The Messe Düsseldorf once again opened its doors to attendees of the world’s largest medical trade fair, MEDICA, from 13th–16th November 2017. Comprised of medical professionals from hospitals, research, practices, and of course industry, there was a total of 123,500 visitors from over 130 different countries during the 4-day event, showing the high regard in which this trade fair is held by the medical community. MEDICA took place alongside COMPAMED, the leading international market platform for suppliers to the medical technology industry, and continues to be recognised as the place where collaboration between suppliers and their customers begins.

In a statement, Joachim Schäfer, Managing Director, Messe Düsseldorf GmbH emphasised the trend of increasing numbers of exhibitors and visitors from the emerging economies of the world: “Besides the ‘classic’ target markets of Europe, North America, and Japan, suppliers are also increasingly focussing on emerging economies in spite of some uncertainties. This is because people’s willingness to spend on health is increasing with rising incomes in these markets. More and more prosperity-related diseases and greater life expectancies in these countries are additionally driving up demand for medical products and modern treatments.”

In total, there were >5,000 exhibitors from 66 countries present at MEDICA 2017. A plethora of cutting-edge developments was on show, including electromedicine and medical technology, laboratory technology and diagnostics, physiotherapy and orthopaedic technology, commodities and consumables, information and communication technology, and medical furniture and specialist furnishings for hospitals and practices. With such broad coverage, MEDICA had something to offer medical professionals of any background.

In addition to the vast range of innovative medical products, devices, and instruments on display throughout the many halls of the Messe Düsseldorf, there was a wide range of new conferences and forums for healthcare professionals to attend to allow them to keep abreast of current developments in key areas. Amongst these was the introduction of the MEDICA Academy, which enabled doctors from all therapeutic areas to undertake further training in imaging,
The Growing Importance of Wearables in Modern Medicine

WEARABLES were very much at the forefront of the MEDICA 2017 congress, with dedicated sessions at the MEDICA CONNECTED HEALTHCARE FORUM, in addition to The Wearable Technologies Show, which focussed on prevention of injury and other developments in sports medicine.

The scope of wearable technology is massive, with >150 million wearables sold globally in 2017 a figure that is projected to rise in the future. Christian Stammel, CEO of WT Wearable Technologies Group, Munich, Germany, explained how wearables are much more ubiquitous today than might be realised, stating: “We define all electronic components that are worn on the body, close to the body, or in the body as wearables.” Under this broad definition, it can be seen that the wearables revolution has been underway for a long time, through the use of devices such as pacemakers and hearing aids. Furthermore, there is still significant room for expansion of the wearables market. It is estimated that 400 million wearables will be sold in 2020 and that ≥50% of this figure will be medical wearables.

Medical wearables are being increasingly developed in the form of smart patches and will so enable patients to use long-term monitoring products and even receive medication in such a way that is almost invisible to others.

The next edition of MEDICA will take place from 12th–15th November 2018, and we look forward to seeing even more medical innovations and developments throughout the following year!
outpatient care. One of many wearable innovations on show at MEDICA was a training glove for patients recovering from debilitating stroke. This glove used robotic support and motion sensors to facilitate movements, such as grasping, and improving the perception of touch. Another key aspect of wearables is the ability they offer to monitor vital patient data, either at home or in the clinic. When combined with miniaturisation, this will change the paradigm of monitoring and treatment. Mr Stammel expanded on this, saying: “Medical wearables are being increasingly developed in the form of smart patches and will so enable patients to use long-term monitoring products and even receive medication in such a way that is almost invisible to others.”

Looking to the future, there are a number of challenges that must be overcome in order to maximise the impact of wearables, including medical licensing, data protection, and data interoperability. Furthermore, Mr Stammel raised the interesting point that existing hospital and clinic infrastructure would impede the adoption of wearables in that domain, meaning initial benefits were more likely to be seen in the outpatient setting. Bearing in mind the sheer scale of the opportunities offered by wearables, as well as their associated challenges, Mr Stammel concluded: “It is up to the medical profession to openly explore the new opportunities that are being opened up by digital innovations and to indicate their interest to the established suppliers of medical infrastructure solutions for practices and clinics.” Fortunately, MEDICA 2017 was the perfect opportunity to do so.

