VOL.14 NO 10 PAGES 64

EXPRESS HEALTHCARE

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NOVEMBER 2021, ₹50

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Public Health

Upswing in rural vaccination: Thanks to sustained, 'out of the box' efforts

Healthcare IT

Interview

There is a dire need of digitisation of healthcare services in an emerging economy like India: **Sandeep Gudibanda,** CEO and Co-Founder, HealthPlix

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Building a smart & sustainable hospital infrastructure and rethinking strategies required is the need of the hour

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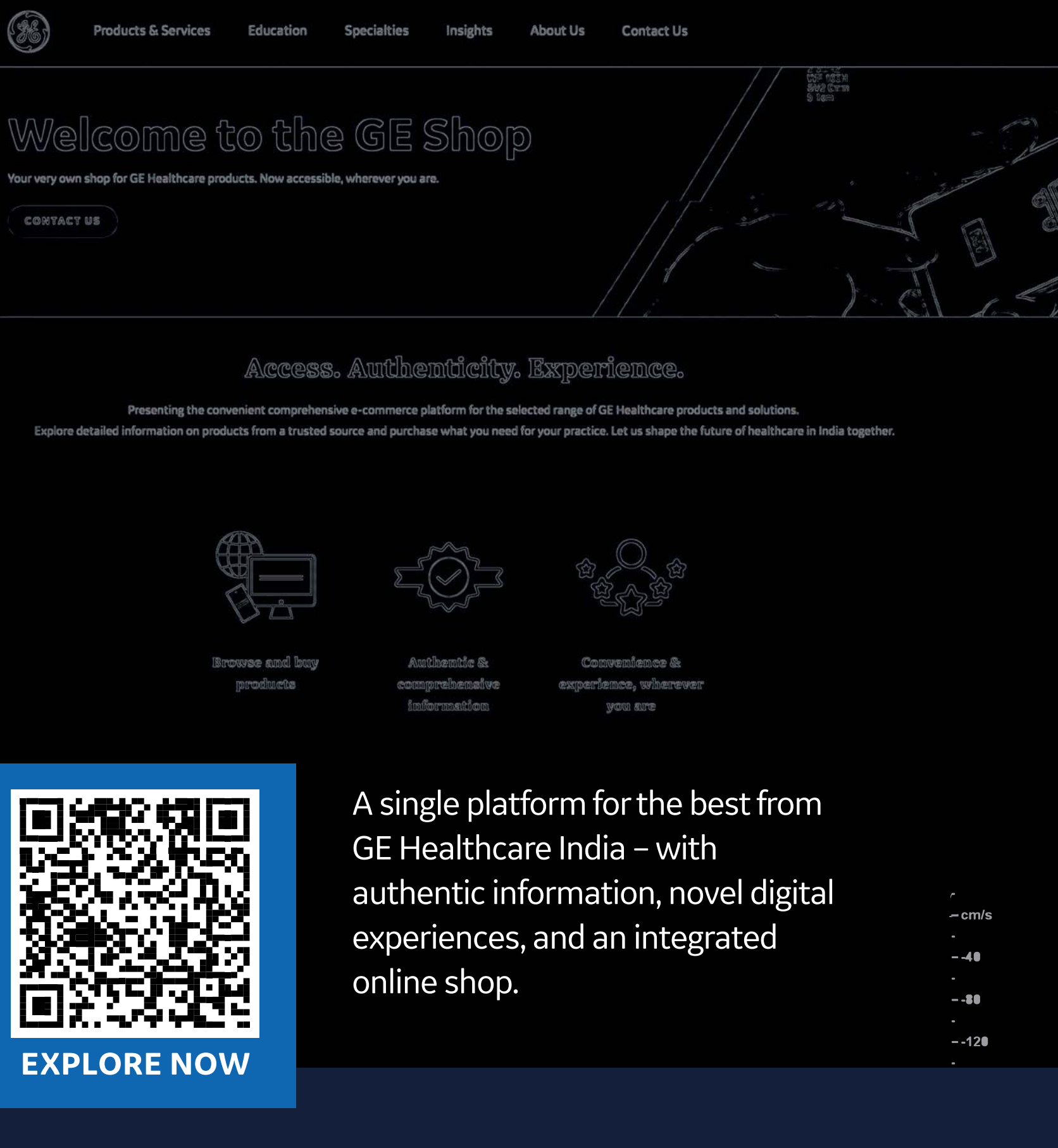

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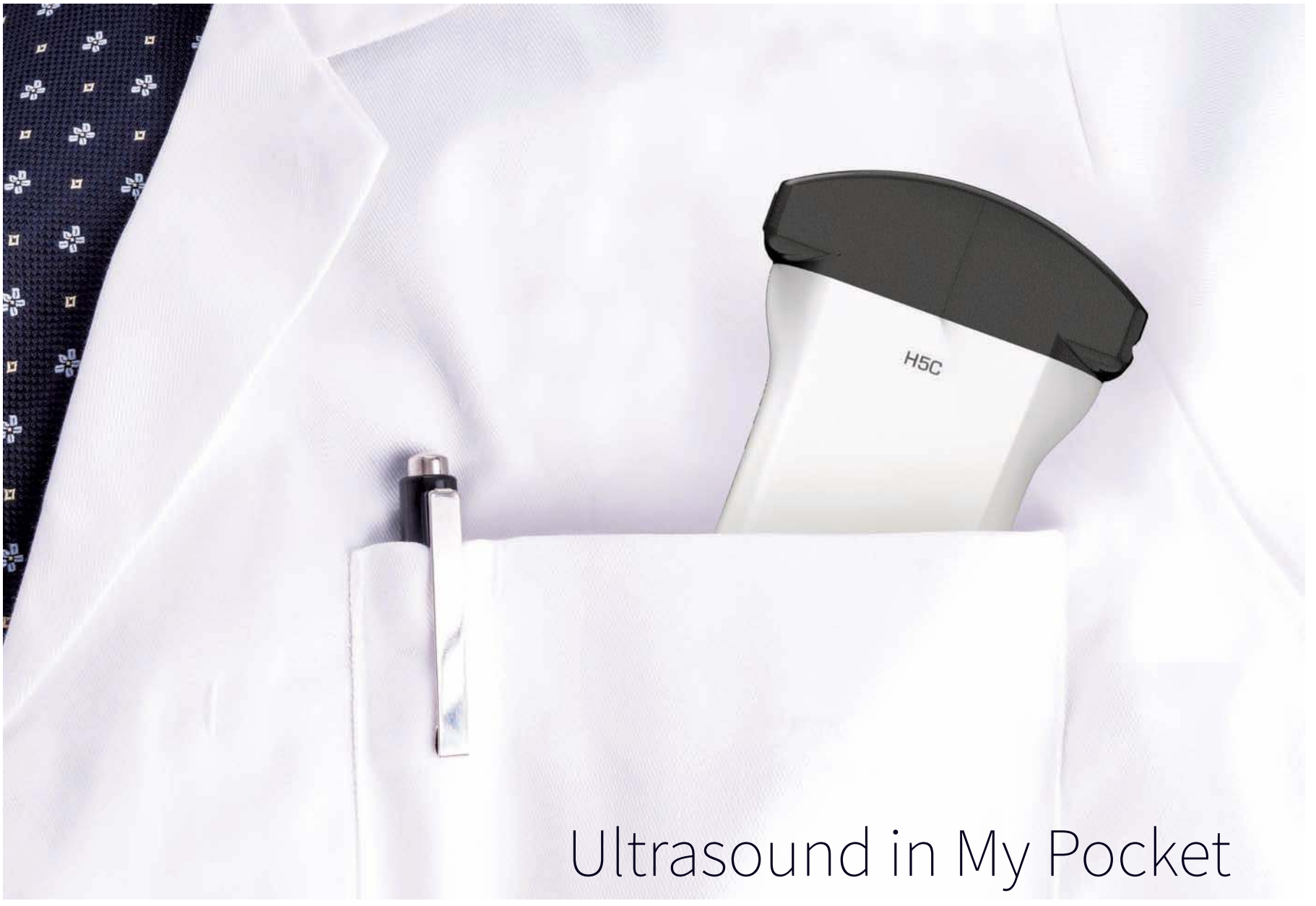

