE)).

4. Researchers at Singapore's National University Hospital found that use of UpToDate led to changes in investigations, diagnosis or management 37% of the time.

Support for families with children suffering from adrenoleukodystrophy

By **David Cry**
Chief Executive Officer
The Adrenoleukodystrophy Foundation

Adrenoleukodystrophy, or ALD, is a genetically determined neurological disorder which strips away the myelin sheath from neurons in the brain and spinal cord. Myelin is likened to insulation on an electrical wire. The eradication of this essential sheath causes varying degrees of disorder, resulting in seizures and hyperactivity. Other symptoms include problems with speaking, listening, and understanding verbal instructions.

Approximately two-thirds of ALD patients will present with the childhood cerebral form of the disease, which is the most severe form. It is characterized by normal development in early childhood, followed by rapid degeneration to a vegetative state. The other forms of ALD vary in terms of onset and clinical severity, ranging from adrenal insufficiency to progressive paraparesis in early adulthood – this form of the disease is typically known as adrenomyeloneuropathy (AMN).

As an X-linked disorder, ALD presents most commonly in males, however approximately 50% of heterozygote females show some symptoms later in life. ALD affects males, normally between the ages of 4 and 10. ALD has not been shown to have an increased incidence in any specific country or ethnic group. In the United States, the incidence of affected males is estimated at 1:21,000.

There is no reliable way to predict which form of the disease an affected individual will develop, with multiple phenotypes being demonstrated within families. Onset of adrenal insufficiency is often the first symptom, appearing as early as two years of age. Untreated, cerebral ALD is characterized by progressive demyelination leading to a vegetative state and death.

The clinical presentation of ALD can vary greatly, making diagnosis difficult. With the variety of phenotypes, clinical suspicion of ALD can result from a variety of different presentations.

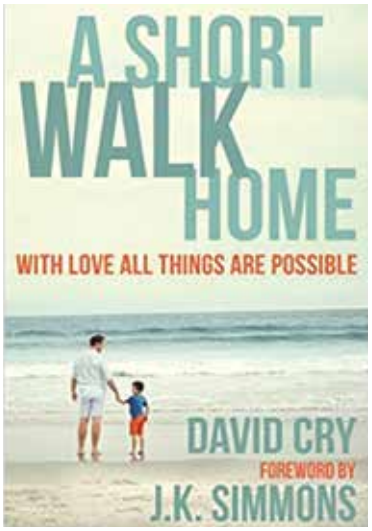
AMN is an adult, non-fatal form of ALD. With gene mutation taking place at the end of the third decade of life, the loss of myelin in AMN is restricted to the spinal cord. Gait changes, urgency with urination, and loss of balance are among the early symptoms of AMN. As it progresses slowly, most men use a cane to assist with walking initially. Over time, the ability to walk decreases, making ambulation a critical issue. Many older men whom have had AMN for decades are relegated to using wheelchairs or scooters for movement.

Historically, bone marrow transplant has been used to treat ALD. Boys with a higher degree of damage in the brain do not fare well. In 2007, a Paris-based ALD researcher successfully performed gene therapy, using autologous transplantation, where the patient's own cells were altered to correct the genetic mutation and then placed back in the body.

A clinical trial is currently underway to test a genetic transplant therapy. Study ALD-104 is an international, non-randomized, open-label, multi-site study in male subjects (≤17 years of age at enrolment) with cerebral adrenoleukodystrophy (CALD). This trial will evaluate the efficacy and safety of autologous CD34+ hematopoietic stem cells, transduced ex-vivo with Lenti-D lentiviral vector, for the treatment of CALD. A subject's blood stem cells will be collected and modified using the Lenti-D lentiviral vector encoding human adrenoleukodystrophy protein. After modification with the Lenti-D lentiviral vector, the cells will be transplanted back into the subject following myeloablative conditioning. The study is expected to be completed in February 2023.

Quality of care

The disorder has been described as a parent's worst nightmare. Steps taken on behalf of a child with ALD must be straightforward and succinct. The quality of a boy's care determines a great deal about his outlook. In the face of ALD, be aware that you are not alone. Rely on medical professionals, family, friends, and spiritual leaders for your needs. Thousands of mothers and fathers have endured a great deal in the face of this. Do not be afraid to seek the guidance of those who can enlighten you as to what to anticipate. MEH



The Adrenoleukodystrophy Foundation: We are always here to help.

The Adrenoleukodystrophy Foundation was formed June 1, 2000 by David Cry. Diagnosed with Adrenomyeloneuropathy in December 1998, David learned all about ALD at a doctor's appointment at Johns Hopkins. Feeling quite fortunate to have not developed the fatal form of the condition, David has dedicated himself to service. To date, he has helped many families who have a son with ALD. He also works with world class physicians who are seeking solutions for ALD. In 2005, David married Jaymee. In 2010, Jaymee's son Logan developed symptoms of ALD and died in April 2013 at the age of 14. David then wrote a book titled "A Short Walk Home" (available on Amazon) about what they endured as a family, "so that as many families as possible may be helped". David is now restricted to a handicap scooter for movement as his condition has progressed to the point he can no longer walk well.

- For further information, please visit: *www.aldfoundation.org*

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Leading DICOM medical printers to be showcased at Arab Health 2020

OKI pushes the boundaries where the world of healthcare and printing meet with their award-winning fully integrated DICOM printers

OKI Europe Limited will participate in the Arab Health Exhibition 2020, where it will showcase their revolutionary print solutions in the medical and healthcare sectors. The exhibition will take place at Dubai World Trade Center, from 27-30 January 2020. It is the largest gathering of healthcare professionals in the region.

During the exhibition OKI will exhibit a first in digital printer technology; a high-quality LED printer that is combined with DICOM embedded software. This allows the DICOM printers to talk directly with medical imaging equipment, presenting many opportunities for printing high-quality, non-diagnostic images in high definition mono and colour on a wide range of media.

Delegates visiting the OKI Europe at Stand S3.F50 will have the opportunity to preview a completely new innovation that can revolutionise their medical imaging. They will also discover how customer satisfaction can be improved through personalised A4 and A3 patient leaflets and brochures. Additionally, they will also learn how OKI devices save medical and healthcare businesses time and money in medical imaging and standard office printing.

