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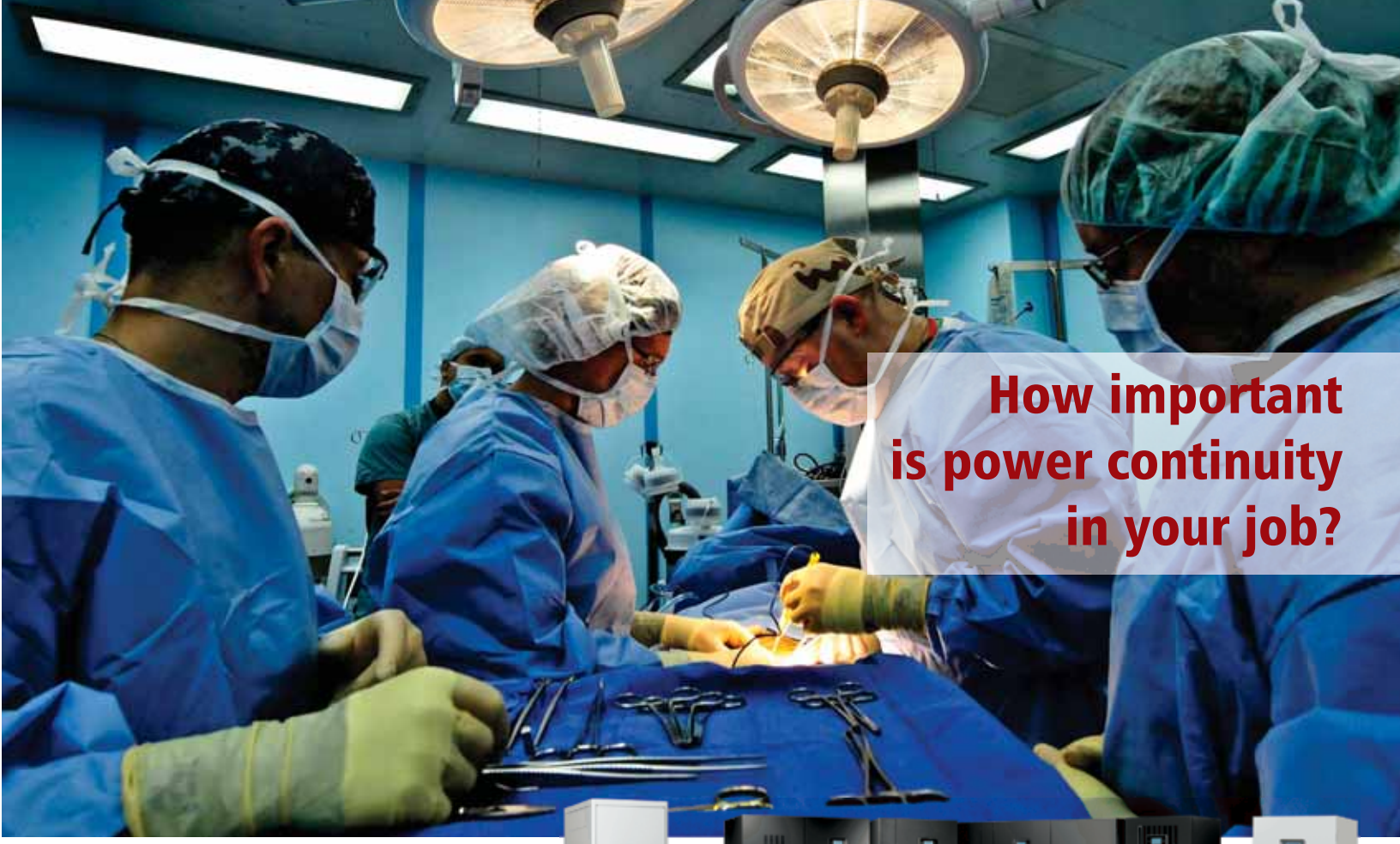

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Publisher's Note

Special focus on:

Prosthetics and Dental Equipment

"Entering a New Phase

In India, healthcare development has never been a top priority of the successive governments in power. Until recently, the government spending on healthcare remains at around 1 per cent of the country's GDP. Together with, the high custom duties levied on medical devices have created a cascading effect on the pricing of medical devices which in turn hindering the growth of medical devices industry.

As the government is going to present its interim budget on February 1, the industry players will keep their fingers crossed for a 'change' in government spending on healthcare. This will not only boost investment in the medical devices industry, but will make healthcare sector truly affordable. Medical Technology Association of India (MTaI) seeks reduction of custom duties to 2.5 per cent including all surcharges. In addition, the industry body has raised concerns about the probable 'smuggling of low-bulk-high-value devices' since the custom duty regime on most medical devices in neighbouring countries of Nepal, Bangladesh, Sri Lanka, and Bhutan is lower than in India. This will not only be loss of revenue for the government but also the patient will be beset with products which are not backed by adequate legal and service guarantees, MTaI said.

Further, according to a survey conducted by the Association for Democratic Reforms in 2017, improving healthcare in India is by far the second most important issue among the top priorities of Indian voters. Therefore, it will be surprising if healthcare delivery is not considered as a top election agenda issue during 2019 general election.

Preventive maintenance is an important part of dental practice. All dental equipment require upkeep to be available whenever needed. Proper and regular maintenance helps dental equipment to perform smoothly and reliably and minimises the risk for poor functioning or damage. This time we discuss on why it is important to maintain dental equipment. Our report also highlights the maintenance checklist and procedure.

Prosthetic technology has emerged as a revolutionary way to help improve the lives of people with physical disabilities. Prosthetic is all about creating limbs for the limbless. Here we present you a summary of the game-changing breakthroughs in the field of prosthetic.

I hope you will enjoy reading this issue as always. Please send your comments at **pravita@charypublications.in**

Pravita Iyer
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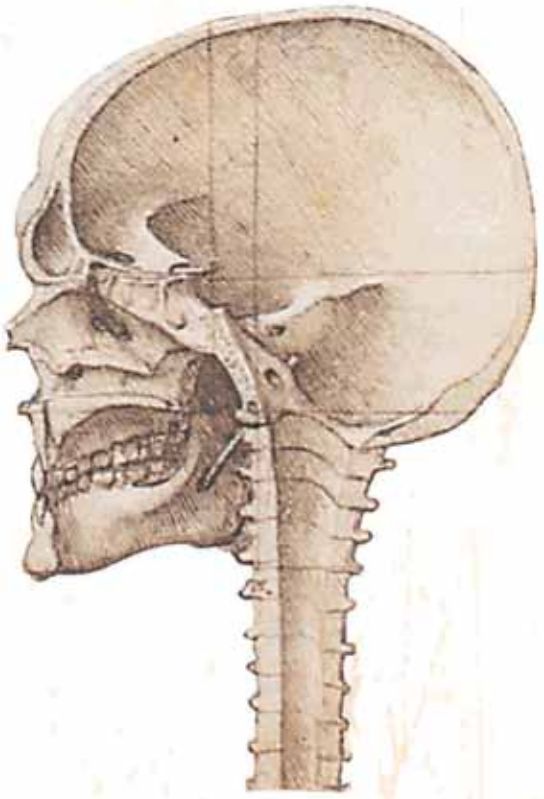

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Editorial

Positive outlook for Indian healthcare sector

Healthcare sector in India, considered as a sunrise sector, has progressed significantly over the last two decades. However, it remains at the critical stage thanks to the poor delivery system.

Today, though the industry is still wading through a sea of challenges, there have been some positive developments that can offer respite. The Pradhan Mantri Jan Arogya Yojana (PMJAY), also known as Ayushman Bharat, is being considered as a game changer for the Indian healthcare sector. The world's 'most ambitious healthcare initiative' envisages to cover nearly 11 crore families or 50 crore people — about 40 per cent of India's 1.3 billion population. The scheme has been designed to provide free treatment of up to Rs 5 lakh per eligible family in a year for treatment of serious ailments.

Of late, the central government has also accorded 'industry status' to private hospitals, along with support for land acquisition, clearances and funding, to boost expansion of healthcare infrastructure in tier-2 and -3 cities. The much-awaited decision is expected to be a shot in the arm for the struggling private healthcare in India.

Further the government's plan to provide funding for reviving unviable projects or projects that are in limbo come as a breather. The proposed incentives like viability gap funding of up to 40 per cent of the total project cost and gap funding of up to 50 per cent of tax on capital cost can provide much-needed thrust for the cash-strapped sector.

Another offer is to set up of a National Medical Devices Promotion Council (NMDCP) under the Department of Industrial Policy and Promotion (DIPP) in the Ministry of Commerce & Industry. The medical devices industry is an integral part of the healthcare ecosystem and plays a critical role in expanding the reach of healthcare reforms. Although the industry is witnessing an upward trend in India, a large of volume of imports continues to hurt domestic manufacturing growth. In this context, the setting-up of the NMDCP is expected to spur domestic medical devices manufacturing.

The above moves, if properly implemented, can not only create level playing field for domestic players, but can also transform the entire healthcare ecosystem thereby providing access to healthcare for all.

> "Today, though the industry is still wading through a sea of challenges, there have been some positive developments that can offer respite."

Subhajit Roy
Group Editor

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Director / Publisher	Pravita Iyer Mahadevan Iyer
Editor	Mahadevan Iyer miyer@charypublications.in
Group Editor	Subhajit Roy subhajit@charypublications.in
Sub Editor	Neha Wagle edit@charypublications.in
Advt. Department	Nafisa Kaisar nafisa@charypublications.in
Design	Nilesh Nimkar charydesign@charypublications.in
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Contents

INTERVIEWS

DEPARTMENTS

Acceptance of eIFU for medical device a welcome move: MTaI

Medical Technology Association of India (MTaI), which represents leading research-based medical technology companies with significant investments in India, welcomed the Ministry of Health & Family Welfare Gazette notification on acceptance of eIFU (electronic Instructions for Use) for Medical Device and Equipment and said that the regulation is line with governments push for digitalization to reduce the use of Paper.

Ministry of Health & Family Welfare on January 15 published Gazette notification on acceptance of eIFU for medical device and equipment. "The acceptance of eIFU for medical device and equipment puts India's regulatory specifications in line with the practices of some of the advanced countries like Singapore, USA and countries of Europe and will improve users' access to more detailed and up-to-date information," said Pavan Choudary, Chairman and Director General, MTaI.

MTaI further said that the inclusive approach of CDSCO and Health Ministry in considering suggestions encourages the industry. "Many products cannot be supplied with Paper IFU as the product is transferred to the loaner kit in the supply chain and sterilised before being supplied to the doctor, the acceptance of eIFU will remove such issues," Choudary added.

MTaI had made several representations to the CDSCO for the acceptance of eIFU for medical device and equipment. ✚

Two new AIIMS for J&K, One for Gujarat

The Union Cabinet chaired by the Prime Minister Narendra Modi has given its approval for a proposal for establishing three new AIIMS at Vijaynagar, Samba, Jammu at a cost of Rs 1,661 crore; Awantipura, Pulwama, Kashmir at a cost of Rs 1,828 crore; and Rajkot, Gujarat at a cost of Rs 1,195 crore.

Commenting on this, Union Minister of Health and Family Welfare J P Nadda said, "Setting up of new AIIMS would not only transform health education and training but will also address the shortfall of health care professionals in the region. The establishment of new AIIMS will serve the dual purpose of providing super specialty health care to the population closer to their homes, while also help create a large pool of doctors and other health workers in this region that can be available for primary and secondary level institutions or facilities being created under National Health Mission (NHM),"

He added, "Construction of new AIIMS is fully funded by the central government. The operations and maintenance expenses on new AIIMS are also fully borne by the central government."

The Minister stated that each new AIIMS will add 100 UG (MBBS) seats and 60 B. Sc (Nursing) seats, and the new AIIMS will have 15-20 Super Specialty Departments.

"Each new AIIMS will add around 750 hospital beds. As per data of current functional AIIMS, it is expected that each new AIIMS would cater to around 1,500 OPD patients per day and around 1,000 IPD patients per month," he mentioned.

Terming it historic, the Union Health Minister further said that setting up new AIIMS in the states will lead to employment generation for nearly 3,000 people in various faculty and non-faculty posts in each of the AIIMS.

Indirect employment generation will take place due to facilities and services like shopping centre, canteens, etc. coming in the vicinity of new AIIMS.

"The construction activity involved for creation of the physical infrastructure for the various new AIIMS is also expected to generate substantial employment in the construction phase," Health Minister Nadda stated. ✚

Microsoft's venture fund expands investment reach to India

M12, Microsoft's corporate venture fund, announced it would extend its investing coverage to India to help entrepreneurs innovate and grow with Microsoft's reach, expertise, and technologies. Rashmi Gopinath, partner at M12, will be leading M12's investments in India. Microsoft continues its portfolio of investment in the Indian start-up ecosystem with M12 announcing its first India investment, Innovaccer, a start-up working to solve data interoperability challenges in healthcare and helping health systems enhance their clinical and financial outcomes with a data-first approach.

"We are thrilled to broaden M12's reach to include India," said Nagraj Kashyap, Global head of M12 and Corporate Vice President, Microsoft. "India is a market rich with entrepreneurs creating world-class start-ups that are poised for success on a global scale. In working with these innovative start-ups, we believe together we will help disrupt enterprises and industries ripe for digital transformation."

The healthcare SaaS start-up Innovaccer has offices in both India and the United States, offering a comprehensive Healthcare Data Platform and intelligent care application modules for over 10,000 healthcare providers across 500 practice locations. Leveraging machine learning and healthcare-related contextual expertise, Innovaccer enables its users to consolidate financial, claims, patient, and operational data together to provide a comprehensive patient 360-view for better decision-making, care coordination, and reporting.