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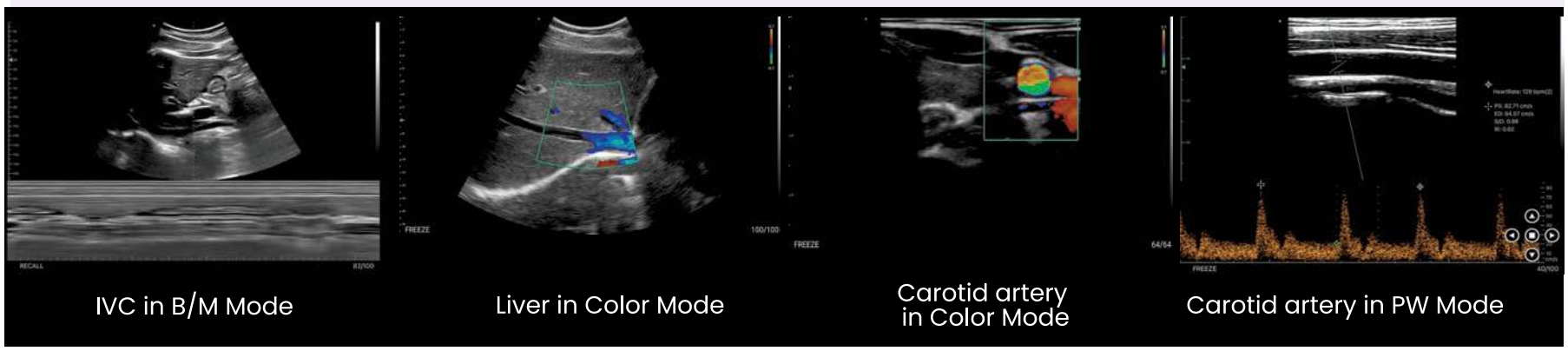

IVC in B/M Mode | Liver in Color Mode | Carotid artery in Color Mode | Carotid artery in PW Mode

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* Responsible for selection of news under the PRB Act.

Planning for a pandemic

With an eye on preparing for the next wave of the COVID-19 pandemic, the recent launch of the Pradhan Mantri Ayushman Bharat Health Infrastructure Mission, also known as Pradhan Mantri Atmanirbhar Swasth Bharat Yojana (PMASBY) rightly starts at the grassroots. As per a PIB release, it aims to shore up India's critical healthcare network from village to block, to the district to the regional and national level in the next 4-5 years.

While it is a long-overdue initiative, the government must also take care to plug any leaks fast. And the initiative must hopefully outlast political regimes, and not become another Centre versus States battle at implementation stage, to show long-lasting results.

Initiatives like the PMASBY are critical for the public health sector to match the infrastructure expansion already underway in the corporate healthcare sector, so that there are as many affordable care options as possible.

Given that we are in the midst of our biggest festivals, and after a year of masking and various degrees of social restrictions, public health officials are bracing for a third wave. Especially as COVID fatigue has set in. India's vaccination drive continues, but there are still areas where coverage is poor. While the cover story in Express Healthcare's November 2021 edition, with a special theme on sustainable healthcare infrastructure, showcases strategies to design and build smart and sustainable hospital infrastructure, a couple of recent reports throw up interesting insights on where India's health ecosystem needs an infrastructure ramp up.

The FICCI-EY report, 'Prevent, Plan and Prepare: Strategies to win against the pandemic' makes the point that the virus and the pandemic have been erratic, and therefore it is difficult to predict where, when and how high the third peak will be.

As each region displays its own distinct wave pattern, the FICCI-EY report suggests that a highly localised plan, instead of a common nation-wide plan, may be critical to designing an effective pandemic response in case of a possible third wave.

The report considers three scenarios. Projecting a repeated peak of 4 lakh cases per day, the FICCI-EY report estimates it would call for 9 to 10 lakh beds to cater to moderate and severe cases, with shortages in over 200 under-served districts. The report recommends that Intermediate or Transition Care Centers can be an effective low-cost and scalable option to address surge capacity, specifically for management of moderate COVID cases. If the prevailing case load continues, existing infrastructure would be able to absorb the demand for COVID beds and requirement of surge capacity may not exist.

If, however the third wave turns out to have similar intensity as the second wave with a peak of ~4L daily cases, the FICCI-EY report predicts an estimated 9-10L COVID beds may be needed to cater to moderate and severe cases. With the existing infrastructure, demand for ~8L COVID beds can be met, leaving a shortfall of ~2L beds, of which 84 per cent is contributed by six states and 180-200 districts.

However, if the third wave has 50 per cent lower incidence (i.e., ~2L daily cases) and 50 per cent lower hospitalisations, an estimated 3-4L COVID beds would be required and hence 'surge capacity' requirement may be minimal to nil, as per the FICCI-EY report.

Even as India's total vaccinations crossed the one crore mark, we are still far from safe. Let's consider a second report, from Boston Consulting Group (BCG) aiming to understand vaccination trends and India's vaccination hesitancy.

While the virus and the pandemic have been erratic, certain trends are now visible

BCG conducted two surveys in March and May this year and recently released findings of a third survey titled, 'COVID-19 vaccination - Citizen willingness: research insights'. The September survey has a study sample of over 3500+ participants, is representative of different states, city tiers, age, income and gender. Though the sample size is small, considering India's 1.3 billion population, the findings are still valuable.