The devices on display will include OKI's colour ES6410DMe and the mono ES8431DMe A4/A3 which combine LED technology with embedded DICOM software. The Pro9431DMe, a versatile DICOM embedded printer, will also be showcased.

OKI Europe delivers unbeatable accuracy and precision printing for the medical industry by removing the requirement for additional hardware that enables DICOM imaging and streamlining support through a single point of contact with a lower cost of ownership. OKI's embedded DICOM solution provides superior "near" diagnostic image quality with DMe (DICOM Enhanced) and higher quality mono printing for x-ray and ultrasound with its DMe printers.

"We are delighted to announce our participation at Arab Health 2020," said Carine Haddad, Healthcare Manager, MEIT, OKI Europe. "We are excited to showcase the diverse benefits of our printers which can be used to support patient care and non-diagnostic medical imaging without the need for additional hardware or software. These devices can also be used for day-to-day office printing, reducing the number of devices required by businesses in this thriving sector." MEH

About OKI Europe

OKI Europe Ltd is a division of OKI Data Corporation, a global business-to-business brand dedicated to creating cost effective, professional in-house printers, applications and services which are designed to increase the efficiency of today's and tomorrow's businesses.

The company is well-established as one of Europe's leading printer brands, in terms of value and units shipped. For over 60 years OKI Europe has been delivering advanced printing solutions worldwide, introducing ground-breaking technologies that support the needs of businesses large and small. Their pioneering development of digital LED printing technology has placed OKI at the forefront of the market in delivering high-definition, eco-friendly printing devices.

Since the acquisition of the globally-deployed wide format printer business of Seiko I Infotech Inc. a subsidiary of Seiko Instruments Inc. OKI distributes precision-engineered wide-format printing systems specifically for the sign, graphics, CAD and GIS markets that provide industry-leading productivity and image quality. With an EMEA wide network of authorised distributors and dealers OKI Europe provides complete printing solutions including wide format printers, inks, media, software, installation, support, knowledge and training.

In addition to a vast portfolio of award-winning printers and MFPs, OKI offers a range of services to help optimise print and document workflows. This, together with an integrated suite of software technologies and tools, can help businesses take control of their print and document costs in a secure environment, whether office based, mobile or in the cloud.

OKI Europe employs over 500 staff in 15 locations (sales offices and production sites) and is represented in 60 countries throughout the EMEA region.

OKI Data Corporation is a subsidiary of Tokyo-based Oki Electric Industry Co. Ltd., established in 1881 and Japan's first telecommunications manufacturer.

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Diabetes Research Update

Healthiest lifestyle linked to 75% reduction in diabetes risk

People with the healthiest lifestyle have a 75% lower risk of type 2 diabetes than those with the least healthy lifestyle, according to a new study in *Diabetologia* (the journal of the European Association for the Study of Diabetes). Amongst those individuals with type 2 diabetes, a healthy lifestyle is also associated with a lower risk of cardiovascular disease (CVD) and a lower risk of death from all causes, including CVD and cancer.

The number of people with type 2 diabetes (T2D) globally has now been estimated at higher than half a billion, according to the latest Global Burden of Disease Study. There are 22 million new cases documented each year. Previous

studies have shown that healthy lifestyle factors, such as physical activity, diet and weight management, are useful interventions in the prevention and management of T2D. This new systematic review and meta-analysis, conducted by Dr An Pan and Mr Yanbo Zhang, Huazhong University of Science and Technology, Wuhan, China, and colleagues, aimed to evaluate the impact of combined healthy lifestyle factors; firstly on incidence of diabetes and secondly on morbidity and mortality outcomes in persons with the condition.

The authors looked for studies to include in their analysis that had a combination of at least three factors to indicate overall lifestyle, including: smoking, drinking alcohol, physical activity/ sedentary behaviour, diet, being overweight or obese, and sleep duration/ quality. Follow up of at least a year was required for study eligibility. Baseline characteristics of the participants were extracted to adjust the data – age, gender, race and ethnicity, education level, health status.

Fourteen studies were identified for the main analysis, with 1,116,248 participants, and researches based in the USA, Asia, Europe, and Oceania (Australia, New Zealand and adjacent islands). Mean baseline age ranged from 38 to 73 years; mean follow up was 2.7 to 20.8 years. A further 10 studies were used in the meta-analysis of people who already had T2D, with 34,385 diabetic participants from researches based in USA, Asia, and Europe, and one global study across several continents. The mean age at baseline ranged from 46 and 69 years; with a mean follow up duration of 4 to 21 years.

A combination of healthy lifestyle factors was found to be associated with a 75% lower risk of T2D, compared with individuals with the least healthy lifestyle. For each of the 14 studies, healthiest versus unhealthiest lifestyle was assessed in a slightly different way (usually with a points system), with each study giving a slightly different result. However, by weighting each study based on number of participants and variation of the effect size, it was possible for the authors to come to the final figure of 75% lower risk of developing type 2 diabetes for the healthiest versus the unhealthiest lifestyle.

> Given that the proportion of individuals with the healthiest lifestyle was found to be low in most populations, promotion of an overall healthy lifestyle, instead of tackling one particular lifestyle factor, should be a public health priority for all countries

Due to the differences in definition and selected study populations, the proportion of people with the healthiest lifestyle varied substantially across studies and in most of the studies, it was low (under 20%). A meta-analysis of the included studies indicated that overall, around 14% of people adhered to the healthiest lifestyle, whereas 11% adhered to the unhealthiest lifestyle, although the range in both categories was large across all the studies (from 4% to 42% for the healthiest lifestyle and from 3% to 43% for the unhealthiest lifestyle). It is clear from the results, say the authors, there are clearly large rooms for improvement in lifestyle across all countries.

Over 1 million participants

This study, with over 1 million participants, has identified that healthy lifestyle factors in combination, can substantially lower the risk of developing T2D. Although bodyweight plays a dominant role in the risk of T2D, its individual association with the condition was found to be weaker than that of combined lifestyle factors; furthermore, lifestyle behaviours such as physical activity, diet quality and sleep pattern, have been shown to affect bodyweight. Within this new research, several studies reported that each additional lifestyle factor was associated with an 11-61% lower risk of T2DM.