Abhinav Shashank, CEO Innovaccer, said, "Our unique value proposition is a holistic healthcare data platform that offers data aggregation and key analytics to help healthcare systems and insurance providers to align with value-based care models and realise significant cost savings and operational efficiency. We are excited to work with M12 and Microsoft in order to leverage their best-in-class technical, industry, and go-to-market expertise to help address needs for healthcare organisations across the world." ✚

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Global medical equipment maintenance market worth over $ 51.9 Bn by 2024

The global medical equipment maintenance market was valued at approximately $ 26.2 billion in 2017 and is expected to generate revenue of around $ 51.9 billion by 2024, growing at a CAGR of around 10.26 per cent between 2018 and 2024, reports Zion Market Research.

Medical devices play an important role in disease diagnosis and treatment and are valuable assets to human lives. Medical equipment maintenance has become an essential practice for the healthcare sector. Medical devices require considerable investments. Scheduled and managed equipment maintenance plays a vital role for safe, reliable, and accurate test results for diagnostic procedures and patient monitoring therapy and treatment.

The worldwide demand for medical equipment is growing rapidly, owing to the increasing prevalence of life-threatening diseases. Preventive maintenance is widely accepted to maintain proper functioning and accidental breakdown of equipment. Thus, the growing focus on preventive maintenance is likely to drive the market. Technologically advanced and high costs of medical equipment are projected to drive the demand for refurbished medical equipment. Wide acceptance and consumption of refurbished medical equipment, in turn, is anticipated to drive the medical equipment maintenance market. Increasing installations of new and advanced medical equipment in hospitals, clinics, diagnostic centres, etc., are likely to further drive the medical equipment maintenance market in the future. Additionally, the high burden of chronic disorders and the increase in the aging population are other factors likely to indirectly contributing toward the medical equipment maintenance market. However, high maintenance cost might hamper the market for medical equipment maintenance market. Nevertheless, the increasing service offerings and the use of internet of things are likely to create further growth opportunities for the medical equipment maintenance market globally.

FICCI welcomes govt's move to accord 'industry status' to hospitals

The Federation of Indian Chambers of Commerce and Industry (FICCI) has welcomed the government's announcement of according 'industry status' to private hospitals, along with support for land acquisition, clearances and funding, to boost expansion of healthcare infrastructure in tier 2- and 3- cities.

The announcement follows the launch of the Pradhan Mantri Jan Arogya Yojana (PMJAY), also known as Ayushman Bharat, in September 2018, which aims to provide 10.74 crore poor and vulnerable families (nearly 50 crore beneficiaries) with an annual cover of Rs. 5 lakhs per family for secondary and tertiary care hospitalisation.

Welcoming the move by the government and highlighting the need for more healthcare delivery organisations to ensure access under PMJAY, Sangita Reddy, Senior VP, FICCI and Joint MD, Apollo Hospitals Enterprise Ltd said, "In India, skewed distribution of hospital beds, with their heavy concentration in the metros has long been a challenge in reaching the last mile with quality healthcare provision. This opportune step by the government strongly reinforces private healthcare providers' commitment towards improving access to quality care."

In the last decade, 70 per cent of the new bed capacity additions were in the private sector, which also caters to 70 per cent of in-patient and 60 per cent of out-patient healthcare services in the country.

Appreciating the intent of the government to build an enabling environment for successful implementation of PMJAY, (Hony) Brig Dr Arvind Lal, Chair, FICCI Health Services Committee and CMD, Dr Lal PathLabs Ltd said, "The key to engage more private healthcare organisations will be a viable model for their sustainability. The new hospitals which will be mandated to empanel under PMJAY should be allowed to charge other patients who can afford to pay as per market rates, as the current PMJAY package rates may not be sustainable to set up and run operations in such locations."

Govt to set up National Medical Devices Promotion Council

The government said it will set up National Medical Devices Promotion Council (NMDPC) under the Department of Industrial Policy and Promotion (DIPP) in the Ministry of Commerce & Industry to give a fillip to the medical device sector.

While speaking at a programme on the occasion of 4th WHO Global Forum on Medical Devices, at Andhra Pradesh Medtech Zone, in Vishakhapatnam Commerce Minister Suresh Prabhu, said, "As Indian manufacturing companies and start-ups move towards creating innovative products, the setting-up of the Council will spur domestic manufacturing in this sector."

The Medical Devices Industry (MDI) plays a critical role in the healthcare ecosystem and is indispensable to achieve the goal of health for all citizens of the country. The manufacturing and trade in MDI is growing steadily which includes a wide range of products. Although the industry has been growing in double digits but is predominantly import-driven with imports accounting for over 65% of the domestic market.

The Council will be headed by Secretary, DIPP. Apart from the concerned departments of Government of India, it will also have representatives from health care industry and quality control institutions. Andhra Pradesh MedTech Zone, Visakhapatnam, will provide technical support to the Council.

The NMDPC will act as a facilitating and promotion and developmental body for the Indian MDI. It will identify redundant processes and render technical assistance to the agencies and departments concerned to simplify the approval processes involved in medical device industry promotion and development.

"NMDPC will enable entry of emerging interventions and support certifications for manufacturers to reach levels of global trade norms and lead India to an export driven market in the sector," the Minister said in a statement. The Council will drive a robust and dynamic Preferential Market Access (PMA) policy, by identifying the strengths of the Indian manufacturers and discouraging unfair trade practices in imports, the statement added.

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New measures having positive impact on Ebola response in Congo

New measures to succeed challenges in the response to the Ebola outbreak in the Democratic Republic of the Congo (DRC) are having an assertive impact, although the crash remains dangerous and unpredictable, the United Nations Department of Peacekeeping and the World Health Organisation (WHO) said after a joint mission to estimate the outbreak.

WHO Director-General Dr Tedros Adhanom Ghebreyesus and United Nations Under-Secretary-General for Peacekeeping Jean-Pierre Lacroix recently travelled with the Minister of Health, Dr Oly Ilunga Kalenga, to the city of Beni in eastern DRC, the epicenter of the outbreak, where they met health workers, civil society representatives, peacekeeping troops and local authorities.

The United Nations Stabilization Mission in the DRC, MONUSCO, has recently taken an active path to well-armed groups operating in North Kivu, which has given to a period of calm in and around the city of Beni, although some attacks have continued in surrounding villages.

Under the leadership of the Ministry of Health, WHO and partners are also making excellent use of community surveillance, in which community members are encouraged to conduct contact tracing activities in areas that strangers have difficulty accessing. This has contributed to a drop in new cases over the past few weeks, although the situation remains of grave concern.

Ebola response teams have sometimes faced challenges on the ground, with misinformation and doubt due to decades of conflict contributing to a hesitation with some local populations to allow Ebola response teams to vaccinate, conduct contact tracing and perform safe and dignified burials. Community engagement activities have helped address concerns and most local communities have proven supportive and are keenly aware of the dangers of Ebola and the importance of ending the outbreak. ✚

Taiwan opens new product centre in Chennai

Taiwan External Trade Development Council (TAITRA) opened its new product centre in Mumbai, as part of a plan to strengthen its footprint in India.

The centre named as Taiwan Product Centre (TPC) displays a range of products from information and communication technology, healthcare, Internet of Things from Taiwanese companies, a statement said.

Speaking about the launch of the TPC, Alex Pen, Director - Taipei World Trade Centre Liaison Office, Mumbai said, "Opening of the new TPC is a part of TAITRA's efforts to expand business ties with India – Asia's third largest economy. India and Taiwan's bilateral trade is expanding steadily. Taiwan and Indian business cooperation have also become particularly active in the past 2-3 years because with Taiwan's new southbound policy, the focus is on India. Currently, TAITRA is actively offering smart solutions, hardware, software, and electronics among others driving bilateral trade and investment between the two countries."

Several Taiwan-based companies are well known for the smart solutions they have created for various noteworthy smart projects around the world. Taiwanese companies have been seeing great potential in expanding its trade association in the technology space in various sectors like for smart city, pharma, agriculture, food, machineries, ICT etc. Taiwan is keen to share these skills and proficiency with countries like India that are now on the economic forefront with ambitious projects like the Smart Cities Mission. Taiwan has been contributing to various projects of the Indian government including Smart Cities mission, Make in India, Skills India and Digital India.

While there has been a rise in bilateral trade between India and Taiwan in the recent past, TAITRA believes that trading with India has given a great impetus to both countries to build the smart nations. TPC is a strategic move and a step further for smooth exchange of business between the two countries.

In 2017, an India centre was launched in Taipei to promote awareness about India's business ecosystem in Taiwan. TAITRA also opened its new office in New Delhi in May 2018. It already has offices in Mumbai, Chennai and Kolkata. ✚

CII urges Govt to reduce custom duty on medical devices

The customs duty on medical devices may get reduced in the forthcoming budget with an aim to boost domestic manufacturing of such goods. This movement will also help promote the governments ambitious initiative 'Make in India'. Industry chamber CII in its has pre-budget memorandum has asked the government to reduce customs duty from 10 per cent to 2.5 per cent on PDS Plates used for nasal reconstructive surgery. It has also asked to exempt the duty on instruments for joint replacement and spinal equipment. The government has recently set up National Medical Devices Promotion Council (NMDPC) to boost manufacturing, attract investments and promote exports of the fast-growing sector.

Medical devices include any instrument, apparatus, appliance, implant, material or other article, whether used alone or in combination, including the software intended by its manufacturer to be used specially for human beings or animals for one or more of the specific purposes. India has achieved a major global position in the pharmaceutical sector.

However, the same has not been replicated in the medical devices industry. Currently, 100 per cent FDI is allowed under the automatic route in the medical devices sector to encourage manufacturing of equipment. Reduction of basic customs duty on PDS Plates to 2.5 per cent would reduce the cost benefit the patients," CII said. ✚

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Industry demands inclusion of Ayurveda in Ayushman Bharat

More than 75 per cent of the Ayurveda business today is with the private sector, and therefore engagement with private sector has become critical – towards this CII organised the "2nd Ayurveda Conclave: Vision 2022: Roadmap to Achieve Three Times Growth in Market Size" in November 2018, New Delhi. The event saw the presence of representatives from both private and government sectors.

The government has undertaken big initiatives to popularise Ayurveda in India as well as overseas. Speaking at the event, Vaidya Rajesh Kotecha, Secretary MoAYUSH mentioned that Ministry of Defence and Ministry of Labour have agreed to start AYUSH related services. In addition, entry level accreditation by the National Accreditation Board for Hospitals has been initiated for AYUSH healthcare facilities that would help them procuring soft loans, a subsector skill council for AYUSH has been established for skilling of AYUSH professionals and MoUs with 15 countries have been signed with 13 more in the pipeline."

Advocates of AYUSH have been keen on becoming a part of Ayushman Bharat post its announcement. Towards this, Dr Vinod Paul, Member, NITI Aayog re-iterated Dr. Trehan's point on demystification. "This will help build standard treatment guidelines that will ensure uniformity in treatment protocol across the states and its easy governance". He added that the government is open to proposals but expects them to comply to current standards and regulations.

According to industry leader, Rajiv Vasudevan, Chairman, CII Core Group of Ayurveda and CEO AyurVAID Hospital the different stakeholders of Ayurveda talk about different aspects which makes this sector highly segmented. "We need to unify them in order to perceive the hugeness of the sector. Unless Ayurveda is implemented in government initiatives such as Ayushman Bharat and National Nutrition Mission its true potential cannot be tapped" he emphasised. ✚

Cabinet approves MoC between India and Japan for healthcare

The Union Cabinet chaired by Prime Minister Narendra Modi has given approval on the Memorandum of Cooperation (MoC) between India and Japan in the field of healthcare and wellness that was signed in October 2018. The MoC is promoting specific projects including establishing an advanced joint testing laboratory for clinical examination; establishing a Japanese language education center for trainee candidates of care workers; establishing collaborations among tertiary care centers in both countries such as AUMS; and, supporting sending organisations to provide pre-lectures about elderly care for technical intern training programs of care workers through sending out certificated care workers from Japan.

Both countries will cooperate in establishing a centralised management healthcare distribution center; promoting institutional collaboration on patient data analysis and information and communication technology and artificial intelligence in medicine; developing India-Japan Innovation Hub in India; establishing high end mobile BSL 3 Lab facilities in India and collaboration on getting high-end medical devices including point-of-care diagnostics with a special focus on establishing manufacturing units in India under Make in India. The MoC will also cover the development of research and project promotion for health self-management such as ME-BYO and Ayurveda; holding an India-Japan public and private healthcare forum; any other areas as may be mutually decided upon to promote the synergies between Ayushman Bharat program and other initiatives and AHWM. ✚

Wockhardt Hospital, South Bombay celebrates success of Little Hearts treated for congenital heart

Wockhardt Hospitals, Mumbai Central along with Rotary Club felicitates Rotary International President Elect Mark Maloney & celebrates success of Little Hearts. The announcement took place in the presence of Dr. Habil Khorakiwala, Chairman, Wockhardt Group.

Every year about 1.5 lakh babies are born in India with congenital heart disease. It's a condition in which a baby is born with a malfunctioning heart. Despite being detectable, 80 thousand babies don't make it beyond infancy. Infants born with congenital heart disease in India die every year due to lack of awareness, inadequate health care facilities in the country and lack of Funds. This high infant mortality rate is directly related to the huge cost of hospitalisation and surgery to correct congenital heart defects. It forces a parent to make a tough choice; to accept things as they come, and expect the worse, anytime… any day… any moment.

Little heart is an initiative especially for those who cannot afford the treatment and than they are never cured which later creates major complications of the heart. Thanks to advances in pediatric heart surgery and interventional catheterization, nearly every form of congenital heart disease can be treated with the expectation of a good outcome. ✚

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Orthopaedic medical robots market to grow at 24.1% CAGR to 2025

Picture Courtesy: www.adrianbauze.com.au

The orthopaedic medical robots market is estimated to grow with a CAGR of 24.1 per cent from 2018-2025, reports a new market research study titled 'Orthopaedic Medical Robots Market to 2025 – Global Analysis and Forecasts' by Research and Markets. The market is expected to reach US$ 2,110.69 Mn in 2025 from US$ 375.49 in 2017, the report reveals.