Regarding the unvaccinated participants, the BCG's September survey shows that the high willingness seen in their May'21 survey has translated in high adoption in recent times. The current unvaccinated adult population is showing significantly lower vaccine willingness (v/s May'21 round). The willingness to get vaccinated varies by citizen cohorts, higher willingness to adopt in smaller town (38 per cent), rural (47 per cent) and <5 lakhs income population (40 per cent).

According to the BCG report, the key adoption barriers for those willing to be vaccinated are crowded vaccination sites, long waiting time and lack of nearby vaccination sites. The September survey also showed a higher proportion of fence sitters in urban - large towns (44 per cent) and older age groups (56 per cent). Hesitancy towards vaccine was driven by doubts over vaccine efficacy as well as fear of long-term irreversible effects. Unlike earlier, short-term side effects did not come up as a key hesitancy driver this time, except in rural areas, as they fear a loss of wages.

Among the vaccinated participants, those who have taken 1st dose but not 2nd dose, approximately 60 per cent of the population who are vaccinated with first dose have high willingness to take the 2nd dose. The willingness for 2nd dose shows no/ less variation by citizen cohorts. 35 per cent of this segment is indifferent, driven by lower COVID-19 cases, and belief of one shot being sufficient to protect against.

The BCG report concludes with two key policy implications/suggestions for demand generation and uptake of COVID-19 vaccinations. One, the demand generation strategy among unvaccinated needs to be different for urban v/s rural, given significant differences in underlying barriers (e.g., lack of nearby vaccination sites is more critical for rural).

In rural areas, the focus needs to be on converting willingness to actual vaccination - e.g., access innovations. There is also need to increase access by setting up residential camps, increasing sites especially in rural and small towns and improve perception of experience on safety measures, limited wait time, etc.

In urban areas, the focus should be on increasing vaccine willingness, given high hesitancy in unvaccinated. Therefore, vaccine efficacy has to be built up, via communication and influencers (e.g., PM, Doctors). Doctors/ experts need to be to allay perceived fears around long- term health implications.

The second recommendation from the BCG report is that willingness to receive the 2nd dose should be increased via a communication, outreach programme run by influencers to educate the masses on disease prevalence, hospitalisation/ mortality risk, as a single dose is not sufficient to prevent COVID-19 infection.

Policymakers and healthcare industry would do well to pay heed to these predictions as they plan their infrastructure investments.

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INTERVIEW

Pharma marketers in India are opening up to digital physician marketing

Dr Harshit Jain, Founder & Global CEO, Doceree in an interaction with **Kalyani Sharma** talks about the physician marketing space and its future growth in India

Walk us through the journey of Doceree so far (including the current revenue & targets)
When we started Doceree in 2019, we ventured into a space that was very niche, especially in the context of the Indian market. Pharma brands across the globe were not much open to using digital mediums for physician engagement as traditional route of in-person interactions by sales reps still remained the most popular way to connect with physicians. However, the pandemic changed the entire scenario -- sales reps were locked indoors and the only way for pharma organisations to reach out to physicians was through only digital. Around this time, pharma companies realised that digital needed to be more than a checkbox activity in their marketing plans. Our platform turned out to be exactly what pharma brands looked for, providing them complete transparency in accessing physicians through a regulatory compliant medium. Doceree enabled pharma marketers to target physicians contextually at opportune moments, helping them optimise their business outcomes. That we have been able to expand to three international geographies - the US, India, UK & Europe in a span of two years shows how critical our platform had been for pharma players. We have been expanding to a new international market every six months and launching various products and features to provide further optimisation capabilities to pharma marketers. Presently, we are working with top 7 out of 10 global pharma players and over 50 publishers throughout the world. Our India business became cash positive in the first 15 months and the US business is expected to become cash positive in the next three months. We are on track to clock projected annual revenue of $6 million this year.

Doceree recently expanded in Europe and is already active in US & India. Can you throw some light on the physician marketing space in all these locations? (A comprehensive analysis)
Irrespective of any market, physician marketing lagged much behind consumer marketing when it comes to digital. While the concept was almost new for Indian pharma marketers, the story was no different even in the developed markets like Europe and America. It is the mental block pertaining to regulations and compliance that had limited the adoption of digital in the pharma industry. This hesitation has now been waning among pharma marketers, especially in India where digital penetration is growing fast in the sector. The concept exists elsewhere in the US, Europe, UK and Japan, but because not much innovation has happened in the space the growth has been very slow. Consumer marketing in the last decade changed the way brands reached out to their target consumer. That kind of transformation did not happen in the pharma marketing space so far, be it any market we talk about. The pandemic though has fuelled the adoption of digital in the industry and marketers are now being more serious about digital pharma marketing tools and strategies.

We can say it is now becoming an exciting space across markets.

Physician marketing is a comparatively niche area in India. What is the need of the hour as far as its growth in India is concerned?
Pharma marketers in India are opening up to digital physician marketing. The future of pharma marketing post pandemic is definitely 'hybrid', which is a combination of both offline and online marketing mediums. Simply following the traditional route of meeting physicians personally to update them about new drug or therapy will not suffice now. The growth of telehealth and EHR platforms as also the government's thrust on digital health will now require pharma brands to switch to 'online-offline' model for optimum results. Thus, important at this stage is the introduction of innovative products and features that can take physician engagement to new levels with healthcare experts getting more active on digital platforms.

How do you see this space in the next five years? Any gaps/challenges/suggestions that you would like to highlight?
Digital pharma marketing is fast evolving and it will soon become an integral part of marketing efforts for the pharma industry. The primary gap right now is physicians not being able to get relevant and trusted content from pharma companies that could optimise treatment outcomes. Delivering hyper relevant messages through multiple channels is the need of the hour. As a company, we are addressing the issue through our product offerings.

What are the future plans of the company? (Any new product in the pipeline or further expansion or collaboration)
The plan is to expand to Japan next year and come up with market-specific products to cater to the needs of pharma marketers. We will continue doing partnerships in this domain to further optimise business goals of pharma brands.

Please describe about your new product launch.
Doceree initially enabled pharma brands to reach physicians via display and text-based messaging, the scope of which we have broadened by introducing opti-channel marketing that now would empower brands to access physicians digitally via email and SMS as well.

With this, the platform has increased physicians' touchpoints, enabling marketers to garner better engagement. Also, by using the Doceree platform, pharma brands can now showcase a single message to physicians on multi channels - display email and SMS, pronouncing greatly the impact of digital messaging campaigns. We are developing capabilities that would make digital a crucial marketing component for the pharma industry. It is thus important that we enable pharma brands to gain access to physicians' touchpoints across effective digital channels. That's what our product is aiming to establish.