This study also considered the potential benefits of a healthy lifestyle on the management of T2D – an important clinical issue. Compared with diabetic individuals with the least healthy lifestyle, those with the healthiest lifestyle displayed a 56% lower risk of all-cause mortality, a 49% lower risk of CVD mortality and a 31% lower risk of cancer mortality, as well as a 52% lower risk of developing CVD. The authors say: "This supports the recommendations from the American Diabetes Association and other organisations that lifestyle modification should be the cornerstone for the management of diabetes, and the findings from various trials indicating that healthy lifestyle interventions could reduce CVD outcomes in persons with type 2 diabetes."

The authors note certain limitations to this study, which they suggest might be addressed by future research. As most studies were conducted in high-income countries and most participants were of white ethnicity, they suggest that evidence from other populations is needed. Also, as T2D is now increasingly seen in adolescents and young adults, the authors recommend more research on the associations of healthy lifestyle with diabetes and diabetes complications in these age groups.

The reduction of premature mortality from non-communicable diseases, the authors note, is one of the Sustainable Development Goals set by the United Nations, to be achieved globally by 2030. They say: "As diabetes complications, particularly CVD, are the leading cause of illness and death amongst individuals with type 2 diabetes, prevention of the condition and its long-term adverse outcomes is urgently needed to meet this goal."

They add: "At the individual level, we encourage people to adopt healthy living habits for example as regards diet, activity, smoking and drinking. At the population level, governments should facilitate the changes needed to make healthy lifestyle choices accessible, affordable and sustainable."

They conclude: "Given that the proportion of individuals with the healthiest lifestyle was found to be low in most populations, promotion of an overall healthy lifestyle, instead of tackling one particular lifestyle factor, should be a public health priority for all countries".

• **doi**: 10.1007/s00125-019-04985-9

Diabetes increases the risk of heart failure more in women than men

Diabetes confers a greater excess risk of heart failure in women than men, according to new research in *Diabetologia* (the journal of the European Association for the Study of Diabetes). Type 1 diabetes is associated with a 47% excess risk of heart failure in women compared to men, whilst type 2 diabetes has a 9% excess risk of heart failure for women than men.

It is now recognised that diabetes and heart failure (whereby the heart pumps blood less efficiently) are conditions that often occur together. Diabetes is not only associated with an increased risk of heart failure, but also with an increased risk of death following diagnosis; and heart failure is the second most common initial presentation of cardiovascular disease in people with type 2 diabetes – more common than heart attack or stroke. The number of people with heart failure is expected to rise, making earlier prevention and treatment essential.

Accumulating evidence suggests that there are considerable sex differences in the increased risk of a range of cardiovascular diseases associated with diabetes. Previous analyses have shown that diabetes confers a greater excess risk of coronary heart disease (CHD) and stroke, as well as of other non-cardiovascular complications including dementia and cancer, in women compared with men. This study, by Dr Toshiaki Ohkuma from the George Institute for Global Health at the University of New South Wales, Sydney, Australia and Dr Sanne Peters from The George Institute for Global Health at the University of Oxford, UK, with colleagues, examined possible sex differences in the excess risk of heart failure associated with diabetes.

The study included observational cohort studies from the PubMed database if they provided sex-specific risk information of the association of diabetes with heart failure in both sexes, and excluded them if they included individuals with underlying diseases, had data for one sex only, or did not take into consideration possible confounders including at least age. The study pooled the sex-specific relative risks and the women to men ratio of relative risks for heart failure, either fatal or non-fatal, comparing individuals with diabetes to those without the condition, from the relevant research identified.

Of 5991 articles originally identified, 14 studies provided useable data for sex differences in the association between diabetes and the risk of heart failure. Two of these included data on type 1 diabetes – 2 cohorts providing results for 3,284,123 individuals and 95,129 events. Data on type 2 diabetes and heart failure were available from 13 studies, involving 47 cohorts that included 11,925,128 individuals 249,560 heart failure events.

Type 1 diabetes was associated with a 5.15 times higher risk of heart failure in women, and a 3.47 times higher risk in men - meaning a 47% excess relative risk of heart failure for women compared to men. Type 2 diabetes was associated with a 1.95 times higher risk of heart failure in women, and a 1.74 times higher risk in men – meaning a 9% excess relative risk of heart failure for women compared to men.

Explanations for increased risk

The authors suggest several potential explanations for the increased excess risk of heart failure in women with diabetes. Firstly, they note that diabetes may confer a higher risk of CHD in women than men – CHD is a major cause of heart failure in people with type 2 diabetes and excess risk of CHD associated with diabetes has previously been shown to be greater in women. Secondly, sex differences in diabetes management could underpin these associations, as historically women have had poorer blood sugar control than men.

Another possibility is that under-treatment for women with diabetes may contribute to the development of diabetic cardiomyopathy (disease of the heart muscle causing it to become thick or rigid.

Another potential cause for the difference concerns variation in prolonged high blood sugar levels prior to full diabetes diagnosis, known as 'prediabetes', between men and women. This period can be up to two years longer in women and is associated with cardiac dysfunction. Finally, other cardiovascular risk factors, again reported to be higher in women with diabetes than men, may account for the greater excess risk in women.

In terms of type of diabetes, the excess risk in women was seen to be higher for type 1 compared to type 2. The reason for this difference is unclear, but the authors suggest it may be partly explained by the above mentioned sex differences in the association between diabetes and CHD. In a previous study the authors noted a stronger sex difference for type 1 diabetes than type 2 in the association with CHD.

The strengths of the current study include the large number of participants – data from 14 studies, with 47 cohorts and over 12 million individuals – and the fact that single sex studies were excluded. Limitations, the authors suggest, include the possibility of unmeasured confounding factors in the studies used, and the fact that potentially useful data on duration of diabetes, blood sugar control, use of glucose lowering drugs or type of heart failure was unavailable. Also, the risk of premature death is higher in men with diabetes than women with diabetes (and also in the general population), making men less likely to develop heart failure.

The excess risk of heart failure following a diagnosis of diabetes is high in both sexes, but significantly greater in women than men, conclude the authors, "highlighting the importance of intensive prevention and treatment of diabetes for women as well as men". They stress the need for further research – to understand the mechanisms underpinning this excess risk in women (particularly for type 1 diabetes) and "to reduce the burden associated with diabetes in both sexes".