According to the Research and Markets report, the orthopaedic medical robots market is driven by the driving factor such as increase in the number of musculoskeletal diseases, rise in funds allocated for medical robots research and technological advancements in orthopaedic surgical robots. However, the market is likely face the restraining factors such as high cost of robotic systems and safety concerns associated with the robotic devices market. The future trend that is likely to drive the market growth is rise in number of strategic collaborations and joint ventures to develop novel robotic systems.

The orthopaedic medical robots market as per the product the segment is segmented as systems and instruments and accessories. The market of instruments and accessories has the highest market share in 2017, contributing to orthopaedic medical robots market is of 60.7 per cent and is expected to retain its dominance during the forecast period from 2018 to 2025. The rise in demand by the aging population for the hip and knee replacement is likely to propel the growth of the medical robotic systems market. Similarly, the systems segment contributed 39.3 per cent of the market share in the year 2017 and is expected to be the fastest growing market in the coming forecast period.

The anatomy segment of the orthopaedic medical robots market includes upper extremities, lower extremities, and others. The anatomy segment for the orthopaedic medical robots market was valued at US$ 375.49 Mn in 2017 and is estimated to reach US$ 2,110.69 Mn by 2025.

The upper extremity segment was further divided into the sub-segments such as shoulder, wrist, hand, and elbow. Similarly, lower extremity segment was also sub-segmented as knee, hip, foot and ankle and others. The lower extremities segments is the fastest growing segment in the anatomy and is expected to be the fastest growing segment in the forecast period owing to the increase in the knee surgery, trauma surgery, and hip surgery among the others. Among the lower extremity the knee segment holds the largest market in the anatomy segments likewise, shoulder is the largest market share holder in for the upper extremity market among the anatomy segment.

Some of the major primary and secondary sources included in the report orthopaedic medical robots market are: The American Society of Orthopaedic Surgeons, BioHealth Diagnostic Center, Canadian Agency for Drugs and Technologies in Health, International Conference on Advanced Robotics and Mechatronics, Indian Institute of Technology Madras, Ruby Clinic and Group Companies, are World Health Organisation.

A painless adhesive

Pulling off a band-aid may soon get a lot less painful.

Researchers from the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) and Xi'an Jiaotong University in China have developed a new type of adhesive that can strongly adhere wet materials — such as hydrogel and living tissue — and be easily detached with a specific frequency of light.

The adhesives could be used to attach and painlessly detach wound dressings, transdermal drug delivery devices, and wearable robotics. The paper is published in Advanced Materials.

These two hydrogels, adhered with an aqueous solution of polymer chains, come apart easily in the presence of UV light. (Image courtesy: Zhigang Suo/Harvard SEAS)

"Strong adhesion usually requires covalent bonds, physical interactions, or a combination of both," said Yang Gao, first author of the paper and researcher at Xi'an Jiaotong University. "Adhesion through covalent bonds is hard to remove and adhesion through physical interactions usually requires solvents, which can be time-consuming and environmentally harmful. Our method of using light to trigger detachment is non-invasive and painless."

The adhesive uses an aqueous solution of polymer chains spread between two, non-sticky materials — like jam between two slices of bread. On their own, the two materials adhere poorly together but the polymer chains act as a molecular suture, stitching the two materials together by forming a network with the two preexisting polymer networks. This process is known as topological entanglement.

When exposed to ultra-violet light, the network of stitches dissolves, separating the two materials.

The researchers, led by Zhigang Suo, the Allen E. and Marilyn M. Puckett Professor of Mechanics and Materials at SEAS, tested adhesion and detachment on a range of materials, sticking together hydrogels; hydrogels and organic tissue; elastomers; hydrogels and elastomers; and hydrogels and inorganic solids.

"Our strategy works across a range of materials and may enable broad applications," said Kangling Wu, co-lead author and researcher at Xi'an Jiaotong University in China.

While the researchers focused on using UV light to trigger detachment, their work suggests the possibility that the stitching polymer could detach with near-infrared light, a feature which could be applied to a range of new medical procedures.

"In nature, wet materials don't like to adhere together," said Suo. "We have discovered a general approach to overcome this challenge. Our molecular sutures can strongly adhere wet materials together. Furthermore, the strong adhesion can be made permanent, transient, or detachable on demand, in response to a cue. So, as we see it, nature is full of loopholes, waiting to be stitched." +

Dental Made Easy

The article discusses on what guidelines should be followed to maintain a dental clinic and dental equipment.

Managing a dental clinic and the necessary dental equipment repair tasks can be time-consuming because of the amount of equipment that must be routinely sterilised, disinfected and maintained. The dental equipment repair and replacement must be timely to ensure patient and staff safety. This article share on what guidelines should be followed to maintain a dental clinic and dental equipment.

Dental equipment represents a notable monetary investment for most practices and if anything goes wrong repairs or replacements can be costly. Many pieces of dental equipment are made up of minute parts forming complicated and delicate inner workings that can be destroyed through age and repeated use. Damaged equipment poses a possible danger for both the patient and the user; for this reason, as one could be involuntarily placing patients at risk if the user is not following to the manufacturer's maintenance etiquettes.

Guidelines for Maintenance

A checklist of maintaining the dental equipment is a great tool to ensure that the important task isn't missed or aren't performed late. Performing regular dental equipment maintenance helps it to run smoothly and it minimises the risk of poor functioning. By maintaining it properly and timely, can also extend the life of the instruments.

There is a regime what needs to be followed in order to maintain the dental equipment. There has to be a checklist of daily, weekly, monthly and yearly task to help the staff to organise the clinic or hospital. Below mentioned are some steps of how to maintain a piece of dental equipment:

Daily basis:

- Water should be flushed through the handpieces and air/water syringes
- The handpieces should be sterilised on a daily basis
- The equipment should be sterilised after each patient
- The suction cleaner should be cleaned through the operatory HVE and saliva ejector tubing's
- The delivery unit traps should be clean
- The ultrasonic cleaner should be drained and wiped
- Hazardous and infectious waste should be replaced.

Weekly basis:

- The traps on delivery units should be changed
- Handpieces couplers and O-rings should be checked and replaced.
- The gasket on handpiece should also be replaced
- Performing a biological spore test in each steriliser
- Safety hazards in the office should be checked.

Monthly:

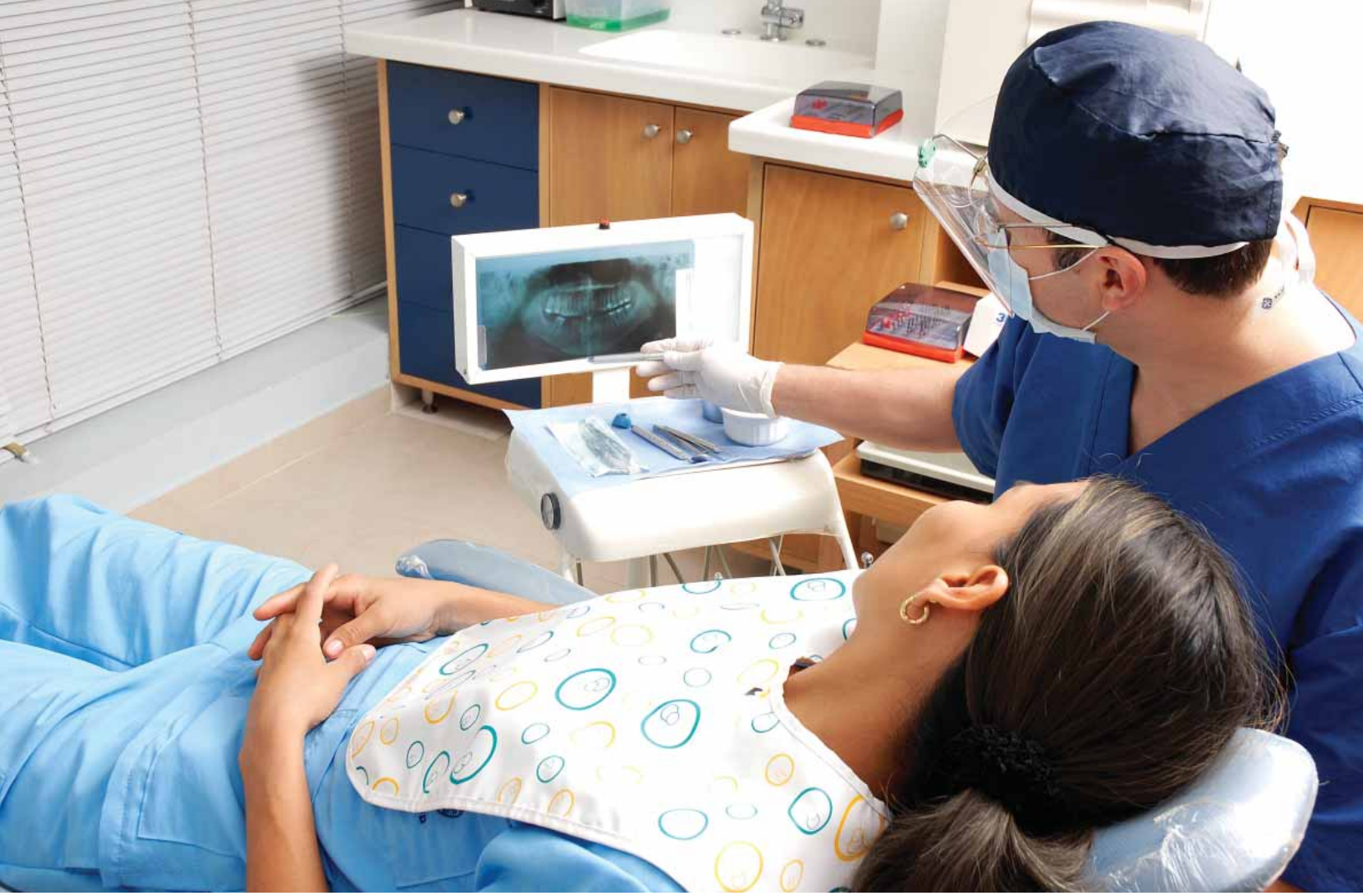
- Plaster trap should be checked, cleaned and replaced
- Model trimmer should be clean
- Clean the panoramic/cephalic cassettes and intensifying screen
- Nitrous oxide systems and emergency oxygen units should be checked to ensure that they are working properly and do not need to be replaced or repaired
- Master trap should be checked, cleaned or replaced if required
- Check patient monitoring equipment is up to code and working properly

Annually:

- Change steriliser door gasket and cassette seals
- Compressor oil should be changed
- Inspect fire extinguisher, smoke alarm and emergency lighting
- Schedule inspection, calibration, and certification of x-ray equipment.

Dental Equipment Maintenance Kit

In extension to performing routine dental equipment repair and maintenance, keeping an emergency kit for last minute dental equipment servicing is a must for



every clinic. Few things for what to keep in kit include:

- Handpiece: Lube, cleaner & additional turbines, chucks and bur tools
- Air compressor: Oil and intake valves
- Vacuum: Intake filter, line cleaner, traps and canisters
- Spare light bulbs: Handpieces, curing lights and operatory lights
- Spare O-rings and gaskets.

Keeping certain basic self-maintenance items make it simpler to implement simple dental equipment repair chores while they are small and easily controlled problems, without giving them progress to more serious issues.

Preventive Maintenance and Repair Guidelines

All dental equipment needs preventive maintenance. The list would include, X-ray machines, dental chairs, handpieces, automatic film developers, dental lights, air compressors, dental vacuum systems and many more. It also depends on how the clinic is equipped, accordingly there may be other equipment which requires preventive maintenance.

The manufacturers of each equipment always provide information on how to handle or take care of the equipment supplied. This information of handling the equipment should be included in the maintenance plan for the dental clinic. Repair of the dental equipment is very necessary. Especially in rural areas. Timely repair services for dental equipment is very important in rural areas. There will be a problem of revenue lost due to unavailability of a dental operatory if the maintenance and repair of the equipment is not up to date. Repair costs, which are very expensive are increased by the charges for travelling time of the repair person to the location. Members from the clinic should learn how to perform basic repair of the dental equipment used in the clinic. Most of the equipment manufacturers offer repair courses for the staff while providing the equipment to the clinics or the people purchasing it. The staff of the clinic or the buyers of the equipment should research about the repair and maintenance before determining which equipment to purchase. One should keep the most needed parts handy so that they are readily available when needed. Usually a dental clinic will enter into a maintenance and repair contract while purchasing the equipment with a local dental supply company. By doing this, it can be cost-effective if the clinic or hospital is close enough to minimise the travel costs. These contracts will ensure that all preventive maintenance will be performed timely keeping the cost in mind and that equipment failure does not take away time of the staff from providing clinical care.

Procedure of Sterilisations and Routine Checks for the Equipment

Sterilisation is a necessary action in the reprocessing of reusable dental instruments that have become infected, or are probably contaminated, with

saliva, blood or other biological fluids. This includes dental handpieces. The aim of sterilisation is to break the chain of possible cross-infection between patients by eliminating micro-organisms, including spores. However, prion proteins are not fully deactivated by the sterilisation process. Therefore, adequate instrument cleaning is important to materially remove contamination, including prion proteins, prior to sterilisation.

The decontamination of reusable dental instruments includes:

- Cleaning
- Thermal disinfection
- Rinsing
- Drying
- Inspection for dryness, functionality and cleanliness
- Wrapping before sterilisation when using a vacuum steriliser
- Sterilisation
- Wrapping after sterilisation when using a non-vacuum steriliser.

Sterilisation using a steam steriliser is suggested as the most efficient, cost-effective and safe way of sterilising dental instruments in primary care dental practices. The sterilisation method must be validated to assure that instruments are certainly and consistently sterilised using predetermined and reproducible conditions. To destroy microorganisms, the instruments need to be displayed to vapour at a detailed temperature for a particular holding time. Although other alternatives exist, the favoured temperature-pressure-time the link for all small steam steriliser is 134–137°C, 2.1–2.25 bar standard pressure for at least a 3-minute holding time.

It is advised to use reusable instruments that can resist both an automated cleansing/disinfection method and steam sterilisation or to use single-use instruments. Reusable instruments that cannot resist steam sterilisation must be disinfected as recommended by the instrument manufacturer.