In the US, we have launched Doceree Perform, a measurement solution to pioneer a new era of transparency for life sciences brands to increase the ROI of digital messaging campaigns. As the latest advancement to the company's platform for healthcare professional communications, Doceree Perform progresses the sector to go beyond vanity marketing metrics to establish business outcomes with a compressive overview on the effectiveness of virtual interactions. The unparalleled measurement proficiency of Doceree Perform equips life sciences organisations with an interactive platform to evaluate business performances and to raise script lift with the utilisation of more precise data-driven messages. With access to total prescriptions (TRx), new prescriptions (NRx), new-to-brand prescriptions (NBRx) and ROI metrics on Doceree Perform, life sciences companies can not only identify the behaviors of healthcare professionals (HCPs) and campaign results precisely across the Doceree network, but also gauge the performance of initiatives on additional channels and networks.

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HMD reaches milestone of supplying 500 million 0.5 ml AD syringes to government for COVID vaccination

HMD is on track to produce & supply outstanding orders of 310 million 0.5 ml KOJAK AD Syringes by 2022 beginning, hopefully by January end

Hindustan Syringes & Medical Devices Ltd (HMD), one of the leading manufacturers of Disposable Syringes in the World and possibly the largest for auto disable syringes on Monday, 11th Oct has achieved another milestone of supplying 500 million 0.5 ml AD syringes to government to help vaccinate over 685 million people till date to support the massive vaccination campaign to eradicate COVID-19 and help make India Atmanirbhar.

The next lot of 16.3 million syringes has been inspected and is ready to dispatch.

In our endeavor "to ensure there is no shortage of syringes to help vaccinate India against COVID, HMD has preponed the supply commitments to the Ministry of Health and Family Welfare (MoH&FW) and has supplied 500 million pcs of KOJAK AD syringes to Government of India to help vaccinate over 685 million people. HMD presently is not accepting new business export opportunities from many overseas buyers and also had earlier diverted the supply of 100 million pcs from UNICEF order to Government of India from September to December. HMD will always prioritise domestic needs, Sorry if it wasn't enough. Regret Government has had to partly restrict exports, we all could have planned better", shared Rajiv Nath, Managing Director of Hindustan Syringe & Medical Device Ltd (HMD).

"Total government orders HMD received till date from December 2020 are of 753.10 million pcs of 0.5 ml Kojak AD syringes. In addition, HMD has been supplying most of the 1 ml / 2 ml dispovan & 0.5 ml/2 ml Kojak AD syringes (approx 50 million syringes) being used in the private sector vaccination campaign. All orders received from December till date have been supplied on time or before time as committed", added Nath.

Presently, HMD is producing more than 4.25 lakh syringes of various types per hour at our factories spread over 11 acres in Faridabad industrial district in Haryana. The next lot of 16.3 million syringes has been inspected and is ready to dispatch

HMD is on track to produce & supply outstanding orders of 310 million 0.5 ml KOJAK AD syringes by 2022 beginning, hopefully by January end.

"We feel humbled & honoured to contribute to the National vaccination campaign & Union Health Ministry's plans to celebrate India administering 1 billion COVID vaccine doses by October. The vaccine bullets need our guns. It is a huge responsibility", said the elated Nath.

HMD's manufacturing plants are operational 24/7. It's a race against time to help ramp up capacity of our Cannulas (Needle Points) & Needle Capillary Tubing Manufacturing. A new 150,000 sq ft factory as a green field project is set to be commissioned by Jan 2022 to increase capacity from 4 billion cannulas (needle points) per annum to 6 billion per annum to be Atmanirbhar, a vision we share with the Honorable Prime Minister. Presently, HMD is producing more than 4.25 lakh syringes of various types per hour at our factories spread over 11 acres in Faridabad industrial district in Haryana." stated Nath, who is also referred as Make in India Man of medical devices.

"We again request The Union government to place orders for syringes with the manufacturers in India well in advance so that the latter could ramp up supplies or allocate supplies for Government of India. Clarity should be given of India's quarterly needs by MoH&FW for calendar year 2022 as we can't plan on a 2-4 months window horizon basis. To ramp up capacity, we need an order confirmation at least nine months to a year in advance", said Nath.

"India's vaccination drive has been a role model for the world. We congratulate the Indian government & we are glad we could shoulder the responsibilities with the government for the success of India's massive vaccination campaign, while balancing ongoing market needs for seasonal spike of dengue & typhoid" said Pradeep Sareen, Marketing Head of Hindustan Syringes & Medical Devices Ltd.

"In line with PM Modi's plans to resume export of surplus COVID-19 vaccines in the fourth quarter of 2021 in order to fulfill the commitment of India towards COVAX, we at HMD are confident that India will also be in a position to export some COVID vaccine syringes as part of 'Vaccine & Syringe Maitri' to fulfill India's commitment towards the world for the collective fight against COVID-19. No One is Safe until Everyone is Safe", shared Nath.

HMD extends full cooperation & support to Government of India and will do whatever it needs to produce syringes ahead of schedule to ensure success of India's massive vaccination campaign" assured Nath.

SUSTAINABLE HOSPITAL INFRASTRUCTURE

Building a smart & sustainable hospital infrastructure and rethinking strategies required is the need of the hour

By Kalyani Sharma

Countries across the world are under unprecedented and volatile pressures due to the ongoing pandemic and number of challenges associated with it, casting greater responsibility on the governments to protect, nurture and provide a sustainable environment and build a pool of resources for the country.

Highlighting the challenges posed by COVID-19 and need for adopting structural changes, Akshat Seth, CEO, CK Birla Healthcare said, "COVID-19 has correctly taught us that there might not be a virus erupting every day but it is every day that we must be prepared. The structural changes introduced during COVID-19 operations and infection control measures. To put it briefly, we should aim to build hospitals without rigid walls, buildings that we can remodel to heed to the crisis and offer uninterrupted high-quality medical care."

Sharing his views on the same, Col. Hemraj Singh Parmar, Co-founder, DoctCo said, "The lack of pre-defined with natural or manmade disasters of this scale in future. Hospital design, therefore, needs to undergo a drastic transformation in line with future requirements."

Stressing on the need for revamping infrastructure to suit today's sustainable approach, Dr S. Narayani, Zonal Director, Fortis Hospitals Mumbai said, understand wind direction and place equipment, furnishing etc., and create ambient spaces - one that does not remain heavily dependent on air-conditioning to keep your environment right. This will be an important change and progressive step towards sustainability in the long run. The second thing to do is to tackle hospital waste. It is

Institutes that are already adopting unique ways for environmental sustainability should be recognised & rewarded and be allowed to help others in creating such green healthcare spaces, setting golden examples of progressive change

Dr S Narayani
Zonal Director,
Fortis Hospitals, Mumbai

We should aim to build hospitals without rigid walls, buildings that we can remodel to heed to the crisis and offer uninterrupted high-quality medical care.