• **doi**: 10.1007/s00125-019-4926-x

No point in sugar coating it

The Middle East is the second highest region worldwide to be affected by obesity, with as much as 75% of the population being obese or overweight[1].

According to data from the World Health Organisation (WHO), obesity rates among adults are exceptionally high in the region, at more than 37% in the UAE, almost 40% in Kuwait and more than 42% in Qatar[2].

Weight management services at Bupa Cromwell Hospital

At Bupa Cromwell Hospital we take the time to understand the patient's individual circumstances and work together to help achieve their goals. For some people this will be through having bariatric (weight loss) surgery. For others it may be possible through lifestyle changes or medication.

The Weight Management team, led by Consultant Bariatric Surgeon Mr Ahmed Ahmed, is committed to delivering the best care and providing expert, personalised treatment. Patients are given all the information needed to help them make decisions about their future health. Patients are supported by the team throughout their weight loss programme. Additional services such as home visits from a personal trainer or dietitian can be provided. We also offer therapies including pulmonary rehabilitation for people with breathing difficulties and alternative therapies, such as massage.

The relationship between obesity and diabetes is now referred to as diabesity. For procedures requiring surgery - our team adopt a near-scarless approach using 2mm incisions as opposed to commonly used 12mm incisions. Post surgery, patients exeprience an immediate improvement in the management of type 2 diabetes.

If patients choose to have surgery, they can be confident in the expertise of the consultant team who pay close attention to pre and post operative care. Consultants are supported by experienced bariatric nurses. We also have a paediatric weight loss service and the team offer online consultations with our experts as well as translation services. Our team also runs satellite clinics in the Middle East and Egypt.

Patients with weight-related health problems can be reassured that they are being treated in a hospital which provides high quality care through advanced treatment technologies and highly experienced and skilled experts.

To book an appointment to see Mr Ahmed or the weight management team, please call Bupa Cromwell Hospital on +44 (0) 20 7460 5700 or email appointments.team@cromwellhospital.com

Bupa CROMWELL HOSPITAL

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[1] Renewbariatrics.com. (2019). [online] available at: https://renewbariatrics.com/obesity-rank-by-countries/ [Accessed 28 Oct 2019]
[2] Euiperspectives.economist.com. (2019). [online] available at: https://euiperspectives.economist.com/sites/default/files/ControntingobesityintheMiddleEast_0.pdf [Accessed 28 Oct 2019]

Innovation in Heart Failure: from Pills to Devices

Under the high patronage of the Lebanese Minister of Public Health, His Excellency Dr. Jamil Jabak, the Division of Cardiology at Hôtel-Dieu de France organized its 2nd annual meeting on 6-7 September 2019, in Beirut, entitled "Innovation in Heart Failure: from Pills to Devices", in collaboration with the Faculty of Medicine at Saint-Joseph University and the Lebanese Society of Cardiology.

The conference was attended by the President of the Lebanese Order of Physicians, Prof. Charaf Abou Charaf, the President of the Lebanese Society of Cardiology, Dr. Malek Mohammad, the Director of the Heart and Vascular Institute, and Vice-Dean at the American University of Beirut, Prof. Ziyad Ghazzal, the Rector of Saint-Joseph University, R.F. Salim Daccache, s.j., represented by the President of Hôtel-Dieu de France, Mrs. Martine Orio, the Dean of the Faculty of Medicine at Saint-Joseph University, Prof. Roland Tomb, represented by the Vice-Dean, Prof. Elie Nemr, the Medical Director of the Hospital, Prof. Negib Geahchan, in addition to top cardiovascular specialists from Lebanon and neighboring Arab countries.

"This meeting is important because the treatment of heart failure has become very sophisticated and complex," said Professor Rabih Azar, Chief of Cardiology at Hôtel-Dieu de France. "In addition to medications, the treatment now relies on sophisticated non-invasive structural interventions and on electronic devices. Cardiologists need to stay up-to-date, because innovations in this field are becoming numerous," he said.

"Our mission as a university hospital is to ensure the highest quality of health care without any racial, social, and economic discrimination. The Ministry of Health is with us to meet this challenge so that any Lebanese patient can have access to the best health care," said Professor Elie Nemr, Vice-Dean of the Faculty of Medicine at the Saint-Joseph University.

The President of Hôtel-Dieu de France, Mrs. Martine Orio, pointed out the technological innovations and scientific advances that have contributed in reducing this pathology. She added: "Heart failure is one of the most frequent reasons for admission to Hôtel-Dieu. We are aware that with this problem comes very difficult financial obligations, but we believe that the values of Hôtel-Dieu will not let these challenges be an obstacle."

Speaking at the event, Minister Jabak said: "While statistics show that more than 2% of the world's population suffers from this disease, in Lebanon more than 70,000 people suffer from it. Our records show that more than 11,000 cases are admitted to hospitals every year, and the Ministry of Health covers more than 33% of them. These figures indicate the widespread prevalence of this disease in Lebanon as well as in the world, giving even more importance to this conference."

All aspects of heart failure management from pills to devices were discussed by top cardiovascular experts from the United States and Europe, as well as by local faculty members.

"We are pleased to announce that the most advanced therapies for heart failure are available for Lebanese patients at Hôtel-Dieu de France hospital," said Professor Toni Abdelmassih, Director of the Heart Failure Unit at HDF.

"We can now open blockages in the arteries and correct problems in the mitral and aortic valves with minimal catheter-based interventions. We can also cure some of the most common electrical problems associated with heart failure with non-invasive procedures such as ablation therapy. In addition, we can implant small but very smart pace-makers and defibrillators that have the capacity of improving cardiac output and preventing sudden death."

The Division of Cardiology at Hôtel-Dieu de France Hospital is a leading cardiovascular institution in the Middle East. Its mission is to provide the best cardiovascular treatment as well as to provide continuous medical education to professionals in the health field and to the community.