There is currently no recognised system for the active decontamination of dental handpieces. Research to evaluate the effectiveness of several methods of handpiece decontamination is ongoing. At present, it is best practice to understand manufacturer's guidance for handpiece cleaning. After cleaning it is then necessary to sterilise handpieces in a steam steriliser. Although the effectiveness of sterilisation of the interior structures is unclear, processing in a steriliser assures that the external surfaces are sterilised and may also add to risk reduction through further thermal disinfection of the internal structures. When buying new handpieces, one should ensure that they can face thermal disinfection and steam sterilisation. Always treat dental handpieces in a steam steriliser as part of their decontamination. Substitute existing handpieces that cannot withstand steam sterilisation. Follow the handpiece manufacturer's decontamination instructions.

If necessary, reach the handpiece manufacturer to ask clarification of their instructions. Lubricate handpieces before and/or after sterilisation as recommended by the manufacturer. If lubrication is needed both before and after sterilisation, use separate designated 'cleaned only' and 'sterilised' canisters of lubricant, labelled accordingly.

The important thing the dentist need to keep in mind is that programmed 'handpiece cleaning machines' can be utilised to lubricate handpieces. These machines are not approved for cleaning and do not disinfect. However, their treatment may increase handpiece life and can be particularly useful if handpieces are washed in a washer disinfector.

Conclusion

Above all, cleansing, sterilising, and organising instruments can drain time, and therefore, money. The more smooth instrument processing procedure is, the more time doctors and the team can spend nursing patients.

And the smarter the practice is about cleaning and sterilising dental instruments, the better-equipped one will be to stop the transmission of germs. By protecting instruments, patients, and clinicians, one will be well on way to maximising the investments made in practice.

The goal of infection control is to lessen the appearance of contagious diseases. Infection prevention is everyone's responsibility as is implementing clean and safe surroundings in which to treat patients. ✚

Solar-powered skin for prosthetic limbs

Engineers from the University of Glasgow, who have previously developed an 'electronic skin' covering for prosthetic hands made from graphene, have found a way to use some of graphene's remarkable physical properties to use energy from the sun to power the skin.

Graphene is a highly flexible form of graphite which, despite being just a single atom thick, is stronger than steel, electrically conductive, and transparent. It is graphene's optical transparency, which allows around 98 percent of the light which strikes its surface to pass directly through it, which makes it ideal for gathering energy from the sun to generate power.

A new research paper, published in the journal Advanced Functional Materials, describes how Dr Dahiya and colleagues from his Bendable Electronics and Sensing Technologies (BEST) group have integrated power-generating photovoltaic cells into their electronic skin for the first time.

Dr Dahiya, from the University of Glasgow's School of Engineering, said, "Human skin is an incredibly complex system capable of detecting pressure, temperature and texture through an array of neural sensors which carry signals from the skin to the brain."

He added, "My colleagues and I have already made significant steps in creating prosthetic prototypes which integrate synthetic skin and are capable of making very sensitive pressure measurements. Those measurements mean the prosthetic hand is capable of performing challenging tasks like properly gripping soft materials, which other prosthetics can struggle with. We are also using innovative 3D printing strategies to build more affordable sensitive prosthetic limbs, including the formation of a very active student club called 'Helping Hands'."

Skin capable of touch sensitivity also opens the possibility of creating robots capable of making better decisions about human safety. A robot working on a construction line, for example, is much less likely to accidentally injure a human if it can feel that a person has unexpectedly entered their area of movement and stop before an injury can occur.

The new skin requires just 20 nanowatts of power per square centimetre, which is easily met even by the poorest-quality photovoltaic cells currently available on the market. And although currently energy generated by the skin's photovoltaic cells cannot be stored, the team are already looking into ways to divert unused energy into batteries, allowing the energy to be used as and when it is required.

Dr Dahiya said, "The other next step for us is to further develop the power-generation technology which underpins this research and use it to power the motors which drive the prosthetic hand itself. This could allow the creation of an entirely energy-autonomous prosthetic limb."

Prosthetic Innovations 2018

Prosthetic is all about creating limbs for the limbless. Here's a summary of the game-changing breakthroughs in the field of prosthetic.

Artificial joint restores wrist-like movements to forearm amputees

A new artificial joint restores important wrist-like movements to forearm amputees, something which could dramatically improve their quality of life. A group of researchers led by Max Ortiz Catalan, Associate Professor at Chalmers University of Technology, Sweden, have published their research in the journal IEEE Transactions on Neural Systems & Rehabilitation Engineering.

For patients missing a hand, one of the biggest challenges to regaining a high level of function is the inability to rotate one's wrist, or to 'pronate' and 'supinate'. When you lay your hand flat on a table, palm down, it is fully pronated. Turn your wrist 180 degrees, so the hand is palm up, and it is fully supinated.

Most of us probably take it for granted, but this is an essential movement that we use every day. Consider using a door handle, a screwdriver, a knob on a cooker, or simply turning over a piece of paper. For those missing their hand, these are much more awkward and uncomfortable tasks, and current prosthetic technologies offer only limited relief to this problem.

"A person with forearm amputation can use a motorised wrist rotator controlled by electric signals from the remaining muscles. However, those same signals are also used to control the prosthetic hand," explains Max Ortiz Catalan, Associate Professor at the Department for Electrical Engineering at Chalmers. "This results in a very cumbersome and unnatural control scheme, in which patients can only activate either the prosthetic wrist or the hand at one time and have to switch back and forth. Furthermore, patients get no sensory feedback, so

they have no sensation of the hand's position or movement." The new artificial joint works instead with an osseointegrated implant system developed by the Sweden-based company, Integrum AB – one of the partners in this project. An implant is placed into each of the two bones of the forearm – the ulnar and radius – and then a wrist-like artificial joint acts as an interface between these two implants and the prosthetic hand. Together, this allows for much more naturalistic movements, with intuitive natural control and sensory feedback.

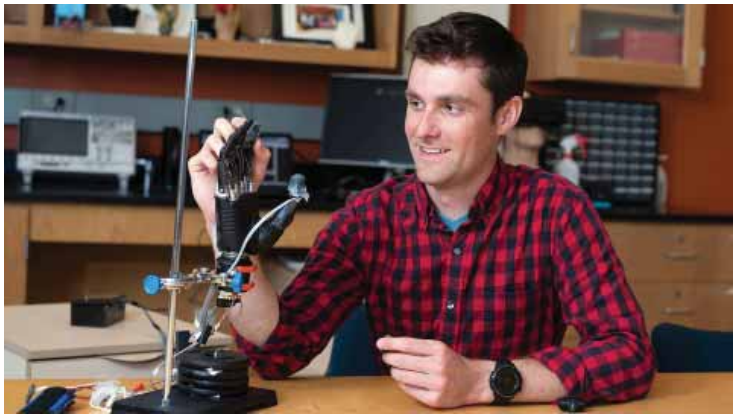
Max Ortiz Catalan
Associate Professor,
Department for Electrical
Engineering, Chalmers

Patients who have lost their hand and wrist often still preserve enough musculature to allow them to rotate the radius over the ulnar – the crucial movement in wrist rotation. A conventional socket prosthesis, which is attached to the body by compressing the stump, locks the bones in place, preventing any potential wrist rotation, and thus wastes this useful movement.

"Depending on the level of amputation, you could still have most of the biological actuators and sensors left for wrist rotation. These allow you to feel, for example, when you are turning a key to start a car. You don't look behind the wheel to see how far to turn – you just feel it. Our new innovation means you don't have to sacrifice this useful movement because of a poor technological solution, such as a socket prosthesis. You can continue to do it in a natural way," says Max Ortiz Catalan.

New 'e-skin' brings sense of touch, pain to prosthetic hands

A team of engineers at the Johns Hopkins University, including one of an Indian-origin, has developed a novel e-dermis that will enable amputees to perceive a real sense of touch through the fingertips of their prosthetics.



Made of fabric and rubber laced with sensors to mimic nerve endings, e-dermis recreates a sense of touch as well as pain by sensing stimuli and relaying the impulses back to the peripheral nerves.

"We've made a sensor that goes over the fingertips of a prosthetic hand and acts like your own skin would," says Luke Osborn, a graduate student in biomedical engineering. "It's inspired by what is happening in human biology, with receptors for both touch and pain.

"This is interesting and new," Osborn said, "because now we can have a prosthetic hand that is already on the market and fit it with an e-dermis that can tell the wearer whether he or she is picking up something that is round or whether it has sharp points."

Bringing a more human touch to modern prosthetic designs is critical, especially when it comes to incorporating the ability to feel pain, Osborn says.

"Pain is, of course, unpleasant, but it's also an essential, protective sense of touch that is lacking in the prostheses that are currently available to amputees," he says. "Advances in prosthesis designs and control mechanisms can aid an amputee's ability to regain lost function, but they often lack meaningful, tactile feedback or perception."

That is where the e-dermis comes in, conveying information to the amputee by stimulating peripheral nerves in the arm, making the so-called phantom limb come to life. The e-dermis device does this by electrically stimulating the amputee's nerves in a non-invasive way, through the skin, says the paper's senior author, Nitish Thakor, a professor of biomedical engineering and director of the Biomedical Instrumentation and Neuroengineering Laboratory at Johns Hopkins.

"For the first time, a prosthesis can provide a range of perceptions, from fine touch to noxious to an amputee, making it more like a human hand," says Thakor, co-founder of Infinite Biomedical Technologies, the Baltimore-based company that provided the prosthetic hardware used in the study.

Inspired by human biology, the e-dermis enables its user to sense a continuous spectrum of tactile perceptions, from light touch to noxious or painful stimulus. The team created a "neuromorphic model" mimicking the touch and pain receptors of the human nervous system, allowing the e-dermis to electronically encode sensations just as the receptors in the skin would. Tracking brain activity via electroencephalography, or EEG, the team determined that the test subject was able to perceive these sensations in his phantom hand.

The e-dermis is not sensitive to temperature—for this study, the team focused on detecting object curvature (for touch and shape perception) and sharpness (for pain perception). The e-dermis technology could be used to make robotic systems more human, and it could also be used to expand or extend to astronaut gloves and space suits, Osborn says.

Amputees feel as though their prosthetic limb belongs to their body

The famous idiom "seeing is believing" is not enough to help amputees with the use of their prosthetic limb. Many amputees opt out of prolonged use of their prosthetic limb because their missing limb simply does not fit their prosthesis. In other words, their own perception of the missing limb, or the brain's representation of it, does not match-up with what they see of the prosthesis.

The underlying problem is twofold. Amputees still feel their missing limb, even if it is physically gone, and this ghost limb aka phantom limb is perceived as much smaller that the lost limb. Next, the commercially available prosthetic limb does not yet provide sensory feedback other than what the patient sees, meaning that the patient has no sense of touch from the prosthetic limb and must constantly watch it for correct use.

Now, in a scientific collaboration led by EPFL (Ecole polytechnique fédérale de Lausanne), scientists show that amputees can actually be convinced that the prosthetic hand belongs to their own body. They do this by going beyond the "seeing is believing" idiom based on established research on how the brain identifies what belongs to its own body. Instead of using the sense of sight alone, they used an astute combination of two senses: sight and touch. The results are published today in the Journal of Neurology, Neurosurgery & Psychiatry.

"The brain regularly uses its senses to evaluate what belongs to the body and what is external to the body. We showed exactly how vision and touch can be combined to trick the amputee's brain into feeling what it sees, inducing embodiment of the prosthetic hand with an additional effect that the phantom limb grows into the prosthetic one," explains Giulio Rognini of EPFL's Laboratory of Cognitive Neuroprosthetics led by Olaf Blanke, in a collaboration with Silvestro Micera of EPFL and Scuola Superiore Sant'Anna in Italy. "The setup is portable and could one day be turned into a therapy to help patients embody their prosthetic limb permanently."

In two hand amputees, the scientists provided artificial tactile sensations at the tip of the index finger – of the phantom limb – by stimulating the patient's nerve in the stump. At the same time, the patient wore virtual reality goggles which showed the index finger of the prosthetic limb glowing in synchrony with the administered touch sensations. This combination of virtual reality with artificial tactile sensations takes the rubber-hand illusion to another level.

Cranking up the power setting may help some who use prosthetics

Amputees who use powered prosthetic ankles may be able to avoid the energetic costs typically associated with prosthetics by cranking up the power provided by their devices.

A UCF engineering professor recently published a study in Scientific Reports that shows that people with transtibial amputations—the loss of a limb below the knee—may improve their walking ability if they change the power-setting on their devices. Hwan Choi, who received his doctorate in engineering from the University of Washington, is an assistant professor in the UCF department of Mechanical and Aerospace Engineering.

According to a study conducted by the National Institutes of Health, approximately 185,000 amputations occur in the United States every year and 49-95 per cent of lower-limb amputees reportedly use a prosthesis. Most of those on the market are passive prosthetics. On average, amputees spend up to 30 per cent more energy than unimpaired individuals when performing tasks such as walking. This could be due to the fact that most ankle prostheses are passive-elastic, meaning that they can store and release energy when they come in contact with the ground but are unable to perform positive net ankle work that allows for muscle shortening contractions to occur. In fact, these prostheses are only able to provide one eighth of the power of the intact gastrocnemius and soleus muscles, the key muscles that support and propel the body during walking.

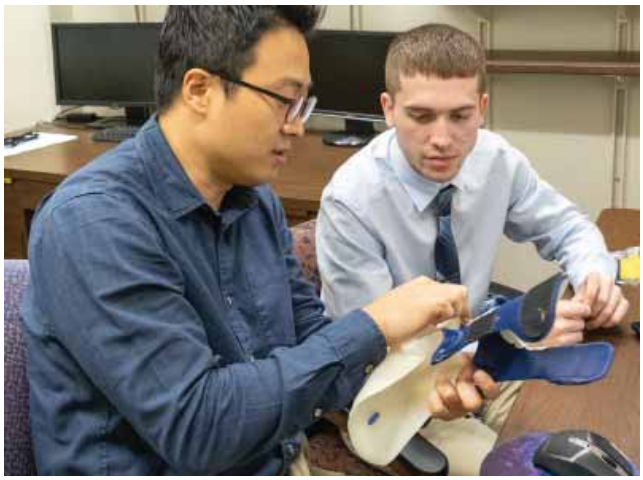
As passive prostheses increase the energetic demand on the user, individuals may have to compensate by increasing muscular effort in the residual or intact limb. Powered ankle prostheses, on the other hand, use actuators to reduce the increased metabolic costs placed on amputees by delivering

positive work. BiOM (now known as EMPOWER), the only commercially available powered ankle prosthetic, uses a visual display that allows the wearer to tune the power setting on the device. Ideally, they would select a power setting between 0 per cent and 100 per cent that best approximates that of a healthy ankle at the user's preferred walking speed. But the question remains: how much power should the prosthesis provide?