Akshat Seth
CEO,
CK Birla Healthcare

Future hospitals will likely have prosocial design for patient and staff wellbeing such as customised patient rooms, attractive visitor's lounges, views of green surroundings like healing garden that help reduce patient anxiety and expedite healing

Kirtiman Sinha
Project Head-Healthcare Spaces,
Edifice Consultants

Sustainable healthcare design should explicitly focus on health equity and communal well-being. This is the only systemic feature that has the capacity to possibly wither an outbreak as overwhelming as the COVID-19

Mohanbir Singh
Founder, Director, Creative Designer
Architects

This comes on top of already-existing challenges that the healthcare sector was grappling with including growing national demand for health services, investment and funding and overall impact on the environment. Amid all this, building a smart & sustainable hospital infrastructure and rethinking strategies required is the need of the hour. Moreover, these challenges are the driving force behind adaptation of more sustainable design solutions which will not only reduce the operational costs but will also generate better health and well-being outcomes for patients.

teach us an important lesson about sustainability-hospitals have to be adaptable and flexible. The pandemic taught us that the routine medical requirements of patients should be addressed, uninterrupted. A conscious healthcare system, thus, should provide for robust design for infection control & patient safety, modular design to allow for zoning services /spaces, integrated designs to incorporate natural healing & wellness and natural healing through exposure to sunlight. Space repurposing should be planned according to the evolving social norms, facility

clinical processes for aiding a significant number of patients falling sick at once overwhelmed our healthcare ecosystem. There were two major issues; inadequacy of infrastructure (equipment, medicines, life support equipment and trained manpower) to deal with mounting COVID positive cases and poor clinical and operational protocols. Acute shortage of life-saving medicines and medical devices only added to the woes. This situation calls for a rethink on the sustainability of healthcare infrastructures keeping futuristic requirements in mind and our ability to deal

"Currently, most hospitals have centralised control units. But during the COVID19 pandemic, this aspect proved detrimental. What hospitals must do differently, is that we need to break the air-handling units into small pods, where you have the opportunity for open ventilation & an opportunity for segregating or isolating/ compartmentalising sections of the hospital. Additionally, when you plan your air conditioning systems and everything in the right and more sustainable way, you can add elements of nature. By doing so, hospitals can be at an advantage to

significant for every hospital to relook at the amount of waste each unit generates in terms of biomedical waste and office generated waste. There is an urgent need to regulate hospital waste management. Moreover, hospitals use biomedical gases for various purposes, the use of which needs to be brought down."

Sudhir Damodara, Director, Climatronics Technologies said, "The COVID19 virus and the subsequent second wave has shown how hospital infrastructure can be overwhelmed by a unexpected outbreak and there is a

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definite need for better healthcare for India. China also a very large country with a billion plus population has shown the right way to tackle such outbreaks earlier such as SARS, and now COVID by creating emergency isolation facilities at break neck pace."

"The challenges remain in public delivery of universal healthcare, since health is a state subject there has been significant variation in quality of hospitals state to state, and there is a definite need for better public health centres. Another aspect is taxation on healthcare - which is significant since the supplies are at full GST and there is a definite need to liberalise this sector and allow more players with a focus on certifications to ensure quality", he added.

Green healthcare: Current scenario

A sustainable business is no longer just about meeting regulations - it's about playing an active role in addressing the climate change challenge, while also creating a healthier future for communities by focusing more on and adaptation of green hospitals.

As per a green paper by Health Care Without Harm, "Health care's climate footprint is equivalent to 4.4 per cent of global net emissions (2 gigatons of carbon dioxide equivalent). The global health care climate footprint is equivalent to the annual greenhouse gas emissions from 514 coal-fired power plants. If the health sector were a country, it would be the fifth-largest emitter on the planet."

As per the paper, "United States, China, and collectively the countries of the European Union, comprise more than half the world's total health care climate footprint (56 per cent). The top ten health care emitters make up 75 per cent of the global health care climate footprint. The United States health sector, the world's number one emitter in both absolute and per capita terms, produces 57 times more emissions per person than does India. While India has the seventh-largest absolute health sector climate footprint, it has the lowest health-related emissions per capita of all 43 nations. China's health sector produces six times more greenhouse gases per person than India's does. But China's health system also emits one-seventh the greenhouse gases per capita as that off the United States, one-third that of Korea and just under one-half per capita that of the European Union."

Talking about the steps that hospitals can take to reduce their ecological footprint and reduce waste, Vinay K Mayer, Director - Market Research & Consulting, Asia Research Partners said, "The principles of environmental sustainability can be applied to healthcare systems in several ways, including the reduction of paper waste through the use of electronic health records (EHRs) and electronic medical records (EMRs). The system must empower the workforce to play an active role above all by educating them on the issues at hand. Also, it is critical that they are able to communicate their needs and desires as well as implement any changes that may occur. Solidifying medical waste can prove to be an energy intensive process, having the potential to release noxious fumes that cause fatalities upon inhalation. Healthcare providers must consider moving towards greener ways of disposing of their solidified medical waste, such as autoclaving, chemical treatment, and microwaving.

"Saving energy can be difficult in some cases when hospitals, for example, try to reprogram their heating and cooling plants. On the other hand, re-engineering air handling systems and upgrading lighting systems may seem like an impossible task at first, until you start with small steps like conserving water or making sure that lights are turned off by finding innovative ways to bring about positive change in the world around us", he added.

Talking about the green initiatives in hospitals in India, Dr Narayani said, "There are a lot of green initiatives being undertaken, especially in the field of anaesthesia and OT infrastructure. Hospitals are certainly adopting green OTs and moving towards the concept of green buildings. Many hospitals have already applied for Green OT Certification. In these cases, we are trying to change the way we induce a patient, and the kind of anaesthesia we use, aiming to minimise the amount of bio-medical gases and number of medication, in a manner which is good for the patient and is more sustainable for the environment. Some hospitals also have options of solar panels for energy conversation. Now that can be a challenge for some hospitals who have lesser space. Developing solar panels may require more space, in that case, there is an option for adopting wind power."

"From an industry perspective, I feel hospitals should be incentivised to adopt green initiatives. Institutes that are already adopting unique ways for environmental sustainability should be recognised & rewarded and be allowed to help others in creating such green healthcare spaces, setting golden examples of progressive change", she added.