- For more information, visit: *www.hdf.usj.edu.lb*

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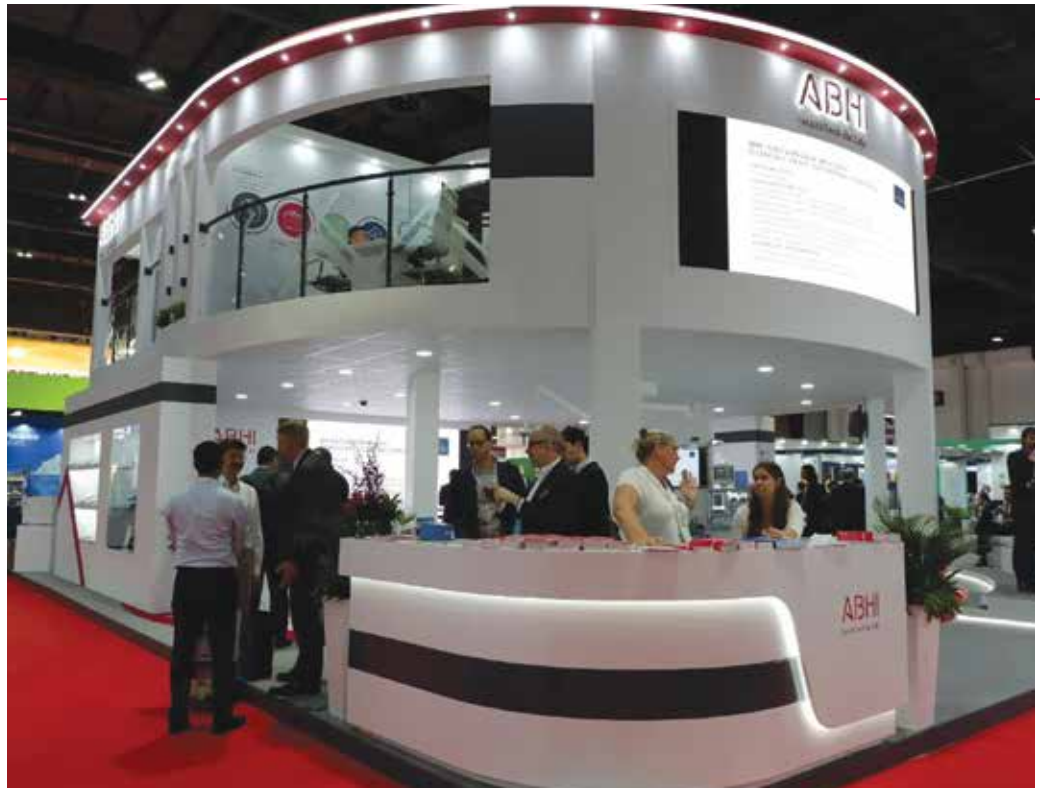

Leading the way in health technology

The Association of British HealthTech Industries (ABHI) will showcase the best of UK HealthTech at the Arab Health exhibition in Dubai in January.

The Health Technology (HealthTech) sector is an incredibly exciting industry to be involved in right now. From the essential, everyday products like sticking plasters and surgical instruments, through to hip and knee implants, pacemakers and MRI machines, we are seeing products increasingly incorporate new fields of science, utilising data, artificial intelligence, robotics and nanomaterials. The industry is integral to the delivery of modern healthcare, supporting better patient outcomes and improved efficiencies within healthcare systems around the globe.

As the sector has matured, devices, diagnostics and digital technologies have become increasingly sophisticated. Treatment for the likes of cancer and strokes are now quicker and more targeted, supporting improved survival rates and life expectancy. However, as people live longer, we are experiencing a rise in chronic conditions, meaning we must predict, identify, diagnose and treat patients as early as possible to prevent, manage or halt disease progression.

There will always be a role for the hospital, but with the right use of technology we can start to look at delivering care in alternative environments, such as the home or workplace. Through monitoring and predictive algorithms, we are positioned to manage our own health, with added focus on prevention and protection, thus, alleviating pressures on health systems.

Digital health

It's not all apps, robots and telemedicine though. There are currently over 11,000 Digital Health employees working in the UK; applying their trade to infrastructure projects, such as hospital and GP information systems. Programmes that will equip services, such as the UK's NHS, to deliver on what is arguably its prize asset: its data. As the world's largest single health-payer system the NHS has a rich data pool. Large datasets, utilised effectively, mean three things for care: it can be more predictable, more personalised and more precise.

As demonstrated by the number of Digital Health companies exhibiting at Arab Health, the UK is leading the way. When we consider the proximity of the world-class research institutions to the NHS, the country has a unique advantage over its global competitors and is highly regarded overseas. International markets continue to view the UK as a 'stamp of quality', and vice versa, UK businesses are eager to demonstrate their credentials on the world-stage, to bring their technologies to new countries and support improved patient outcomes internationally.

With state-of-the-art new hospital complexes and innovative HealthTech, along with plenty of well-qualified staff, healthcare in the Middle East continues to mature, with continued infrastructural investment an important factor for the region's governments.

As the economies of the region continue to diversify, with banking, tourism, commerce and real estate all growing, the demand for proven HealthTech has increased to support the burgeoning population and rise of expatriate workers. Unsurprisingly then, UK companies are well placed to support these trends and Arab Health continues to be the region's flagship show to demonstrate the latest capabilities.

For over 10 years, the Association of British HealthTech Industries (ABHI) has hosted the UK Pavilion at the show. Bringing along 150 innovative companies from the UK, the pavilion is a vibrant hub of activity every January and the 2020 show is shaping up to be no different. ABHI and the UK Pavilion will be located in Hall 2 and alongside the businesses

exhibiting, there is a busy programme of activity planned to showcase the very best of UK healthcare expertise. This will include live surgical demonstrations and product showcases; activities which always draws sizeable crowds to the pavilion.

The world's most watched surgeon

At the 2019 show, cutting-edge doctor Professor Shafi Ahmed performed virtual reality and augmented reality surgery on the UK Pavilion. Dubbed the "world's most watched surgeon" due to the live streaming of one of his surgeries, Professor Ahmed is just one example of the forward-thinking clinical experts the UK boasts, and ABHI are delighted to be hosting an equally impressive line-up this time around. On hand to support the pavilion are Bender UK, a market leader in the provision of critical care power and surgical packages, and Merivaara, whose high-quality equipment will be used throughout the surgical demonstrations.