Augmented and Virtual Reality Glasses Benefit Both Surgeon and Patient

FUTURISTIC augmented and virtual reality eyewear was presented for the first time at the MEDICA 2017 conference. By aiding both the healthcare professional and the patient, these innovative technologies demonstrate numerous possibilities for application in the clinical setting, including increasing the accuracy and precision of surgery. Described in a MEDICA press release dated 12th November 2017, two leading wearable products were presented at the event.

The MEDICA 2017 event highlighted the usefulness of augmented and virtual reality in helping healthcare professionals to improve patient quality of life by increasing accuracy, precision, and effectiveness of procedures and therapies.

Researchers investigated methods of enhancing the operating skill of oncology surgeons when determining the exact location of lymph node metastases to ensure successful removal of the node. A navigation tool, named 3D-ARILE, was developed using an augmented reality system to virtually pinpoint the position of the lymph node through data glasses worn by the surgeon. This innovative procedural aid should make it easier for surgeons to confidently remove the lymph node when preventing metastasis of a malignant tumour.

In addition, methodologies have also been developed that use augmented reality to enable accurate surgical procedures to be performed on the ears. As well as allowing precise intraoperative measurements for middle-ear prostheses, augmented reality has also been used for simplification of cartilage trimming during an operation to close the eardrum. The surface of interest in the situs is virtually marked under a microscope, which can then be displayed through the surgeon’s binoculars using augmented reality when cutting the eardrum. Not only does the use of augmented reality in this setting assist the surgeons and increase accuracy, it may also reduce the risks associated with such invasive surgery.

Moving the focus towards the patient, an exercise training device for use in medical rehabilitation centres has been developed which combines simple exercises with virtual reality glasses. Used as a method to strengthen the back muscles, the patient moves on the device according to the virtual trajectory shown via their glasses, having a desirable effect on muscle group training. A similar technology was also shown to be possible using a massaging armchair and has the possibility of assisting and comforting patients with muscle pains.

The MEDICA 2017 event highlighted the usefulness of augmented and virtual reality in helping healthcare professionals to improve patient quality of life by increasing accuracy, precision, and effectiveness of procedures and therapies. Many companies are investing in such technology and virtual reality systems may soon be implemented into everyday clinical practice.
Innovative Technology Aids Detection and Diagnosis

INNOVATIVE wearable products and applications that can be used to diagnose and monitor health conditions were a topic of interest at the MEDICA 2017 event. According to a MEDICA 2017 press release dated 12th November 2017, there are many new products in the wearable technology sector, as well as a range of portable applications that can be used to efficiently assist patients and medical professionals.

Moving away from the common fitness-tracking applications, the wearable technology sector has evolved greatly in recent years and novel medical products are constantly being developed. For example, a glove has been created that uses sensors on the palm of the hand to predict seizures by consistently measuring data and transmitting the information to the patient’s doctor. By recording indicators like skin conductivity, muscle tone, heart rate, blood pressure, and temperature, the gloves can be used by doctors to better assess symptoms and assist their diagnoses. Patients with other neurocognitive conditions can also benefit from wearable technology, including alleviation of depression by application of a small electrical shock via a headset; this technology is also being investigated in Alzheimer’s disease patients.

One of the most important topics in the field of wearable technologies at MEDICA 2017 was the use of smart patches. Also known as intelligent patches, these wearable products can monitor vital signs when applied to a patient’s skin. The patches have been used to measure the process of wound healing by recording temperature changes and communicating any irregular measurements to the patients or doctors via an app. Physical activity is also recorded by the device and, to encourage physical exercise, motivating messages were also directed to the patient’s smartphone in response to changes in physical activity.