Trends & technologies in designing sustainable hospital infrastructure

Hospitals are already making efforts and adopting the sustainable and green initiatives. The pandemic played a role of a catalyst in fast-tracking the process of this adoption.

Highlightening the trends and technologies in designing sustainable hospital infrastructure, Mohanbir Singh, Founder, Director, Creative Designer Architects said, "Healthcare infrastructure, which is known to be one of the most latent and resource-intensive spaces, is one vital area for probe and optimisation. Some prevalent trends in this area include designing for the climate and economy, including slashing the infrastructure's energy footprints and planning for occupant health and well-being at odds with rising air pollution, temperature, and humidity. Secondly, sustainable healthcare design should explicitly focus on health equity and communal well-being. This is the only systemic feature that has the capacity to possibly wither an outbreak as overwhelming as the COVID-19."

"Further, health providers' emphasis on health-user experience must continue to intensify. The pandemic has propelled the transition of healthcare providers and users towards a digital telehealth ecosystem which will significantly impact facility design in times to come. Therefore, designing for flexibility and adaptability with technology becomes a crucial guide rail in designing sustainable healthcare infrastructure", he added.

The second wave which was a major learning for Indian healthcare system as far as hospital infrastructure is concerned highlighted the need for technology integration while designing the sustainable hospital model.

Talking about the technology evolution and integration of sustainable hospital infrastructure, Mark Matthew, COO, NF Healthcare India said, "While India thrives on quick innovation, we now have a perfect replacement to reduce dependency on these oxygen cylinders & liquid oxygen plants - PSA oxygen plants. These in-hospital equipment takes in atmospheric oxygen and produces medical graded oxygen with 93 per cent purity which is then fed to life support systems like ventilators, Bi-Pap machines etc. Another advantage of these plants is that their oxygen output can be adjusted according to requirements from hospital. The only thing that hospitals need to ensure is continuous electricity supply. These inexpensive plants give an ROI within 1.5 to 2 years depending on oxygen usage. Currently, certain state governments have mandated for any 50+ bedded hospital to have an in-hospital oxygen supply system. Due to high initial costs some hospitals may find it difficult to install such systems, hence, both government and corporates can step in and support such hospitals."

"As technology advances, many companies are working on integrating these oxygen supply systems with AI/ML technology to directly alarm a doctor's phone in case there is something wrong with the oxygen supply systems. This would also mean faster output and self-adjustment of machine to match hospital requirements", he added.

Talking about hospital modernisation, Dr Sharada Rao, Vertical Head-Delivery, Life Sciences, Birlasoft said, "E2E digitisation of the healthcare system - right from onboarding to diagnostics to surgery to post-operative care experience are critical elements to hospital modernisation where healthcare cloud adoption, devices and services, modernisation of HIS enterprises, IoMT, and bots form the underpinnings of futuristic platform solutions."

Investment and partnership: Need of the hour

Healthcare investment has always been the subject of intense focus in the competing demands, whether from the public or private sectors. The same stands important while investing in sustainable hospital infrastructure.

Talking about sustainable healthcare design and innovative long-term partnerships, Kirtiman Sinha, Project Head-Healthcare Spaces, Edifice Consultants added, "Sustainable healthcare design shouldn't be an afterthought. Sustainable approaches can result in cost-effective and better healing environments that contribute directly to a country's healthcare coverage. In India, the public healthcare system is bearing most of the weight of healthcare sector for its population. Today, private healthcare sector has emerged to provide majority of secondary, tertiary care in metros, tier - I and tier - II cities. Innovative long-term partnerships between public and private healthcare sector can bring about major change in the system especially during an unanticipated crisis like COVID-19."

"In future facilities, we need to consider how to build flexibility in order to manage the sudden influx of patients which we had seen during pandemic-Design that maximises infection control, integration of ICU/Critical care bed capacity in the layout that quickly converts regular beds to crucial care beds during emergencies. Future hospitals will likely have prosocial design for patient and staff wellbeing such as customised patient rooms, attractive visitor's lounges, views of green surroundings like healing garden that help reduce patient anxiety and expedite healing. Smart furniture layout is an important consideration - the possibility of a flexible arrangement that breaks the monotony and accommodates visitors with social distancing norms and safety. This can help in reducing the walking demand and employee stress at hospitals", he added.

Stressing the areas of investment, Dr. Mradul Kaushik -Senior Director - Operations and Planning, Max Healthcare said, "The pandemic exposed the faultlines in both Public as well as the private health systems with the resultant near collapse of the healthcare delivery mechanisms. The impact of the pandemic was not limited to hospitals alone, it amplified the issues of inequity, accessibility, affordability, supply chain, infrastructural and operational gaps that are required to mount an effective response

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Shaping the healthcare industry using technology and modular construction

Akhil Kiran Ganatra, Managing Director, Clancy Global highlights the importance of technology-driven healthcare construction

Building construction is a complex and rigorous process and when it is connected with healthcare, the complexity is magnified. Healthcare construction is a highly competitive space that requires continuous upgrades and improvement of amenities. It faces regular construction challenges (multiple task management, material, labour, equipment, and of course tight timelines) while also complying with stringent health, safety, and environmental standards. The time value is of paramount importance in healthcare construction due to the ever-evolving medical facilities.

Therefore, it demands an integrated approach that encompasses overall planning, controlling, monitoring, and coordination of the project construction, right from inception to completion. Sequencing of construction activities, progress visibility, regular audits, documentation, communication, and adhering to strict safety protocols are imperative to planning, managing, and executing a successful healthcare construction project. These also tend to be key challenges being faced during the construction lifecycle of healthcare projects. Thus, stepping away from vintage construction methods and adopting leading -technologies is the only way ahead.

Building Information Modelling (BIM) is a revolutionary protocol that the modern architecture, engineering, and construction (AEC) industry has witnessed. It offers an ideal information collaboration platform for AEC projects. Despite this, most BIM protocols are unable to provide realistic visualization and simple interactive methods. As a result of this, providing feedback and inputs in the form of professional medical requirements to project designers by the stakeholders becomes a challenge. It is at this stage that 2D interactive forms take the lead.

Technology-driven healthcare construction is addressing the challenges faced by the modern healthcare facility, making spaces more adaptable and at the same time helping providers with better prediction of costs, timely completion, stable cash flows, improved time to revenue, and reducing risk

2D interactive drawings

2D interactive drawings provide end-to-end transparency, facilitating quick, easy, and accurate assessment of on-ground activities. It is a single source of truth across design quantification, recording day-to-day progress and bill certification. It also assists significantly in optimising effort, input costs, and alignment across stakeholders. Impact on cash flow, man-days, and variation to design quantity is pinpointed and promptly flagged.