The week affords a range of UK companies to exhibit their latest services and technologies, developing new and existing business relationships with a variety of buyers and distributors visiting the show. In addition, the ABHI UK Pavilion plays host to a number of private hospital groups including Edgbaston Medical Quarter, HCA Healthcare, BMI Healthcare and Harley Street Medical Area (HSMA).

The latter, HSMA, are located in Marylebone, in the heart of central London and is a collective of hospitals, clinics and specialists who deliver outstanding patient care through pioneering treatments and cutting-edge technologies. It is home to around 4000 medical specialists and over 250 clinics working within 92 acres of Marylebone, central London.

Harley Street Medical Area

The Howard de Walden Estate, the guardian of the Harley Street Medical Area, has been supporting and nurturing medical excellence in this historic part of London for 200 years. It has a reputation for offering the very highest standards of medical care and expertise and is notable for the sheer variety and excellence of services on offer in such an attractive and accessible setting. Behind the area's beautiful period façades lives a 21st century medical practice, complete with cutting edge equipment and state of the art facilities.

This year we are delighted to welcome some of the world's largest hospitals to the HSMA stand such as The Mayo Clinic and Cleveland Clinic, who have both chosen the Harley Street Medical Area as their preferred location to build state-of-the-art UK hospitals. Also representing the area is Royal Pharmacists to Her Majesty the Queen John Bell & Croyden, the prestigious King Edward VII hospital, Royal Brompton & Harefield Hospitals (RB&HH) and The Priory.

Paul Benton, Managing Director, International, ABHI added: "HSMA's reputation for medical excellence, innovation and patient experience has grown significantly, as has its contribution to the UK medical sector and the wider economy. It is a prestigious location for any healthcare provider or medical practice and we are delighted that so many world leading names have joined forces to attend Arab Health on the UK Pavilion. It is an honour to have them."

UK International Healthcare Management Association

ABHI is also delighted to be hosting, for the first time, the UK International Healthcare Management Association (UKHIMA). Their broad membership base offers the skills needed to plan, design, build and run hospitals and primary care facilities, and includes supporting services such as quality assurance, technology, IT, commissioning, education and financial service offerings.

In London's Guy's & St Thomas' NHS Foundation Trust, one of the UK's largest hospitals will also be on the ABHI UK Pavilion. Their experience of managing 2.6 million patient contacts a year is sure to be a topic that visitors to their stand will want to discuss and learn from.

Paul Benton added: "ABHI are delighted to be showcasing the best of UK HealthTech at Arab Health. When we consider the substantial investment into public health from the Government of the UAE, and wider Middle East, opportunities for UK companies providing value-based healthcare solutions are significant. This strong delegation of companies shows that the UK is open for business and is keen to forge global healthcare links in the region. Arab Health is the best trade show to drive this and the UK pavilion promises to be a hub of activity."

On ABHI's support for companies, Benton continued: "Our support includes access to one-on-one advice from industry experts and leaders on doing business in the region. As well as access to exclusive market briefing events and inclusion in our wide-reaching PR and marketing activities and on-site media support during the event."

- Taking place at the Dubai World Trade Centre from the 27-30 January 2020, the exhibition is the largest healthcare trade show in the Middle East and is a key highlight of the export calendar. Each year the show attracts over 106,500 visitors and sees over 4250 companies exhibiting from 64 countries, generating US$824 million in business.

The UK group is the third largest pavilion outside the UAE and designed to be a flagship for UK innovation and excellence. MEH

Guy's and St Thomas offer London Visiting Professional Programmes (Observerships and Attachments)

Guy's and St Thomas' NHS Foundation Trust is a world-class organisation with a proud history stretching back over 900 years. We are a centre of excellence for clinical services, education and research. Our clinical services are delivered from two of London's best known teaching hospitals, **Guy's Hospital and St Thomas' Hospital**, where the Evelina Children's Hospital is also located.

Through our Commercial Education and Events department we offer a Visiting Professional Programme, an **opportunity** for individual doctors, researchers and other healthcare professionals from around the world to undertake an **observership** or hands on **clinical attachment** and learn from our areas of clinical care.

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We offer a bespoke service, tailoring the placements to one or more areas of interest, offering multiple dates throughout the year and assisting you with the application, visa, accommodation and honorary contract process. The benefit of the programmes to our overseas medical practitioners is unparalleled; equally we believe the programme brings to the UK an exceptional opportunity to exchange ideas and insights into medical advancements and methodologies whilst building relationships with international colleagues for future collaborations in developing improved healthcare.

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Aerial view of Westminster, London

Guy's Hospital main entrance, London

Surgeons at work, Guy's Hospital

> My time spent here was fantastic and the staff were lovely. I've learned a lot from different disciplines. In particular, there is certainly a lot of clinical knowledge and experience and some things we could learn from the [Guy's and St Thomas'] model to implement it back home. I felt that the programme was excellent as a whole and very useful.
>
> – Pharmacist placed on the Paediatric Pharmacy VPP programme

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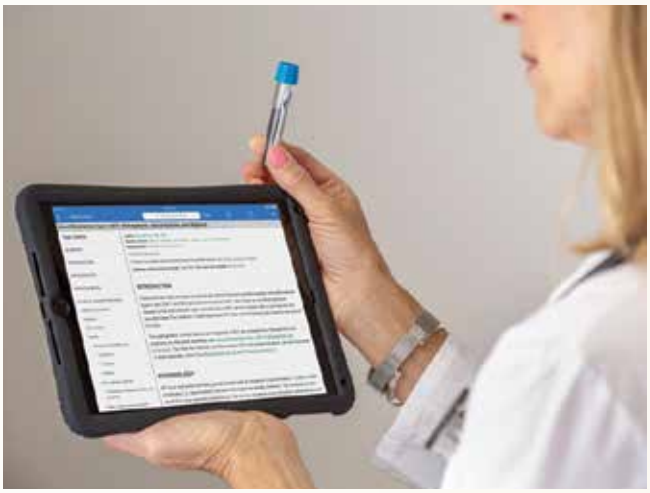

Smart content and technology helps healthcare professionals reduce medication errors and enhance patient safety

Every year, medication errors pose a significant risk to patients receiving treatment in hospitals all over the world. According to the U.S. Centers for Disease Control and Prevention (CDC), medical errors are the third most common cause of death in the United States, claiming over 250,000 lives in 2013. A significant number of these are drug-related errors, including inappropriate therapies, adverse drug events, and dosing problems.