By positively impacting therapy, prognosis, and hospital visit duration, wearables may have great benefits for patient survival, as well as health services around the world.

Other innovative applications include cloud-based voice services combined with health programmes. As well as answering personal health questions, the voice service can initiate actions that will aid the patient’s everyday life and enhance their quality of life; for example, mattress pads can be connected to the software and heated on request. To assist diagnosis and treatment of potentially life-threatening cardiac conditions, app-based ultrasound technology has also been developed to enable physicians to perform sonography tests in any situation. The technology works by activating the corresponding app on a smartphone and connecting it to a USB probe, which contains the system hardware. The wide utility of this device makes it invaluable, particularly in a preclinical emergency setting.

A plethora of studies was presented as part of this event, with topics ranging from the latest in medical apps to the importance of sleep for tissue regeneration, injury prevention, and sporting performance. Prof Yannis Pitsiladis, University of Brighton, Brighton, UK, used this opportunity to showcase his work with the SUB2 Marathon Project, a programme he founded with the goal of supporting top athletes to complete a marathon in <2 hours. By taking an incredibly personalised approach to training, including the analysis of genetic data, transcriptomes, metabolites, proteomes, and epigenomes, Prof Pitsiladis hopes to push human sporting performance to new heights and promote ‘clean running’.

How personalised medicine relates to injury recovery was also a pertinent subject of discussion. Dr Götz Welsch, the Team Doctor at Hamburger SV football club, discussed his methodology regarding when to allow players to ‘return to activity’, ‘return to play’, and finally ‘return to competition’. This discussion was made all the more poignant in a following discussion by Prof Claus Reinsberger, Paderborn University, Paderborn, Germany, regarding head injuries. The consequences of this form of injury are often underestimated in sport because the severity of head injuries often only becomes apparent the day after the damage was sustained. With sideline-diagnosis still largely dependent on pupil reflex tests, Prof Reinsberger introduced a safer diagnostic method in his presentation: ‘Assessing Concussed Brains Between Clinic and Technology’.

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Digital innovations were, naturally, at the forefront of this conference experience, with an enormous range of technology being showcased to supplement patients’ sporting experience. Highlights here included a ‘smart running coach’, which operated based on biomechanical data, as well as devices for the real-time analysis of cardiac arrhythmias.

Ultimately, this conference sought to emphasise that exercise is itself a form of medicine, showing its remarkable benefits not only for mental health, but also for cardiovascular disease and even many forms of cancer.

**Chatbot Allows Conversation-Like Communication for Young Women with Menstruation Questions**

COMMUNICATION technology has changed radically in recent years, particularly in the last decade. With instant messaging across many different platforms becoming an integral part of everyday life, this platform presents an incredible opportunity for the medical field. A press release from this year’s MEDICA congress highlights how an interactive chatbot could be expanded to also be a marketplace for feminine healthcare products as described by Dr Hajnalka Hejja, CEO of Smart Health UG, Berlin, Germany: “Our plan is to develop specific services with companies whose target group is female.”

**The Digital Revolution Is Here!**

THE DIGITALISATION craze in medicine is in full swing, according to a press release from this year’s MEDICA congress. The implementation of information technology and precision medicine are examples of how the digitalisation of medicine is beginning to empower patients, as well as aiding medical professionals to carry out their jobs with increasing accuracy. Prof Erwin Böttinger, Chief Executive Officer of the Berlin Institute of Health, Berlin, Germany, presented a keynote speech at the MEDICA HEALTH IT FORUM as part of a panel discussion titled: ‘The future is digital: How data and analytics will transform the healthcare market.’

A summary of the discussion was presented in a press release from the congress.

The idea of a ‘health cloud’ was very much the heart of the debate session, with the aim of collating all patient data onto one patient-controlled system, accessible anywhere at any time. It is hoped that the analysis of this patient data alongside clinical study information will allow for matchmaking between eligible patients and upcoming studies. This process would enable patients, with guidance from their doctors, to make informed decisions about which therapy path may be the most beneficial for them. The main obstacle highlighted was the transfer of data between sectors, which if not addressed, would hamper the progress of such a potentially national or international network.