The 2D interactive form ensures continuity of information for day-to-day progress reporting and bill verifications as well. The innovative drawings offer a convenient visualisation option for remote visibility and a progressive audit via 3D scanners. These audit recordings are observed to be providing positional, quantity, and quality accuracy far superior to any other tool.

These aspects of 2D interactive drawings provide collapsed timelines that eventually translate into savings in overhead, shorter time-frame, online cash flow, and high predictability of resources.

Prefab & modular construction

Another ground-breaking technology for the industry is modular construction. The offsite technology reduces build times considerably while increasing and improving quality, productivity and safety substantially. Individual modules or prefabricated units are manufactured in factory settings under better controls. These units are then assembled and installed on-site in a fraction of the time as compared to old construction methods. It finds its utility best in the construction of repeatable designs.

While green-field healthcare projects reap the benefits of this technology in the form of short construction schedules and reduced project costs, facility expansion, renovation, and amenities improvement become a cakewalk. The latter requires execution while the facility is running, hence, the process should ensure other healthcare services run uninterrupted and hygiene and safety are uncompromised. Prefabricated units tick on all these prerequisites. The technology's benefits were witnessed during the COVID-19 pandemic when sudden expansion and up-gradation of facilities had to be undertaken.

Technology-driven healthcare construction is addressing the challenges faced by the modern healthcare facility, making spaces more adaptable and at the same time helping providers with better prediction of costs, timely completion, stable cash flows, improved time to revenue, and reducing risk. Tech adoption enables agile yet sound construction practices that deliver value. So, while the healthcare sector takes care of the nation's well-being, technology led construction ensures their facilities are always in good health.

Sustainable hospital ...

Continued from Page 19

to COVID-19. We saw the hospital bursting at seams during the pandemic, the lack of ICU beds was a huge challenge that none anticipated and this was made worse by knee jerk reaction of both public and private sector especially during the second wave which came almost like a tsunami. This certainly emphasises the fact that the health systems should create sustainable ecosystems which take care of the future emergencies."

"This requires significant planning and investment in not only the existing health systems but also for creating new and novel systems. In my humble opinion the digitisation, infrastructure augmentation and operational efficiencies remain the most important challenges and opportunities for hospitals and health systems and this is where the most opportunities also lie", he added.

Talking about the role of community ownership, Sameer Mehta, Vice Chairman Dr Mehta's Hospitals said, "Over the last few years, the writing has been on the wall to evolving customer centric and outcome centric way of life. Most good hospitals now share best practises, drive to improve clinical outcomes through qualities standards (NABH, CAHO, AHPI, QAI, JCI et al). We will also see more community ownership by hospitals and providers. By working in communities, you could reduce specific risks, by working in community you could improve our collective health. So perhaps it is the time for the dawn of the community centric hospital."

Now, in the wake of the COVID-19 pandemic, there is an increasing interest in reform in healthcare delivery, so that systems and infrastructure are capable of being responsive to pandemics, and meeting shifting consumer appetite and preference towards more sustainable hospital facilitates.

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Crucial hospital hygiene standards to follow

Behram Khodaiji, Jt. Chief Executive Officer, Masina Hospital talks about the importance of maintaining hygiene standards in hospitals

Management of health-care waste is a crucial part of the overall hospital hygiene. Health-care waste is no less than a reservoir of pathogenic microorganisms, leading to contamination and infections within the premises. If hospital waste is managed in a compromised manner, these microorganisms can get transmitted through various direct and indirect means. Hence, Infectious waste contributes to the elevated risk of nosocomial infections, putting the health of everyone from hospital staff to patients and visitors at risk.

To avoid this situation, a lot of attention is paid to guarantee that cleanliness and hygiene is maintained across the entire range of medical services. Proper processes are in place so that a continuous improvement program and seamless flow of efficiency in hygiene and sanitation is enabled. For a hospital, it's an absolute necessity to have essential systems in place that oversee the maintenance of cleanliness and hygiene.

A system to guaranty that the hygiene standards of the hospital and its surroundings are maintained with regular checks and reviews as necessitated. Sanitisation establishments must be freely accessible through any point in the hospital. Patients and their relatives must be educated on cleanliness and hygiene protocols to ensure keeping the hygiene standards in check.

Environmental cleaning: Deep cleaning and disinfection has to be carried out on a regular ground with a system in place to maintain the benchmark hygiene levels on real time basis (e.g., bed rails, mattresses, call buttons, chairs etc.) and surfaces of non-critical patient care equipment such as IV poles, stethoscopes).

Sanitisation establishments must be freely accessible through any point in the hospital. Patients and their relatives must be educated on cleanliness and hygiene protocols to ensure keeping the hygiene standards in check

Regular Water and Air sampler is to be done as per Infection Control Standards. Frequent internal audits of PPE, Hand hygiene, and waste handling systems has to be carried out to guaranty that utmost care is taken to maintain the paraphernalia, so that their use delivers results as per the hygiene standards. Cleaning checklists must be adhered at all relevant points and the data must be recorded and surveyed periodically to keep tabs on sanitisation processes.

Drainage Cleaning has to be carried out on periodic basis to avoid overflow of washrooms in addition to ensuring adequate water supply at all times for cleanliness of washrooms. Disinfectants must be used for various waste management processes. Daily deep cleaning of all areas and careful dusting must be carried out about thrice in a day. Daily disposal of waste with proper segregation and weighing has to be done.

Daily laundry for linen and sterilisation for infectious patients has to be done. The laundry is washed in the specified water temperature. Daily disinfection is done for patient utensils. Daily clearance of waste storage facilities and their subsequent sanitisation must be carried out

Initiatives that need to be taken towards waste disposal efficiency:

Bio-medical waste [BMW] management and segregation of waste generated through treatment procedures of chronic and contagious illnesses has to be carried out as per government guidelines. Display Posters need to be put up for BMW management and segregation. Waste disposable has to be done as per WHO and CDC guidelines and data maintenance has to be done every day for the same. Anti-fungal paint must be applied at BMW storage area. Weighing machine installed for waste management protocols must be in place for constant improvement in the efficiency of the system.

Superior quality sharps containers must be used for disposing used needle and sharps devices to eliminate needle stick injuries. Staff must be trained for segregation of waste, different color waste bins must be kept for different waste, as per NABH guidelines. A comprehensive, corporate approach to managing medical equipment should be overseen by a responsible lead, to ensure that appropriate medical equipment is available and fit-for-purpose, as required for the delivery of high-quality clinical services.