Medication errors can occur at several stages of the treatment process: At the time of prescribing, order entry, dispensing, administration, or when the professional is advising a patient about how to use their medication. At any of these stages, there is the potential for a professional to make a mistake that could jeopardize therapeutic effectiveness or impact patient safety.

"A reasonable estimate is that around 30 to 50 people in every 1,000 hospital admissions experience an adverse event related to a medication," explains Alaa Darwish, Middle East and Africa Country Manager for Clinical Effectiveness, Wolters Kluwer, Health.

Healthcare is a fast-paced, high-pressure work environment, Darwish says. There is an "urgency" to providing competent care that must be reconciled with the pressure to keep up with the workload. "It can be challenging to acquire and process relevant information to maximize patient benefits while minimizing patient risks."

Healthcare providers, for the most part, have appropriate training and dedication to meet these therapeutic goals when prescribing drugs. But medication information is constantly evolving, Darwish notes, and it can be hard for professionals to keep up. "Without access to current information and the support of automated screening tools, there is a potential 'gap' in a professional's ability to optimize the safe use of medications."

While the primary concern with medication errors is the risk that they pose to patients, there are also what Darwish calls "secondary impacts" on hospitals and health systems.

"The financial consequences of medication errors can have a detrimental impact on a healthcare institution. The cost of corrective therapies, additional tests, new medications, and hospital readmissions needed to address medication errors are all expenses that could have been avoided had the initial error been prevented.

The time needed to treat adverse events and readmissions puts additional strain on a clinical staff, drawing on resources that may already be in short supply, which ultimately creates an even lengthier triage and wait time for patients in less urgent circumstances.

"One of the most important things hospital leadership can do to equip their professionals to better reduce medication errors is provide 'current, relevant, and accessible information' at the various stages in the continuum of care," says Darwish.

"Physicians, nurses, pharmacists, and technicians should have access to drug safety information on a consistent basis. They can also implement system checks, either through process improvements or automated screening tools that augment the efforts of the dedicated professionals in their institutions."

With medication-related clinical decision support in place, clinicians can receive automatic alerts from their electronic health record (EHR) system, letting them know when there might be a medication concern. They can then evaluate the issue and make an alternative recommendation if they determine the original medication therapy had the potential to create an adverse drug event.

Clinicians can also use drug references at every stage of the process – prescribing, dispensing, administering, and patient education – to look up dosing and other safety issues to help prevent medication errors.

"Nothing can replace a well-trained, capable healthcare provider in his or her role," added Darwish. "But information to guide safe medication use across the process, as well as the use of sophisticated electronic tools to augment their efforts, can have a significant impact."

- For more information, visit: *www.wolterskluwer.com/health*

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Is this brain cell your 'mind's eye'?

Only brain activity involving 'L5p neurons' enters conscious awareness, says new theory

No-one knows what connects awareness – the state of consciousness – with its contents, i.e. thoughts and experiences. Now researchers propose an elegant solution: a literal, structural connection.

'Content circuits' within the cortex are plugged into 'switchboard circuits' that allocate awareness, says the theory, via cortical cells called L5p neurons.

Writing in Frontiers in Systems Neuroscience, the group offers evidence – and caveats. Their challenge to experimentalists: if consciousness requires L5p neurons, all brain activity without them must be unconscious.

State vs. contents of conscious

Most neuroscientists chasing the neural mechanisms of consciousness focus on its contents, measuring changes in the brain when it thinks about a particular thing – a smell, a memory, an emotion. Quite separately, others study how the brain behaves during different conscious states, like alert wakefulness, dreaming, deep sleep or anaesthesia.

Most agree the two are indivisible: you can't think or feel or experience anything without being aware, nor be 'aware' of nothing. But because of the divided approach, "nobody knows how and why the contents and state of consciousness are so tightly coupled," says Dr Jaan Aru, neuroscientist at Humboldt University, Berlin, and lead author of the new theory.

Separate circuits

The divide created between state and contents of consciousness is anatomical.

Our conscious state is thought to depend on the activity of so-called 'thalamo-cortical' circuits. These are connections between neurons in the cortex, and neurons in the thalamus – a thumb-sized relay centre in the middle of the brain that controls information inflow from the senses (except smell). Thalamo-cortical circuits are thought to be the target of general anaesthesia, and damage to these neurons due to tumours or stroke often results in coma.

In contrast, functional brain imaging studies locate the contents of consciousness mostly within the cortex, in 'cortico-cortical' circuits.

The missing link?

Aru and colleagues believe that L5p neurons are uniquely placed to bridge the divide.

"Thalamo-cortical and cortico-cortical circuits intersect via L5p neurons," explains Dr Aru. "Studies tracing these cells under the microscope suggest they participate in both circuits, by exchanging connections with both thalamus and cortex."

Functional brain studies suggest these cells may indeed couple the state and contents of consciousness. Cellular-level brain imaging in mice shows that L5p neurons respond to a sensory stimulus (air puff to the leg); that this response increases when the animal is awake; and that it is strongest by far when the animal reacts (moves its leg) to the stimulus.

"We can't tell what the mouse is thinking," concedes Dr Aru. "But if we assume that it reacts only when it is conscious of the stimulus, then this study demonstrates the interaction between the state [wakefulness] and contents [sensory experience] of consciousness in L5p neurons."

The assumption is consistent with a similar mouse study. This one went further, showing that directly activating the stimulus-responsive L5p neurons (e.g. with drugs) makes the animal react to a weaker sensory stimulus – and sometimes without any stimulus.

"It's as if the mouse experiences an illusory stimulus; as if L5p stimulation creates consciousness," Dr Aru adds.

Testing the theory

The theory is a first iteration that needs refinement, stresses Dr Aru.

"Our goal here is to convince others that future work on the mechanisms of consciousness should specifically target L5p neurons."

Nevertheless, this general arrangement could account for some well-known quirks of consciousness.

For example, the processing delay of this long relay – from cortico-cortical circuit to thalamo-cortical and back again via L5p neurons – could explain why rapid changes of stimuli often escape conscious perception. (Think subliminal messages spliced into video.)