The benefits of a system with detailed, genomic patient information have already been demonstrated in the USA. Clopidogrel, an anti-platelet drug having undergone coronary angioplasty, is inactive in one quarter of patients; as such, these interactions between the user and Izzy is said to be totally different to any other software currently available. Izzy differs from apps and other software in that there is no need for installation and communication takes the form of a real-time conversation rather than a questionnaire or flowchart.
ultimately freeing up medical staff. To automate documentation and drug prescription, reducing costs, and of ineffective drugs. This system will also help the significant reduction in expenditure to patient care, health services will also benefit from the direct benefits and could even be managed by the patients themselves. In addition to the direct benefits, the storage could cross many sectors of medicine and could be used in conjunction with healthcare providers, allowing them to improve their own therapy or day-to-day activities to benefit their patients.

"This is truly an exciting time for medical innovation!"  

Such comprehensive cloud-based data storage could cross many sectors of medicine and could even be managed by the patients themselves. In addition to the direct benefits to patient care, health services will also benefit from the significant reduction in expenditure to patient care. Providing the genetic information is available, a doctor considering prescribing clopidogrel can utilise the patient's electronic file and instruct the programme to screen for a genetic predisposition to clopidogrel resistance. If the patient is resistant to the drug, a warning will notify the doctor via their computer and an alternative solution will be suggested, preventing the prescription of a drug which will not help the patient.

Analyzing patient medical data, in combination with data collected from smartphones, fitness trackers, and smart watches, is hoped to be able to identify events which are likely to lead to undesirable outcomes. This use of big data is already being assessed in clinical trials for its reliability in diabetes; wearable technology collects data regarding the patient's normal daily routine and automatically identifies events that have a high probability of occurring in conjunction with hypoglycaemic events, such as long periods of sitting or a fall. If these events are detected, the patient will get a notification to eat something or a warning to see a doctor immediately. Not only does this technology provide early detection of potential medical incidences, it can also educate the patient on events that may occur because of changes in their disease status, allowing them to improve their own therapy or day-to-day activities to benefit their illness management. The digital advances presented here represent just a snapshot of the effect that digital revolution may hold for both patients and medical professionals alike. This is truly an exciting time for medical innovation!

Novel Methods for Early Detection and Treatment of Cancer

NEW procedures for the early detection of cancer were discussed in Düsseldorf, Germany at the annual MEDICA trade fair. The presentation opened with the question: “Is it possible to diagnose cancer from blood?” introducing blood biomarkers of cancer as a “hot topic” for oncology. Screening and early detection increases chances of identifying tumours at earlier stages of disease, when it is most likely to be curable, potentially even before symptoms become noticeable.

Circulating tumour cells, cell-free nucleic acids, and genetic and epigenetic changes to cell-free DNA and RNA may represent exciting new approaches for early tumour detection.

The latest developments in molecular and immunological treatment approaches have produced some impressive improvements in recent years, even benefitting patients whose disease is already at an advanced stage. One such development is the ability to detect molecular changes in DNA released by the tumour into the blood stream. Through continual patient monitoring during and after therapy, clinicians can determine the efficacy of treatments. “Some centres are already carrying out blood-based molecular trials during routine diagnostics,” said Prof Stefan Holdenrieder, Director of the Institute for Laboratory Medicine at the German Heart Centre, Munich, Germany.