Too little power and they may experience the same metabolic costs of those using passive prostheses, but too much and they may experience problems such as knee hyperflexion and increased energy absorption in the knee that can raise the metabolic costs of the user.

Choi, along with co-authors Kimberly Ingrahm, David Remy, Emily Gardinier, and Deanna Gates from the University of Michigan, tested ten individuals with transtibial amputations. They measured the metabolic cost of transport (COT) and the BiOM's net ankle work at different power settings, while the amputees walked on a treadmill with the BiOM ankle.

Choi said that they discovered that the ideal power that reduced metabolic cost was actually greater than biological norms. In other words, the best tested setting actually decreased



the amount of excess energy used by the subject more than the prosthetist-chosen power setting.

"The key finding of this study was that none of the subjects had the minimum metabolic cost when they walk with unimpaired individuals work or power. When they had greater power, then the impaired individuals actually reduced metabolic cost."

Smart seat cushion is adaptable for prosthetics

The University of Texas at Arlington has patented a smart seat cushion that uses changes in air pressure to redistribute body weight and help prevent the painful ulcers caused by sitting for long periods of time in a wheelchair.

The same technology can be used to create prosthetic liners that adapt their shape to accommodate changes in body volume during the day and maintain a comfortable fit for the prosthesis. Poor prosthetic fit can cause skin damage and create sores in the residual limb of the wearer.

"Pressure ulcers caused by long periods of sitting without relieving pressure at boney regions such as the tailbone, frequently occur in people who spend significant amount of time on wheelchairs. In the case of prosthesis users, poor fitting of the prosthesis leads to pressure injuries for amputees that can severely affect their daily life," said Muthu Wijesundara, co-inventor of the technology and chief research scientist at UTA's Research Institute or UTARI.

"Our technology improves on existing solutions by including real-time pressure monitoring and automated pressure modulation capabilities to help combat the formation of pressure ulcers or sores."

The researchers recently presented the results of their studies on a full-sized seat cushion prototype at the ASME 2018 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference held August 26-29, 2018 in Quebec City, Canada.

When a person sits on the cushion, a network of sensors generates a pressure map and identifies vulnerable areas where pressure relief is needed. Automated pressure modulation uses this data to reconfigure the seat cushion surface to offload and redistribute pressure from sensitive areas. Additionally, the seat cushion periodically changes the pressure profile to eliminate pressure build-up over time.

The researchers demonstrated the effectiveness of the technology using healthy volunteers with different weights who assumed different positions: leaning forward, backward, to the left or right. In all cases, the seat cushion measured the pressure immediately and automatically performed an effective pressure redistribution to offload pressure from sensitive areas.

"This technology has multitude of applications in biomedical fields," Wijesundara said. "We really feel that it shows great promise in helping patients and their caregivers avoid the pain of stress ulcers and sores." Wijesundara added.

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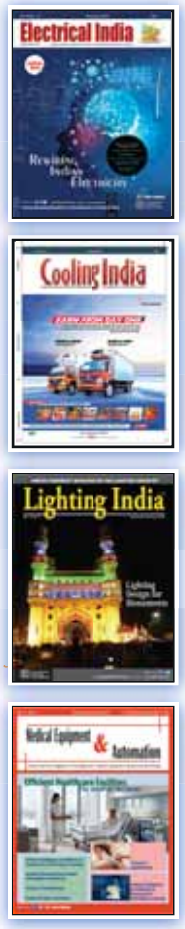

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‘Make in India’ push fails to lift medical devices manufacturing

Unless the Indian manufacturers get level playing field and visible benefit to manufacture in India in comparison to the imports, nobody will venture out to undertake this tedious job of putting together men, machine and capital for manufacturing of medical device in India.

Rajiv Nath, Forum Coordinator, AiMeD (Association of Indian Medical devices)

Medical Technology Association of India (MTaI) has asked the Government for an increase of up to 18 per cent on MRP of medical devices. What’s your take on this?

We don’t think there is a need for it because MRP on most Medical devices is already very excessive as high MRP is being a tool to induce hospitals and retailers to push one’s product and is not having any direct correlation to import or manufacturing ex-factory prices currently. Long-term cross subsidisation to keep the supplies is not healthy for the growing MedTech sector. Current basic import tariff of 0 per cent to 7.5 per cent needs to be over 15 per cent for medical devices and on their components to be 5 per cent, next year 7.5 per cent. At present, the domestic medical device industry is suffering from the onslaught of cheap import from countries like China who subsidies their export by 17 per cent. The existing manufacturers are becoming importer/trader as they find it cheaper to import than manufacture in India with lots of other hassles. The 70 per cent to 90 per cent imports dependent medical device sector got a huge shock after implementation of Goods & Services Tax (GST). Earlier, the domestic manufacturer was getting CENVAT Input Credit (6.45 per cent CVD + E.Cess & 4.57 per cent SAD + E.Cess) on the basis of manufacturing whereas traders/importers were not getting CENVAT input credit. In the GST regime, there was no difference between manufacturer and trader/importer. Simply anybody, whether he is a manufacturer or trader/importer, can get GST input credit on the basis of supply. Comparatively, trader/importer became beneficial to the extent of 11 per cent cost reduction. This is nothing but further disenchantment to the manufacturer for manufacturing the medical device in India. Did the importers pass on the 11 per cent cost reduction to consumers by reducing MRP? If not, why seek increase now?

What’s your comment on the demand-supply scenario?

Demand-supply in India is already 70-90 per cent import dependent. India needs to take out rapidly policies, statements and decisions so that manufacturing takes place in India. It’s not viable to manufacture most medical devices in the country in case the customs duties continue to be less than 7.5 per cent. After the GST was implemented the cost of imports came down by 11 per cent. But the cost of our production did not come down by 11 per cent. Until we’ve got robust regulations it is imperative that India needs to curb imports of any

refurbished or pre-owned medical electronic equipment. In most cases, we cannot compete with any brand-new equipment and to compete with pre-owned equipment is next to impossible. No industry can survive. Our country does not allow pre-owned imports for cars nor for iPhones, then why is our country allowing for medical equipment? Medical equipment requires calibration and covers a higher risk for patients' safety and its vital that even more than cars and iPhones, that patient safety concerns need to be addressed.

How significant is the import dominance?

Last year the Indian import bill was over Rs 31,000 Crore and in medical electronics, it grossed around Rs 16,000 Crore. As far as dominance is concerned, in most categories, imports are dominant, in electronics, it is 90 per cent dominant and 70 per cent in the case of other devices. Among the imports, the USA alone has a dominant 24 per cent - 25 per cent import market share. This dominance by both USA and China is being harmful to Indian interest for the long-term in terms of our own healthcare security and we need to be self-reliant. If we compare other large developing countries, i.e., BRICS Countries, we will find that India is levying the lowest import duty. Though, in theory, China levies less import duty, but they have very high non-tariff barriers that none of the countries including India can effectively export medical devices to China, whereas India is one of the most liberal countries in the world for imports of medical devices with very low tariffs and virtually non-existent non-tariff barrier. In fact, India puts non-tariff barriers for its own Indian manufacturers for exports by not permitting issuance FSC (Free Sale Certificate) for devices not notified as drugs, by MOH&W or in the form of USFDA mandatory regulatory approval clause in Government Bids.

> Healthcare will become a huge agenda for the public when the country goes for the election next year. The pricing of medical devices and unaffordable access to the medical devices and healthcare are going to be the key critical issues.

Do you see any impact of 'Make in India' over domestic medical devices manufacturing?

'Make in India' till now has pretty much failed to deliver whatever was promised for medical devices. Unless the policies that succeeded in enabling Make in India of other sectors are replicated, the medical devices manufacturing will not get a boost. For example - the automobile industry, steel industry, mobile phones, power sector, consumer electronics, these all have increased the import duties to a minimum of 15-20 per cent and even higher. Also, these are aided additionally by non-tariff barriers in the case of steel or air-conditioners by having quality control order to curb imports by seeking quality based regulations. If these strategies are also replicated for medical devices, immediately the manufacturing activity will start increasing. India failed to initiate corrective steps because the Government after getting suggestions from AIMED, begin to consult associations like FICCI and CII who are dominated by importers lobby, who claimed to be the voice of the Indian industry without putting factories in the country. This opposition has lobbied to protect their market share and thus hurt the interest of manufacturing in India. They usually do not make in India nor allow others to make medical equipment in India. 'Make in India' had promised many things and these aren't accomplished. It's been a huge disappointment for our sector.

Healthcare will become a huge agenda for the public when the country goes for the election next year. The pricing of medical devices and unaffordable access to the medical devices and healthcare are going to be the key critical issues.

While the government had promised Ayushman Bharat to safeguard and give affordable access to healthcare to the one-third of the population who has got nil income. This, however, wasn't planned for middle-class people. The middle-class is not able to enjoy access to Ayushman Bharat and with limited public health care access, they are forced to seek support from private health care. So, keeping all this in mind it is important for the government to have regulations, both for the healthcare and medical devices in terms of quality and safety, as well as some rational price controls for enabling affordable access. For the price controls, we have suggested the government cap the trade margins from import landed price in India and the labelled MRP to a maximum of 75 per cent. Same is for Indian manufacturers, cap the trade margin between MRP and ex-factory price. Unless the Indian manufacturers get level playing field and visible benefit to manufacture in India in comparison to the imports,

nobody will venture out to undertake this tedious job of putting together men, machine and capital for manufacturing of medical device in India, which is a dream and mission of our beloved Prime Minister's clarion call of Make in India. If Government of India can boost manufacturing of mobile phones and consumer electronics by levying 15 to 20 per cent duty and even higher for automotive, bicycles, motorcycles and steel, we request similar tariff protection clauses for the medical devices.

How is your association involved in promoting domestic manufacturing?

We have taken many steps in having communication linkages with various Government. Departments like the Department of Commerce, Department of Pharmaceuticals, MeitY, Ministry of Health, PMO, NITI Aayog, what policy changes are required by various departments and sensitised them about our needs. Based on this the Government had initialised the creation of an Inter-Ministerial Task Force under DOP and more recently NITI Aayog had been given this mandate for enabling better inter-ministry co-ordination. They have been holding meetings with ministries to co-ordinate various policy measures required to boost manufacturing for 'Make in India' for medical devices. Additionally, we have also been in communication with various state Governments and state CM's, for example, Mr N. Chandrababu Naidu, who on understanding our needs has acted promptly and even more than what we had hoped for. On our requests, in a very short period of time, a medical device park is under construction at Vishakhapatnam – The Andhra Medtech Zone (AMTZ). The factories have already started the installation and commissioning in the last few months. Some factories have already started functioning and the park will be fully operational by the first quarter of 2019. Department of Pharmaceuticals had supported our case to the Department of Revenue. In budget (Finance Bill) 2018 the duty was increased from 7.5per cent to 10 per cent but the same day in the evening the notification stated at 7.5per cent. We were informed by the Department of Pharmaceuticals and Department of Industrial Policy & Promotion that Department of Revenue is awaiting clarification/response from MOH&FW to Department of Pharmaceuticals proposal. MOH&FW needs to support the Department of Pharmaceuticals/ AiMeD's submission. AiMeD also serves on the Board of AMTZ and KIHT (Kalam Institute of Healthcare Technologies).

What do you have to comment regarding the standards of manufacturing of medical devices in India?

Indian manufacturers in the absence of regulations are needing to convince doctors and hospitals to use their products on the basis of third country certifications like CE mark or USFDA approval for the safety approval. These approvals are very expensive and quite needless in case the company is not going to targeting exports to these countries. To address this issue, AIMED had initiated with QCI India Certification for Medical devices (ICMED) and this was introduced in March 2016 and this has become way forward for Indian manufacturers for making medical devices that are currently not regulated so that these can be certified by credible certification bodies like TUV, Intertek, UL and they can on these bases convince the customers in India of their quality and credibility. In the case of both public healthcare and private healthcare, it's a challenge to market our products. There are challenges in both the market segments. In the public healthcare, the challenges on one extreme can be low-cost competition from China or on another extreme, when Americans and Europeans cannot compete with the Chinese on low prices, they like to compete by putting in restrictive specifications in tenders in collaboration with the tendering authorities. This is to keep out the low-price competition from China. But by doing this, even the Indian manufacturers get impacted because typically Americans will seek to put in a clause in tenders which specifies that there is a mandatory condition in the tender for having a USFDA as a regulatory approval, which many of the manufacturers will not be having, especially a new entrepreneur or a start-up will not have it. And with this one will not be able to access our home market.

> Normally a manufacturer will be relying on success in public healthcare market before entering the private healthcare market. In the private healthcare market which is more brand conscious and more brand loyal, doctors will naturally patronise an American or European brand which they are more familiar with.

Normally a manufacturer will be relying on success

in public healthcare market before entering the private healthcare market. In the private healthcare market which is more brand conscious and more brand loyal, doctors will naturally patronise an American or European brand which they are more familiar with. It's a bigger challenge to convince doctors and surgeons to switch over from American brand or a European brand to an Indian brand. Even if an Indian start-up is able to get ICMED or CE Certification he finds it difficult to compete even with lower priced product in private Indian market. To convince purchasers lower prices helped in the past to enable a switch to Indian products but recently in the past 5-10 years this competitiveness has not been working because on the other hand, the more expensive imports have induced hospitals with higher MRP and higher trade margins. To convince them to switch from imports to an Indian brand product, low price is not being advantage strangely, lower price with higher MRP and higher margin is needed to be competitive to enter the market, but when you do that both the purpose of making the product in India at low price and affordable to the consumer is not going to be met with.