One feature of this phenomenon is backward masking: when two images are presented briefly in rapid succession (50–100 ms), only the second image is consciously perceived. In this case, posits Dr Aru, "by the time the stimulus completes the L5p-thalamus-L5p relay, the second image has taken over early cortical representation and steals the limelight lit by the first image."

The theory could also help explain why we usually have little conscious insight into some brain processes, like planning movement or even syntax.

"All brain activity that does not (sufficiently) involve L5p neurons remains unconscious," predicts Dr Aru.

Therein lies the key to testing this exciting theory.

• doi: 10.3389/fnsys.2019.00043

Agenda

Selected schedule of regional medical meetings, conferences and exhibitions

Event	Date / City	Contact
November 2019		
World Congress on Nursing & Healthcare	21-22 November 2019 Dubai, UAE	*https://scientificfederation.com/nursing-healthcare-2019/*
International Conference on Obesity and Diet Imbalance	25-26 November 2019 Dubai, UAE	*https://obesity-diet.nutritionalconference.com/*
Global Diabetes Summit	28-29 Nov 2019 Dubai, UAE	*https://assimilate.creativesprout.com/globaldiabetessummit*
7th International Oncology Conference	29-30 November 2019 Abu Dhabi, UAE	*http://menaconference.com/events/7ioc/*
December 2019		
World Congress on Complementary and Alternative Medicine	2-3 Dec 2019 Dubai, UAE	*https://complementarymedicine.cmesociety.com/*
Cognitive Neuroscience Congress	9-10 December 2019 Dubai, UAE	*https://cognitive.neuroconferences.com*
January 2020		
Arab Health	27-30 January 2020 Dubai, UAE	*https://www.arabhealthonline.com*
February 2020		
World Congress on Physical Therapy and Rehabilitation Medicine	22-23 February 2020 Dubai, UAE	*https://physicaltherapyconferences.org*
Case Based Approach to Controversies in Cardiovascular Disease	28-29 Feb 2020 Dubai, UAE	*http://cvuae.com/*
Middle East Health Leadership Program	29 Feb – 2 March 2020 Abu Dhabi	*https://www.insead.edu/executive-education/partner-programmes/middle-east-health-leadership-programme*

List your conference:
If you have upcoming conference/exhibition details which you would like to list in the agenda, please email the details to the editor: *editor@MiddleEastHealthMag.com*

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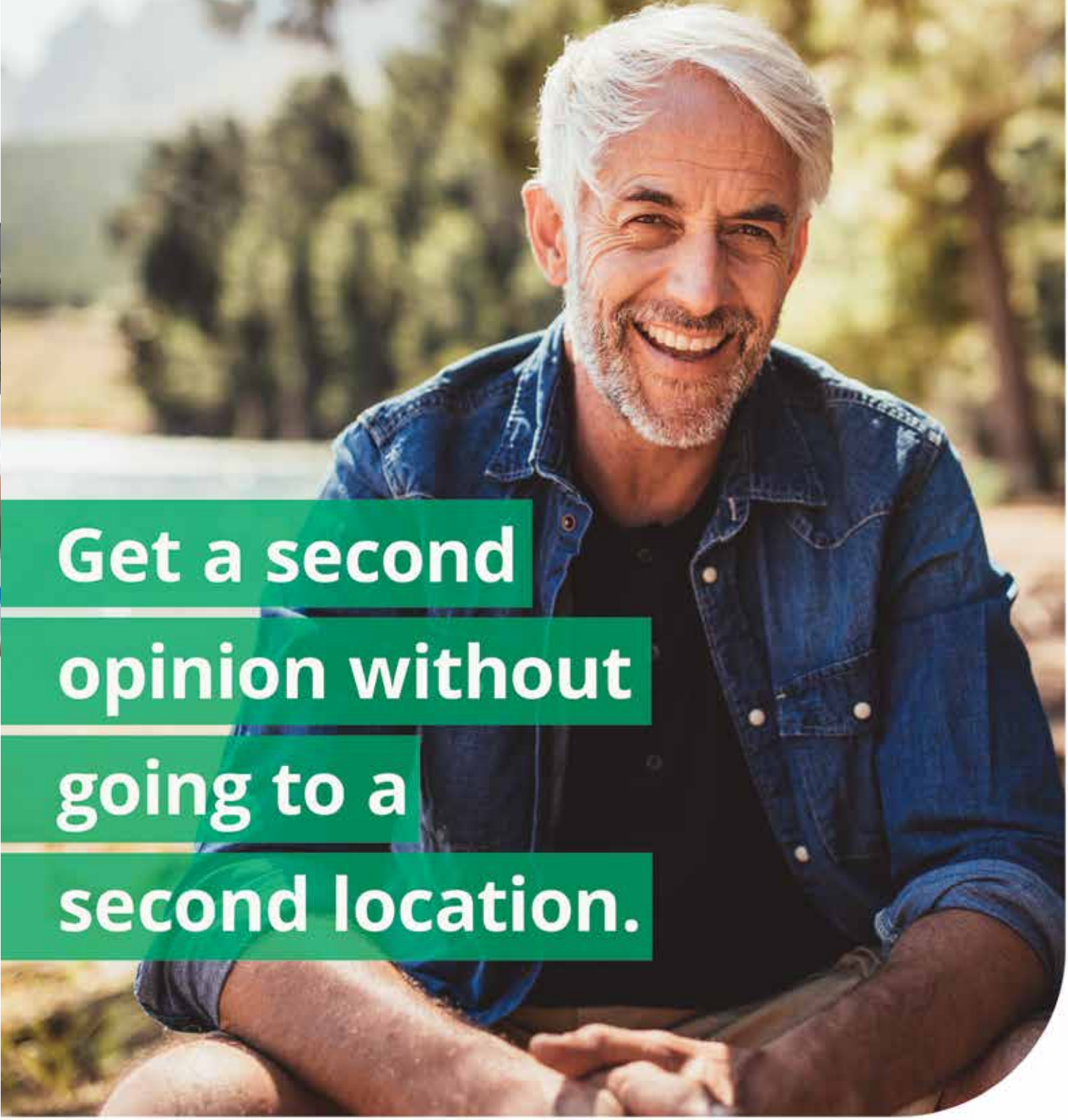

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