Serious issues that will not be easy to deal with may soon develop if this problem is not brought to the public’s attention more frequently...
These potential problems are well-expressed in the example of Germany. Following increasing globalisation and an influx of refugees, Germany’s healthcare system must now be prepared to battle an increasing incidence of tuberculosis, 3/4-multi-resistant Gram-negative bacteria infections, increasing scabies incidence, and parasitic infections such as malaria. Given the nature of refugee migration, it is likely that the majority of refugees will have either travelled from or through an area at high-risk of multi-resistant germs. Reactivation of certain diseases in travellers also constitutes a risk, as Dr Ghebremedhin explained: “The greatest deficiency in the provision of care to migrants is the lack of support to help them deal with their psychosocial and physical stress they experienced during their migration, which means there is a risk of reactivation.” This issue is exacerbated by the propensity to house migrants in close proximity with one another, thereby increasing the risk of transmission.

In the past, one of the most well-known, and effective, methods for infection prevention has been hand disinfection. The World Health Organization’s (WHO) ‘Clean Care is Safer Care’ campaign has initiated an improvement in medical facilities providing in and outpatient care by implementing the Clean Hands Campaign (CHC). In a MEDICA press release dated 15th September 2017, Dr Tobias Kramer, Institute of Hygiene and Medicine, Charité University Hospital, Berlin, Germany, who works on the CHC explained: “We still need to improve compliance with hand disinfection standards.” To work as a long-term prevention strategy, these practices need to be supported by key stakeholders such as employees at management-level who have a direct influence over this environment.

According to Dr Kramer, established methods included in the CHC, including the use of hand disinfection agents, reports on observations and compliance, sharing knowledge, memory aids, and optimised dispenser location and fitting, should be focussed on to improve hygiene conformity. Adding to this, focussing on employees at dispenser stations revealed evidence that when they established a disciplined commitment to hand disinfection standards, through methods such as setting targets, they produced a sustained improvement in compliance. Many patients already check the medication that they are given by hospital staff and we want to encourage this same activity for hand disinfection,” said Dr Kramer.

Both patients and staff can be unsure of procedures in respect to hand disinfection, therefore a further factor to improve medical professionals’ compliance to hand disinfection relies on communicating this information effectively to patients, as well as their friends and relatives; in this way, these groups will be better informed of when and where disinfection is necessary and can ensure an equivalent level of hygiene from staff. According to Dr Kramer, established methods included in the CHC, including the use of hand disinfection agents, reports on observations and compliance, sharing knowledge, memory aids, and optimised dispenser location and fitting, should be focussed on to improve hygiene conformity. Adding to this, focussing on employees at dispenser stations revealed evidence that when they established a disciplined commitment to hand disinfection standards, through methods such as setting targets, they produced a sustained improvement in compliance. Many patients already check the medication that they are given by hospital staff and we want to encourage this same activity for hand disinfection,” said Dr Kramer.

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**Challenges in Prevention Strategies: Infection and Antibiotics**

THE GLOBAL spread of infection and the rising levels of antibiotic resistance requires effective translation of current knowledge from preventative strategies into hygiene measures. Methods of diagnosis, although fundamentally different to traditional hygiene measures, also play a key role in some cases of infection and antibiotic resistance, according to a MEDICA press release dated 15th September 2017. Urinary tract infections are diagnosed through clinical presentation and microbiological reports. Dr Thomas Schwarz, Institute for Medical Microbiology and Hygiene, Johannes Gutenberg University of Mainz, Mainz, Germany, warned: “Both of these involve disturbance variables that can lead to a false diagnosis being given which in turn leads to non-indicated antibiotic exposure.” Consequently, the development of optimised preventative strategies in the future could help prevent urinary tract infections. Furthermore, novel evidence shows how the ‘Clean and Isolate’ method of infection prevention in hospitals, used to combat antibiotic resistance, leads to poorer individual outcomes due to less contact with hospital staff. Dr Anna Eva Lauprecht, Essen-Mitte Clinic Group, Essen, Germany explained how this strategy is not sufficient to produce a reduction in hospital infections, but noted that: “Clostridium difficile infections can be drastically reduced by Antibiotic Stewardship and by restricting prescription of certain groups of antibiotics. Thus, if concretely implemented, antibiotic stewardship could provide a low rate of pathogen resistance to antibiotics; a crucial aspect in ensuring a safer improved quality of care.

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