What do you predict about the future of medical devices manufacturing in India?

The future can be bright only when the Government will be willing to follow what AIMED is suggesting. The Government needs to follow policy measures as done for mobile phones and consumer electronics and we see within 2 years' time we see a huge increase in manufacturing and infrastructure. This can also happen with medical devices because once the investors and Indian manufacturers find it worthwhile to expand capacity and stop imports and start manufacturing in the country then even the foreign manufacturers who are importing will also start following the Indians to retain their market share. The cost then will be reduced with a better ecosystem to source components and sub-contract OEM supplies from India. With the support of appropriate policy, India can emerge as one of top five manufacturing hubs of medical devices and can be the next big story after pharma and IT.

For Dr Tejas, No Matter The Distance

With the successful execution of the first-in-human telerobotic intervention, we are now opening new avenues and this is going to change the global scenario of telerobotic interventions.
Dr. Tejas M. Patel, Chairman and Chief Interventional Cardiologist, Apex Heart Institute, Ahmedabad

On 5th December, Dr Tejas M. Patel, Chairman and Chief Interventional Cardiologist at Ahmedabad's Apex Heart Institute, achieved rare feat in the field of cardiovascular treatment. Sitting behind a console at the complex of the Akshardham temple in Gandhinagar, Dr Tejas successfully performed angioplasty on five patients who were some 32 kms away from him using the first-in-human telerobotic intervention. Edited excerpts from his interview with Neha Wagle:

As per our knowledge, you have performed about 300 robotic surgeries so far. How much time did it take to prepare for a full-fledged in-human telerobotic operation?

Animal study and stimulation was a totally different thing. On humans, we have performed 300 surgeries based out of robotic equipment and consoles which have been installed in our institutions. But recently, in Gandhinagar, we performed the first-in-human distant wireless telerobotic coronary intervention. Sitting 32kms away from my cath lab, patient and robot, with the help of console and Internet, we were able to give command to the robot to travel the wire, balloon, stands etc.

How different is the process from the robotic PCI?

There is a difference between robotic Percutaneous Coronary Intervention (PCI) and distant robotic PCI. In robotic PCI, we work sitting away from the patient at the cath lab in a hospital's operation theatre. Sitting in front of the console, we give command to the robot and perform the operation. But, in case of this distant robotic PCI, we were 32 kms away from the robot, the cath lab and the patient. The coronary intervention was carried out giving command to the robot to perform operation using an Internet-enabled robotic arm at the cath lab in the operation theatre. We are proud to say that this is the first-in-human telerobotic intervention.

Can you elaborate us on the procedure of this operation?

Talking about the procedure, in the beginning, the cardiologist got the case details and planned a surgery based on the case's complications and requirement. On the other hand, cath lab was equipped with a robotic arm connected to the online system as the patient was taken to the operation theatre. Later the cardiologist

took position at the console with control of the robotic arm and screens displaying the heart up close. Another monitor displayed real-time vital stats of the patient. In the final stage, the cardiologist performed the surgery through robotic arm using controls on the console while doctors in the operation theatre kept the cardiologist updated.

Five patients located at the Apex Heart Institute in Ahmedabad had to undergo an elective PCI procedure from a distance of around 32 kms away. Each procedure was remotely performed from inside the Swaminarayan Akshardham temple located in Gandhinagar. All the five patients were with critical blocks and the procedures for all the patients were done in less than 10 minutes time. Overall, the experience was amazing!

With the successful execution of the first-in-human telerobotic intervention, we are now opening new avenues and this is going to change the global scenario of telerobotic interventions. A time will come when a patient in the most remote area will be treated using an Internet-enabled robotic arm at the cath lab in the operation theatre. Not only it is going to help the people with heart blocks, but will also impact on strokes which leads to major paralysis.

How robotic PCI is more beneficial in treating cardiology?

It will practically eliminate the distance between patient and the doctor. Imagine, after two to three years there is going to be a briefcase technology – a cardiologist will move around with the briefcase which will consist of a mini console and the cath lab which is equipped with a robot and Internet connectivity at both the ends to help doctors perform. This is exactly a transformation like telecom technology – from a telephone to a mobile device.

In recent years, what are the various trends you have observed while performing cardiac surgeries?

This operation was a ground-breaking research. The first coronary angiography was done by Dr Mason Sones in 1958 till then nobody knew how coronary can be cumulated. In 1977, Andreas Gruentzig, a cardiologist did first balloon angioplasty. Nobody ever thought that blocks in the coronary can be dealt without bypass surgery or without any cut inserting a balloon and carrying the operation successfully. When Dr Ulrich Sigwart did stenting in 1986 at Switzerland, nobody ever thought that this can be done. 1986 the first stenting was performed and that was the last innovation on the intervention front and following that after 30 years this is a telerobotic standing remaining from a distance the cardiologist has fixed a block. This is going to be written in the history. I am really very happy and proud that we are being instrumental to bring India's name to be written in the history.

Transasia showcases its best technologies at a host of national conferences across the country

Transasia team at VAPCON 2018

It's that time of the year, when the industry and academia blend together to be part of a carnival of national and state level conferences and seminars, to contemplate on the future clinical advancements.

Year on year, Transasia Bio-Medicals Ltd, India's leading IVD Company, has been an active contributor by bringing together its subject experts as well exhibiting its latest systems, all in an effort to pave the way for better healthcare outcomes.

Held between 24th - 27th October 2018 at Goa, the 45th National Conference of Association of Clinical Biochemists of India (ACBICON) hosted faculty from across the world, who shared their expertise on varied topics of interest such as cancer genomics, micro RNAs as novel biomarkers and tools for personalised cancer diagnostics, amongst others. Around the same time, the 43rd Annual Conference of Indian Society of Blood Transfusion and Immunohematology (TRANSCON 2018) a dedicated platform for transfusion medicine specialists, was held from the 26-28th October at Vizag. As a principal partner at both events, Transasia welcomed some of the leading names from the IVD industry for insightful discussions at its booth.

Additionally, at ACBICON it also exhibited some of its best clinical chemistry solutions, offering a throughput from 200 – 1,000 tests per hour. On the other hand, at TRANSCON, it showcased its complete range of blood banking solutions,

Attending customers at APCON 2018

Attending to the customer at APP-Pathcon

Dr. Anitha Balkrishnan at the Transasia booth at Transmedcon 2018

Transasia team at GAPM 2018

right from its ELISA panels to fully automated processors for efficient workflow management. Among the very few companies who offer ELISA panels for Transfusion Transmitted Infections (TTI), Transasia's portfolio is targeted to all the five important infections (HIV, HCV, HbsAg, Syphilis and Malaria). Besides this, it also offers ELISA panel and rapid test kits for dengue and malaria. Moreover, Transasia also announced its soon to be launched rapid test kit for Syphilis. Both the events received an overwhelming response from over 300 delegates from across India.

Moving on to November, at the 7th National Conference of Indian Society of Transfusion Medicine - TRANSMEDCON held between 23rd- 25th November at Kochi, Transasia made its presence felt and how! A unique engagement activity at the Transasia stall - a Kathakali dancer as a selfie-point, turned out to be quite a crowd-puller! Here too, Transasia showcased Elan 30s - a fully automated ELISA processor. Among the over 100 visitors at the booth, some of the leading names included Dr. Joy Mammen from CMC Vellore, Dr. Anitha Balakrishnan from IMA Kollam and Brig. (Dr.) P.S. Dhot from SMC, Ghaziabad.

From south to the north, the Transasia team was next seen at Bareilly for APCON 2018 between 28th November - 2nd December 2018 catering to the over 100 pathologists, who visited the Transasia booth. Transasia exhibited its state-of-the-art products in biochemistry, coagulation, urinalysis and hematology, besides introducing its latest, touchscreen ESR analyser, Ves30 touch. This was then followed by the 2nd Annual Conference of Vidarbha Association of Pathologists & Microbiologists (VAPCON) held between 8th- 9th December at Nagpur. In addition to exhibiting its products at the booth, Transasia also organised scientific session on Clinical utility of advanced haematology parameters by Dr. Roshini Shekhar of Manipal Hospitals. The 5th Annual Conference of The Association of Practising Pathologists (APP) - PATHCON & LAB EXPO 2018 was held on 15th-16th December at New Delhi. Transasia clearly stood out from the rest with its extensive spread of semi and fully automated analysers in all areas of diagnosis. Additionally, it also arranged scientific sessions by industry stalwarts such as Dr. (Col.) Jyoti Kotwal and Dr. Jasmita Das from SGRH, New Delhi; Dr. Swati Pai from Manipal Hospital, Bengaluru and Dr. (Col.) S. Venkatesan from AFMC, Pune. Transasia's holistic efforts won it the 'The Best Participation Award'. The end of the season was marked by another whole-hearted participation in the GAPM conclave 2018, organised by the Gujarat Association of Pathologist & Microbiologists on 15th – 16th December 2018 at Ahmedabad. Here too, Transasia exhibited all its advanced technologies to the over 650 visitors who made it a grand success! ✚


Transasia's booth at ACBICON 2018

Transasia's booth at TRANSCON 2018

Healthcare Industry 2018 Recap & 2019 Forecast

2018 was action packed for the healthcare sectors with high profile mergers and acquisitions, government policy changes and regulatory developments. 2019 is expected to witness how technology will contribute in uplifting the healthcare sector with transparency being one of the key concerns.

In recent years, the healthcare industry in India has grown exponentially. It has been growing at a rapid pace owing to the increased investment and expenditure from public as well as private investors. The significant feature of the Indian healthcare sector in 2018 was increased investment in healthcare industry from the private sector. The emergence of reputed global players investing through FDI played a pivotal role in the growth of the healthcare sector.

At present, the rising incidences of lifestyle diseases, the rising demand for affordable healthcare, the emergence of technologies like telemedicine, and the increased role of government in healthcare investment space are the major driving factors in Indian healthcare industry.

Indian government has remained very active with its approach towards the development of healthcare sector. According to a report of NITI Aayog, the Indian government will increase public expenditure on healthcare from 1.1 per cent to 2.5 per cent GDP in the next four years and to 5 per cent in the following 5 years. This shows that the nation is set on the path of progressive healthcare for every individual.

Healthcare Sector in 2018

Healthcare access and quality in India has almost been similar to the last year with a little improvement in 2018. The Indian government has remained focused on providing better facilities in the healthcare sector. Govt. of India implemented 'Ayushman Bharat National Health protection Mission' in August 2018. The AB-NHPS will have a defined benefit cover of Rs 5,00,000 per family (on a family floater basis) per year for secondary and tertiary care hospitalisation.

The Government of India also launched other schemes like 'Mission Indradhanush' with an aim to improve the coverage of immunisation in the country by achieving at least 90 percent immunisation coverage by in India by December 2018.

From the business point of view, 2018 was an iconic year for Indian healthcare sector. A number of established multispecialty

hospitals and healthcare groups were taken over by industry giants. With a vast array of opportunities available and lenient FDI policies, global players from other nations have also started investing in Indian healthcare.

With the digital revolution going on within the country, Telemedicine has also evolved in Indian healthcare space. Indian government has shown a great interest in the development of telemedicine and started investing in this segment to provide better healthcare facilities in rural India as well.

Private business sphere is also witnessing paradigm shifts where India's leading Industries have also poured liquidity in the field of telemedicine. This trend is expected to continue as several other players are also coming to the forefront.

Trends in Healthcare Industry For 2019

Moving forward, single specialty hospital and clinics are growing rapidly in India and this is going to change the facade of the underpenetrated healthcare sector. Initially, healthcare categories such as eye care, dental care were popular in the industry. But with the success of the 'Bouquet hospital' model now, other categories like fertility, oncology and maternity are making their way up into this sector. Emerging start-ups and large players are betting big on the national healthcare to generate profit in this growing boom.

Another trend of 'Budget Hospitals' which has already become popular in the demographics of South India will headline the healthcare sector in 2019. In India, majority of population belongs to middle and lower economic strata. With the growing demand for good medical facilities at affordable prices, 'Budget Hospitals' will gain popularity in the country.

In 2019, India will emerge as one of the most preferred healthcare destinations among foreigners. Especially, medical tourism from the Sub-Saharan countries is expected to grow by nearly 20 per cent. With competitive medical facilities being available in India compared to western countries, India's medical tourism is expected to grow further in the upcoming year.

While Malaysia and Singapore already have a developed healthcare infrastructure, the healthcare sector of most of the South-East Asian countries is growing at a rapid pace. In 2019, the trend is set to continue and it is expected to see further innovations in the healthcare industry.

Ayush Mishra
Co-Founder and CEO,
Tattvan E-Clinics

Medtech:
Democratising Innovation

We are democratising innovation. It involves continuous R&D to make existing products better and create new products. It involves creating products that customers can use economically, for years.

Rajnikant R. Shah, Director, Medtech Life Pvt Ltd.

Medtech is a medical technology company with a worldwide reputation for products that offer superior protection, with high levels of comfort and performance in over 70 countries around the world. Rajnikant R. Shah, Director, Medtech Life talks about the company's innovative product range.

Can you brief our readers regarding the growth of Medtech from its inception?

Our company is engaged in the development of electro-medical devices for health and home care. The success of our company is due to its focus on providing an affordable quality product to the economically challenged mass population of India. Innovation in healthcare can help customers monitor their health, conveniently. But mere innovation is not enough. What's equally important is that everyone should have access to it. At Medtech, we just do that. We are democratising innovation. It involves continuous R&D to make existing products better and create new products. It involves creating products that customers can use economically, for years. The success is also due to the support of our distribution channel and acceptance from end users.

Medtech designs, develops, manufactures and markets a wide range of medical devices and equipment. Can you talk about your vast range of products?

Today, lifestyle diseases are on the rise. The key reason

is hectic lifestyles, that people simply cannot wash away. Though the awareness about health and hygiene has increased, the quality of health is poor. So, there is a need for intense healthcare. Medtech has a wide range of products which include Handyneb Nebulizer which comes in five different ranges and has many features. The Nebulizer are viz Air Pressure Mattress, Handyvap Steam Inhaler, Blood Pressure Monitor, Needle Burner and Syringe Destroyer, Oxygen Concentrator, Handypap, Handy Digital Thermometer, Pulse Oxymeter and many more products which have different traits.

Among the broad range of high-quality products manufactured by Medtech, which is a star product with the highest brand recall?

Amongst the range of product Medtech designs, develops, manufacture is Nebulizers. In the market, Nebulizers is the star product which attributes to a major share of our revenue generation and is most popularly known by the generic name of "Handyneb" instead of Nebulizer. Handyneb Nebulizer comes in different range particularly Gold, Nupro, Smart, Classic, Super with each having different traits and features.

Medtech raises state-of-the-art manufacturing facilities. Please brief us regarding these facilities. What are the various certifications and accreditations acquired by your products?

We have ISO:13485 and CE certification from DNV a reputed notified body from Norway complemented by various registration and certification in many foreign countries. We have fully equipped R&D division recognised by DISR having the latest facility to make more and more innovative products backed by a team of qualified people and headed by one of the directors, a qualified biomedical engineer with inherited business intelligence, a philanthropic background of doing service to the community by providing affordable and economical products for life support.

Are there any steps taken by your company to improve the already existing products? Where does your company market its products?

We are not just a manufacturer as we are primarily R&D driven organisation. So, we continuously do upward integration of our product for quality and innovation and do backwards integration to make it more economical and self-sufficient. We sell our product in pan India and in more than 40 countries in the world.

Can you comment on the standards of manufacturing of medical supplies in India?

Our country mainly depends on the import of electro-medical devices. A very minimal amount of it is produced in the country. Hence it has a great future for development. What is urgent and of immediate importance is to set a standard of product coming in the country. Since there is no standard set for medical devices like a nebulizer, blood pressure monitor, thermometer, oxygen concentrator etc. So, any cheap quality non-standard product enters the country and is freely sold at an attractive price to innocent patients who are put to life threating situation because of the poor quality of the diagnostic and therapeutic products. Equally, a strict standard must be set for manufacturing units in India. The government must promote to set ancillary units to support the manufacturing of component for supplies to finished goods manufacturer like in China. With the help of Government support and regulation industry will flourish as there is a huge population in the country so there is no dependence on export. Reduction in import will save foreign exchange and will generate job opportunity in the country.

Today, lifestyle diseases are on the rise. The key reason is hectic lifestyles, that people simply cannot wash away. Though the awareness about health and hygiene has increased, the quality of health is poor. So, there is a need for intense healthcare.

What are the plans and the future prospects of Medtech?

With help of our R&D and leadership of young directors, we are planning to make more and more import substitute for the Indian market and the same will be announced from time to time. We aim to discover and develop and innovative products for the betterment of human health and enhance the quality of life. We strive for a motivating environment where creativity and effectiveness are encouraged and where cutting-edge technologies are applied to develop inventive healthcare solutions. We intend to contribute to society through the positive impact and social benefits of our services.

CT scans and a custom parametric modeling process were combined to create multi-material physical models of patients' aortic heart valves, each with its own unique size, shape, and amount of calcification.
Credit: Wyss Institute at Harvard University

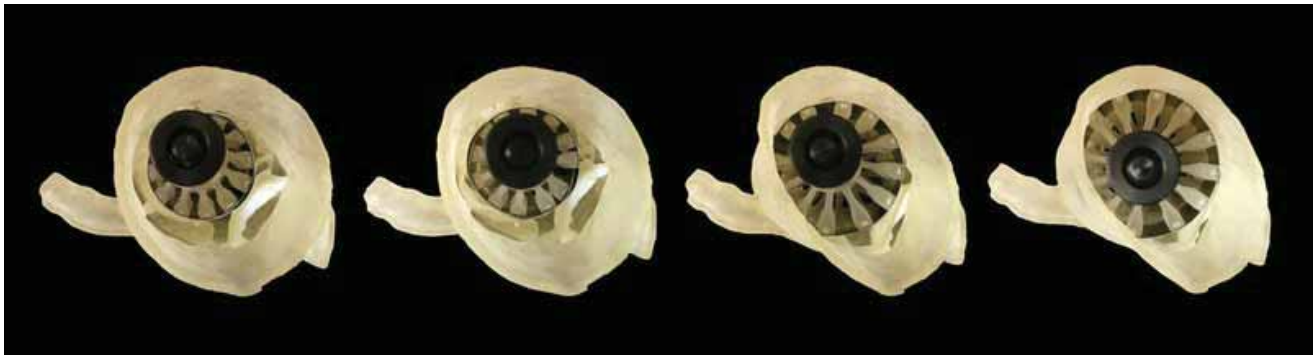
Predicting leaky heart valves with 3D printing

New integrated workflow improves valve sizing accuracy during aortic valve replacement procedures

More than one in eight people aged 75 and older in the United States develop moderate-to-severe blockage of the aortic valve in their hearts, usually caused by calcified deposits that build up on the valve's leaflets and prevent them from fully opening and closing. Many of these older patients are not healthy enough to undergo open heart surgeries; instead, they have artificial valves implanted into their hearts using a procedure called transcatheter aortic valve replacement (TAVR), which deploys the valve via a catheter inserted into the aorta. There are challenges with this procedure, however, including the need to choose the perfect-sized heart valve without ever actually looking at the patient's heart: too small, and the valve can dislodge or leak around the edges; too large, and the valve can rip through the heart, carrying a risk of death. Like Goldilocks, cardiologists are looking for a TAVR valve size that is "just right".

Researchers at the Wyss Institute for Biologically Inspired Engineering at Harvard University have created a novel 3D printing workflow that allows cardiologists to evaluate how different valve sizes will interact with each patient's unique anatomy, before the medical procedure is actually performed. This protocol uses CT scan data to produce physical models of individual patients' aortic valves, in addition to a "sizer" device to determine the perfect replacement valve size. The work was performed in collaboration with researchers and physicians from Brigham and Women's Hospital, The University of Washington, Massachusetts General Hospital, and the Max Planck Institute of Colloids and Interfaces, and is published in the Journal of Cardiovascular Computed Tomography.

"If you buy a pair of shoes online without trying them on first, there's a good chance they're not going to fit properly. Sizing replacement TAVR valves poses a similar problem, in



A custom "sizer" device is placed inside each 3D-printed heart valve model and gradually expanded until the proper fit is achieved.
Credit: Wyss Institute at Harvard University

that doctors don't get the opportunity to evaluate how a specific valve size will fit with a patient's anatomy before surgery," said James Weaver, Ph.D., a Senior Research Scientist at the Wyss Institute who is a corresponding author of the paper. "Our integrative 3D printing and valve sizing system provides a customised report of every patient's unique aortic valve shape, removing a lot of the guesswork and helping each patient receive a more accurately sized valve."

When a patient needs a replacement heart valve, they frequently get a CT scan, which takes a series of X ray images of the heart to create a 3D reconstruction of its internal anatomy. While the outer wall of the aorta and any associated calcified deposits are easily seen on a CT scan, the delicate "leaflets" of tissue that open and close the valve are often too thin to show up well. "After a 3D reconstruction of the heart anatomy is performed, it often looks like the calcified deposits are simply floating around inside the valve, providing little or no insight as to how a deployed TAVR valve would interact with them," Weaver explained.

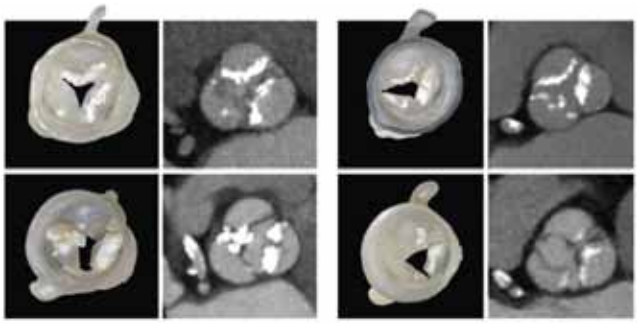
To solve that problem, Ahmed Hosny, who was a Research Fellow at the Wyss Institute at the time, created a software program that uses parametric modelling to generate virtual 3D models of the leaflets using seven coordinates on each patient's valve that are visible on CT scans. The digital leaflet models were then merged with the CT data and adjusted so that they fit into the valve correctly. The resulting model, which incorporates the leaflets and their associated calcified deposits, was then 3D printed into a physical multi-material model.

The team also 3D printed a custom "sizer" device that fits inside the 3D-printed valve model and expands and contracts to determine what size artificial valve would best fit each patient. They then wrapped the sizer with a thin layer of pressure-sensing film to map the pressure between the sizer and the 3D-printed valves and their associated calcified deposits, while gradually expanding the sizer.

"We discovered that the size and the location of the calcified deposits on the leaflets have a big impact on how well an artificial valve will fit into a calcified one," said Hosny, who is currently at the Dana-Farber Cancer Institute. "Sometimes, there was just no way a TAVR valve would fully seal a calcified valve, and those patients could actually be better off getting open-heart surgery to obtain a better-fitting result."

In addition, the multi-material design of the 3D-printed valve models, which incorporate flexible leaflets and rigid calcified deposits into a fully integrated shape, could much more accurately mimic the behaviour of real heart valves during artificial valve deployment, as well as provide haptic feedback as the sizer is expanded.

The team tested their system against data from 30 patients who had already undergone TAVR procedures, 15 of whom had developed leaks from valves that were too small. The researchers predicted, based on how well the sizer fit into the 3D printed models of their aortic valves, what size valve each patient should have received, and whether they would experience leaks after the procedure. The system was able to successfully predict leak outcome in 60-73 per cent of the patients (depending on the type of valve the patient had received), and determined that 60 per cent of the patients had received the appropriate size of valve.



3D-printed models of four patients' unique aortic valves are shown next to the CT scans from which they were created (calcified deposits are shown in white). Credit: Wyss Institute at Harvard University

"Being able to identify intermediate- and low-risk patients whose heart valve anatomy gives them a higher probability of complications from TAVR is critical, and we've never had a non-invasive way to accurately determine that before," said co-author Beth Ripley, M.D., Ph.D, an Assistant Professor in the Department of Radiology at the University of Washington who was a Cardiovascular Imaging Fellow at Brigham and Women's Hospital when the study was done. "Those patients might be better served by surgery, as the risks of an imperfect TAVR result might outweigh its benefits." Additionally, being able to physically simulate the procedure might inform future iterations of valve designs and deployment approaches.

The team has made their leaflet modelling software and 3D printing protocol freely available online for researchers or clinicians who wish to use them. They hope their project will serve as a springboard for evolvable biomedical design that keeps pace with the market's state of the art.

"At the core of the personalised medicine challenge is the realisation that one medical treatment will not serve all patients equally well, and that therapies should be tailored to the individual," said Wyss Institute Founding Director Donald Ingber, M.D., Ph.D., who is also the Judah Folkman Professor of Vascular Biology at Harvard Medical School and the Vascular Biology Program at Boston Children's Hospital, as well as Professor of Bioengineering at Harvard's School of Engineering and Applied Sciences. "This principle applies to medical devices as well as drugs, and it is exciting to see how our community is innovating in this space and attempting to translate new personalised approaches from the lab and into the clinic." ✚

Arvind, JCB India join hands for industrial uniforms

First tie-up for manufacturing co-branded industrial wear in India

Arvind Ltd. announced a partnership with JCB India to introduce ready-to-wear industrial uniforms. This partnership is the first of its kind to offer co-branded protective wear and industrial uniforms for India's workforce. The product range will be made available through Arvind and JCB India's distribution network and point-of-sale locations across the country.

Industrial uniforms have become essential in view of the increasing focus on occupational safety and health (OSH) and regulatory compliance in India. Stringent government norms, growing awareness about safety regulations, globalisation of domestic companies, and the growing number of MNCs setting up manufacturing facilities in India have contributed to the increase in demand for safety-compliant and comfortable industrial uniforms. While the OSH market is growing, there is limited choice in branded ready-to-wear industrial uniforms in the country. The partnership between Arvind and JCB India will unlock new opportunities in this market segment by offering best-in-class products for core sectors like healthcare, pharmaceuticals, iron and steel manufacturing, mining, automobiles, defence, armed forces, and construction, among others.

Arvind will complement JCB India's safety shoes business with its value-added protective wear and personal protective equipment (PPE) product basket, which includes coveralls, dungarees, rain wear, and balaclavas. These products are fire-resistant, chemical-resistant, and shock-resistant, and possess other such properties that serve to protect factory workers, fire-fighters, construction crew, soldiers, healthcare professionals, and security personnel from the harsh operating environments that their respective jobs entail.

"In India's rapidly growing occupational safety and health market, we look forward to working together to create a market presence for value-added protective wear and personal protective equipment," Vipin Sondhi, MD and CEO, JCB India comments.

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"We are transforming our business quickly through technologies and partnerships that enable us to explore and create new opportunities. Extending textile manufacturing beyond fashion and into areas like safety and protection, is one of the areas we are focusing on. This partnership will leverage JCB's market presence with Arvind's textile manufacturing capabilities to provide industrial wear that will meet the highest standards of safety and protection."

Ashish Kumar, CEO
Advanced Materials Division & Arvind Envisol,
Arvind Limited

Stressed surgeon makes up to 66% more mistakes: Study

Surgeons who are stressed out in the operating room may make up to 66 per cent more errors, according to a study published in the British Journal of Surgery.

Using a technology that captured the electrical activity of a surgeon's heart, researchers found that during intervals of short-term stress, which can be triggered by a negative thought or a loud noise in the operating room, surgeons are much more prone to make mistakes that can cause bleeding, torn tissue, or burns.

Medical errors cause between 250,000-440,000 deaths annually in the U.S., with a proportion of those mistakes occurring in operating rooms. Any change in common practice that reduces the number mistakes made by surgeons due to stress would also reduce the number deaths. The results of the study could lead to the development of protocol aiming to reduce acute or short-term stress on surgeons working in the operating room.

The lead author of the study is Peter Dupont Grantcharov – a master's student at the Data Science Institute at Columbia. A year and a half ago, Grantcharov had the idea to ask Dr. Homero Rivas, Associate Professor of Surgery at Stanford Medical Center, to wear a Hexoskin Smart Shirt under his scrubs while he did surgeries. The shirt, designed to give athletes precise physiological data during workouts, measures the electrical impulses that trigger heartbeats. From this data, Grantcharov derived heart-rate variability statistics □ the variation in times between heartbeats, to determine Rivas's momentary stress levels.

Grantcharov was also allowed in the operating room, where he collected laparoscopic video recordings of Rivas as he worked. Another researcher later reviewed the recordings and documented Rivas's mistakes using validated frameworks for assessing surgical performance. Both his stress levels and surgical errors were time stamped so that Grantcharov could correlate the two. This data yielded the somewhat alarming finding that the effect of short-term stress on surgical error is as high as a 66 percent increase.

"I was surprised by that, as well as by the amount of distractions in the operating room," says Grantcharov, who did the study while working as a research assistant at the Stanford Medical Center before enrolling at DSI. "Many machines have alarms that go off periodically, equipment malfunctions, side conversations take place, people walk in and out of the OR – I could go on. My hope is that other researchers will build upon our work to make further strides in learning about the causes of stress on surgical personnel. If our study helps make the OR a safer place for patients, I'd be thrilled."

Grantcharov was involved in designing the study, collecting and analysing the stress and surgical performance data as well as writing the manuscript. It was his first experience with data science, and he loved it. In point of fact, this research is what prompted him to enrol in the master's program at DSI, where he's now in his first semester.

Apollo Hospitals to manage 250-bed hospital in Kochi

Apollo Hospitals Enterprise recently announced its foray into Kerala market by entering into an Operations and Management (O&M) contract for 250-bed super speciality hospital in the town of Angamaly, Kochi with the Adlux Group as its infrastructure partners. The operations will begin in next four to six months.

This was announced for being a support to rebuild infrastructure damage as a result of the recent floods in Kerala in collaboration with Kerala Government. Amongst the 250-beds, 50-beds will be dedicated for the critical care unit at Apollo Adlux Hospitals. The hospital will begin services as a tertiary care hospital with an advanced Oncology section in the next phase. PET Scan and Linac will also be added in the next phase. Super Speciality departments like, trauma care, orthopedics, cardiac care, kidney with affiliated specialities and sub specialities would also be present at the Apollo Adlux Hospital.

ACTREC at Kharghar to be expanded for cancer treatment

Tata Memorial Hospital, Parel recently announced to soon start operating a 930-bed for cancer treatment at Kharghar, Navi Mumbai. The TMH, Parel has a capacity of 700-beds while the upcoming ACTREC at Kharghar will have 90-beds for the cancer patients.

Adding more to the news, the Kharghar Centre will also have a 300-room accommodation facility for patients' relatives. Five new towers are under-construction at ACTREC's 60-acre campus and they will also house other facilities. Tata Memorial authorities declined to share the cost of the ongoing project claiming that budgets are still being worked. The TMH Parel treats 60000 new patients every year this does not include follow up cases.

Tata Memorial will try and move women and children patients as possible to the ACTREC, Kharghar. The idea is to turn ACTREC into a complete diagnostic treatment-research facility, senior officials, who did not wish to be identified, said. Over 70 percent of Tata Memorial patients are treated for free. ACTREC will follow the same model.

The main motive of this project is to reduce overburdened Tata Memorials load by 50 per cent. This is being funded by Atomic Energy Department.

A new Multi-Speciality Hospital at Kharghar

Shree Sai Multi-Speciality Hospital and Occupational Centre is now operational for all. This hospital is equipped with the requisite personnel and facilities to provide emergency services to patients from all over Mumbai and Navi Mumbai.

Shree Sai Multi-Speciality Hospital, serves its patients with a wide range of treatments, skilled doctors, latest technologies and attentive staff catering services in various medical departments. The hospital has various departments as Antenatal Care Unit, Gynecological surgeries, Infertility Centre, MTP Centre, Family planning centre, Cancer Detection Centre.

The hospital is equipped with Endoscopy equipment, ECG Machines and many more facilities. This multi-speciality hospital in Navi Mumbai is a collection centre where its core service is to collect samples from patients for a variety of tests. The pathology testing services cover six disciplines, namely Clinical Chemistry, Clinical Microbiology, Cytogenetics, Hematology, Molecular Diagnostics and Surgical Pathology. Modern equipment that is used for Digital OPG, Color Doppler, and Digital Mammography etc is equipped at this hospital along with Bone Mineral Density, Eye Checkup and dental implant services available here for 24-hours.

Fortis Hospital, Mohali launched Cochlear Implant Clinic

A Cochlear Implant Clinic was recently launched at Fortis Hospital, Mohali. A cochlear implant is an electronic medical device that replaces the function of the damaged inner ear. This is different from hearing aids, which makes sounds louder. Cochlear implants bypass cochlea to provide sound signals to the brain. Dr Ashok Gupta, Director, Department of ENT, Fortis Hospital, Mohali emphasized the need of this Cochlear Implant Surgery in children during the early days. He said,

"Most of the children remain undiagnosed or are diagnosed very late." He also advised for regular medical checkups with the specialist so that it can be diagnosed at an early stage and surgery can be performed for a better quality of hearing. This cochlear implantation is a 2-hour surgery which requires 2-3 days of hospitilisation. The best results are obtained when the implant is done at an early age.

Another factor that ensures success is post-op rehabilitation, ie; speech therapy to ensure that the child starts hearing & speaking. The government of India has started an early intervention in the form of otoacoustic emission as a screening test to be done for every hospital born child, though it is strictly not being followed. It is done only for high-risk cases i.e. children who had significant jaundice/cried late after birth etc.

These children require evaluation in the form of field audiometry, ABER & ASSR. Then further evaluation is to see whether cochlear (Hearing Organ) is formed or not by getting CT Scan & MRI of temporal bone.

NephroPlus on an expansion path

Hyderabad-based dialysis centre network and dialysis care provider, NephroPlus is on an expansion path. The company is managing 14,000 patients every month, with 40 per cent growth over the last year.

The company which obtained DaVita India operations recently is eyeing further addition opportunities in 2019. It expects at least two acquisitions this year (in India and abroad). There are plans to add 3-4 new centres in Hyderabad in coming months alone as a part of its pan-India expansion. The company in November 2018 acquired the Indian dialysis network of DaVita Inc that has 22 centres across key metros in the country, giving access to four new cities in India. The staff of DaVita has been united into NephroPlus by December 31, 2018.

Vikram Vuppala, CEO and founder, NephroPlus recently said, "We have the presence of 183 centres (including 10 in Hyderabad) across 18 States of India and Nepal, its first overseas centre. We are looking at a fundraising possibility as well as acquisition possibilities in India and overseas. We are looking at raising $25 million from a new investor in addition to existing investors. We had been talking to 15 plus investors in the last six months. We have hired a banker for this purpose a few days back. The funding could complete by June this year. We anticipate more action this year."

Indian organised dialysis market is today estimated at $300 million while the market potential in the country is $2 billion, means only 15 per cent of the population is going for dialysis. With government interference and Public-Private Partnership (PPP) projects, the 85 per cent population which doesn't have access to dialysis is likely to go for dialysis steadily. Addressable market of $300 million is growing 30-35 per cent every year.

nephroplus
dialysis made easy

The company is working with Andhra Pradesh and Uttarakhand in PPP route. It is talking to more states. It is also operating with few public sector enterprises to create dialysis centres for them. NephroPlus has established partnerships with several hospitals across India to create centres inside their premises. "We have recently tied up with one more unit of Max Hospitals in North and Medanta Hospital in East. We have taken up with Ruby Hall Clinic of Pune and signed up a fresh partnership with Kohinoor Hospital in Mumbai, an NABH accredited hospital. We are spreading our partnerships with marquee institutions," he informed.

The company will continue to look at hospital partnerships across India. It plans to add 30-35 centres in the country every year. In the outsourced ties, the company has six out of ten in Hyderabad alone. Several arrangements are in a process now.

Dr Douglas Bly
(1824 – 1876)

Dr Douglas Bly, a physician from Rochester, New York, was born in West Henrietta, Monroe County, in the year 1824. He is known for his work of inventing and patenting an artificial leg that included new technology, materials, and design to better mimic the movements of the human leg. At an early age in school, he made rapid progress and gave indications of much promise. Upon reaching the age of discretion he determined to study medicine, and to this end attended the medical college at Philadelphia, where he graduated in 1851. To develop himself in his profession he made a tour to Europe. On reaching the continent he went immediately to Paris and enrolled himself as a student in the College of Physicians and Surgeons. After studying here some time he received his degree, made a trip to Europe, visiting many of the places of note in the old world, and returned to this city in 1854. He began the practice of medicine and was very successful as a physician. Soon after his return from Europe, Dr. Bly delivered a course of lectures on anatomy, in this city, to a few he liked with tickets. In the role of a lecturer, he presented knowledge of his subject not unworthy of one making more claims.

Contributions:

He at once considered a prominent position in the medical fraternity of Rochester, and while practicing there he identified a medicine for strychnia-poisoning, which addressed him a national reputation. At the 12th annual meeting of the American Medical Association, held in the city of Louisville, May 3, 1859, he was present as a member, representing the Monroe County Medical Society. He invented and patented an artificial limb which is critically celebrated, and known all over the country. Leaving the practice of medicine, he turned his attention to the manufacture and introduction of artificial limbs. He began their manufacture in this city, and soon after in New York. The merit of his patent being recognised by all, he made a deal with the government during the late rebellion to supply all soldiers whom loss compelled to use artificial limbs.

The demand in the west became so great that Dr. Bly found it necessary to establish manufactories in St. Louis, Cincinnati, and other leading cities. After the close of the war he closed agreements with many of the southern States to supply disabled soldiers, and in consequence, he carried on business in Memphis, New Orleans, Charleston, and in other famous cities in the south.

These facts alone attest the great worth and popularity of Dr. Bly's invention, not to converse of the thousands who have shown and are ready to show in regard to the value of his patent limbs. Dr. Bly also did a large real estate business with Chauncey Perry, whose daughter he married as his first wife in 1870. Mrs. Bly was taken ill and died at an early stage. This was a heavy loss to the doctor, and he felt it severely. In October 1874, he was again married. He chose as his wife the daughter of F. H. Amidon, of New York, with whom he lived most happily, and who bears him to grieve the loss of a most loving and indulgent husband. Dr. Bly was universally respected and beloved. He always showed the department of a man of the highest culture in society, and in every department of life he was a man who performed his presence felt by his social and intellectual acquirements; honest and upright in business transactions, a citizen virtuous and law-abiding, a friend firm and steadfast, a husband indulgent and affectionate. He died in Rochester, May 10, 1876. +

FORTHCOMING EVENTS

MEDICAL FAIR 2019
Location: Pragati Maidan, New Delhi
Date: 21st to 23rd February 2019

CMEF Indonesia 2019
Location: Jakarta, Indonesia
Date: 6th to 8th March 2019

Medicall 2019
Location: Hitex Exhibition Centre, Hyderabad
Date: 8th to 10th March 2019

SPS – Industrial Automation Fair Guangzhou
Location: The China Import and Export Fair Complex, Guangzhou, China
Date: 10th to 12th March 2019

Emirates Thyroid Congress
Location: Sofitel Abu Dhabi Corniche, UAE
Date: 15th to 16th March 2019

Indo Health Care 2019
Location: Jakarta, Indonesia
Date: 21st to 23rd March 2019

Index to Advertisers

Medical Wizard

Polyethylene

A Polyethylene is the most popular plastic. Polyethylene is usually a mixture of similar polymers of ethylene with various values of n. Many hip replacement implants and almost all total knee replacement implants do contain ultra-high molecular-weight polyethylene (UHMWPE). This plastic provides cushioning and movement.

Polyethylene is a common plastic and it is often one of the materials used in medical implants because it is an acceptable synthetic polymer that is biologically inactive and does not degrade in the body. However, some polyethylene implants are considered better than others.

A long-term follow-up study carried in Australia confirmed that hip implants which contain crossed-linked polyethylene (XLPE) mainly lower the risk of a patient wanting revision surgery after a total hip replacement when compared to the effects of implants that include the conventional polyethylene (CPE) components. High-density polyethylene (HDPE) solid implants have been used by plastic surgeons since the 80s for facial augmentation purposes.

Titanium

Titanium is usually used to make implants for dental surgery but has more recently been used instead of stainless steel for other medical uses, such as hip implants. Pure titanium and titanium-base alloys are known to be the various corrosion resistant and biocompatible of all implant materials in the body. Pure titanium is optionally used for hip cup shells with polyethylene inserts. This is also used to produce heart valves and bone screws. Its main benefit, when used to fix bones, is that it can combine with bone and is extremely strong but lighter than most alloys.

Despite being erosion-resistant and incredibly strong, titanium plates can lead to bone embrittlement once bones are recovered as the material is significantly more stringent than bone. Last year scientists in Japan developed titanium fibre plates that are safer than conventional titanium plates when used to support broken bones.

Polylactic Acid Screws

Biodegradable screws made of polylactic acid are already used in the medical field, but they have the drawback that when these screws degrade, they can leave holes in the bone. To avoid this, surgeons have started to use polylactic screws because they are biocompatible and biodegradable. The researchers have recently developed a moldable composite made of polylactic acid and hydroxylapatite, a ceramic which is the main constituent of the bone mineral. This composite helps the growth of bone into the implant. Depending on the structure the screws will biodegrade in 24 months.

The screws can be precision made using conventional injection moulding methods, meaning there's no need for any post-processing such as milling. Another advantage of the composite material is that it can be compressed at just 140-degree Celsius – normally the powder injection mould has to be compressed at much higher temperatures of up to 1,400-degree Celsius. These medical screws also promote bone growth into the implant.

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