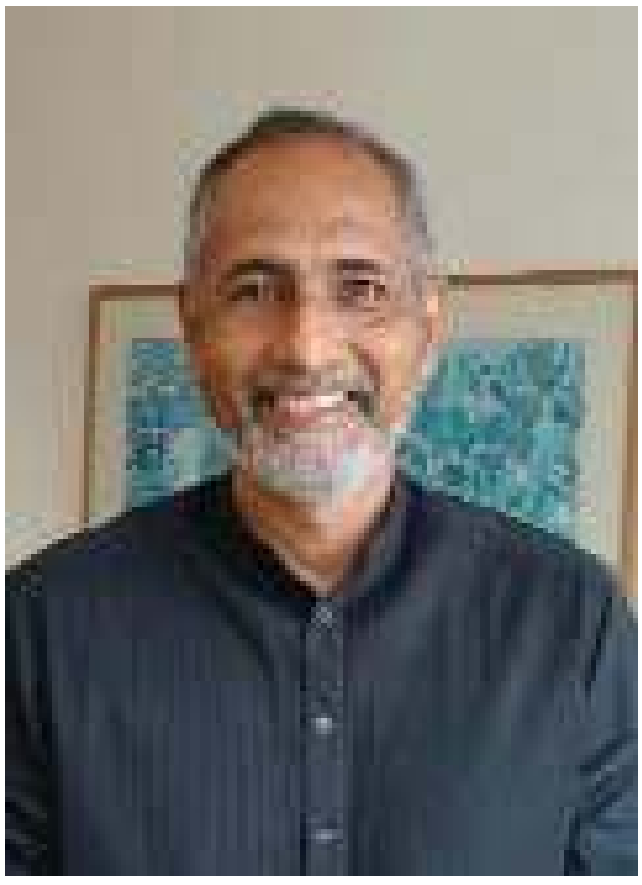
The processes set for the cleaning staff to maintain the standards:

National standards for hospital and healthcare must be followed. Usage of standardised gloves, masks, PPE suits must be carried out as per IPC guidelines and risk management protocols. Training and awareness programs for usage of various PPE kits, disinfectants etc. must be delivered to staff on periodic basis. Education on Hand hygiene techniques used for patient handling, procedures etc. must be delivered on a periodic basis. Fumigation has to be done monthly in non-critical areas and in critical areas every week. Personal hygiene training for all staff has to be in process every week. Personal grooming standards of staff have to be ensured as per protocol. Kitchen staff has to be medically checked as per guidelines prescribed for food handlers. Daily supervision on cleanliness has to be provided by housekeeping and nursing team.

A sustainable future for healthcare design

Rahul Kadri, Principal Architect and Partner, IMK Architects highlights the need to rethink model of Indian healthcare design to support health and overall wellbeing rather than simply treating illnesses

The COVID-19 crisis has brought to the forefront the shortcomings of India's current healthcare system. While we need 15 doctors and 20 hospital beds per 10,000 people, we only have about half of those numbers, which means that over 70 crore people are underserved by the system. There's also a huge disparity between urban and rural areas in terms of access to specialised care. These gaps needed to be bridged urgently.



Reinforcing the system

The initial course of action should be to reinforce the primary layer of healthcare in urban slums and rural areas and offer preliminary remedial assistance. Smaller, cost-effective primary healthcare centres and medical sub-centres can be set up as an initial shield in every village, branching out to well-equipped speciality hospitals in every district to cater to the rural population from each of the district's talukas. Such a system would help relieve the strain on healthcare infrastructure in cities and help make it affordable to the masses.

The design of the current stock of healthcare facilities also needs to be looked at through the lens of disease control and changes made accordingly. Several studies over the past few months have shown that the spread of COVID-19 within closed-off, compact, and poorly-ventilated spaces is higher than that within open spaces. But most hospital campuses today exist as hermetically-sealed, integrated units with deep floor-plates, which results in poorly-lit and -ventilated indoor spaces connected via shared circulation elements like lobbies, double-loaded corridors, and elevator banks. Additionally, dependency on air conditioning has increased so much that 90 percent of the air is recirculated within the building and only 5 percent fresh air is brought in. This increases the possibility of cross infection and contamination significantly, while simultaneously inducing high operational energy costs and maintenance problems.

The better design alternative would be to segregate functions into multiple, separate building wings with reduced widths, and to add buffer zones in between. This would aid natural cross ventilation within indoor spaces, reducing the risk of infection by increasing the rate of air exchange, and avoid interference of services and maintenance areas with procedure areas, allowing for greater isolation of diseases. Independent buildings would need to be zoned responsibly too and functions segregated within sections or floors by creating general, semi-sterile and sterile zones (for example, waiting areas to OPDs to ICUs). In order to dilute and remove contaminated indoor air, air conditioning systems will need to be upgraded to incorporate a three-stage filtration process with UV treatment in the AHU (Air Handling Unit) or ducts, while integrating automation through technological solutions will also be crucial to limit physical interaction and aid safe distancing.

Designing for wellness, not disease

Today, healthcare is one of the fastest-growing industries globally and as new medications and technology change methods of diagnosis and treatment, there is a need to rethink our model of healthcare design as well to support health and overall wellbeing rather than simply treating illnesses. We must strive to put the patient's experience at the core of design schemes for healthcare facilities with solutions that respect user and cultural preferences and anticipate innate human behaviour solutions that promote a preventative approach rather than a responsive one with mental well-being incorporated as a key component of physical health.

Within healthcare facilities, the interdependence between the built environment and wellbeing takes on a very important role; good designs can aid the patient's healing process while bad ones can worsen health conditions, making hospitals the hotbeds of disease transmission and cross infections. Even the simplest of design choices such as the placement of a window, the colour of a wall, the texture of the floor beneath our feet, or the height of the ceiling, have a bearing on our physiological and psychological health in both positive and negative ways. Sick Building Syndrome (SBS), for instance, is a health condition that is scientifically proven to afflict people living or working in poorly designed buildings.

One solution that shows promise is basing designs on the theory of biophilia, which seeks to connect buildings and occupants more closely to nature. For instance, maximising daylight, natural ventilation, view of the outdoors, and incorporating green courtyards and water bodies can create a more therapeutic built environment for recovery. Designing the building with longer sides facing the North and the South to improve daylight, providing centralised courtyard landscapes to provide passive evaporative cooling, and adding solar panels to reduce dependency on conventional forms of electricity, are some ways to optimise building energy consumption and improve efficiency. Also, designing decentralised micro-service zones that run parallel to various departments can help make regular servicing and maintenance easier and quicker.

Going forward, as our understanding of health and wellbeing evolves, new construction technologies provide limitless possibilities in this sector. Building Information Modelling (BIM), for example, which can help determine the optimal geometry of buildings in response to selected parameters, can not only help create healthier built environments but also aid in pre-empting problems and shortening the time of construction to save costs, while 'temporary and transformable' architecture has enabled emergency mitigation like never before. Imbibing such innovations within healthcare design holds the key to streamlining our systems for better performance - from accessibility of essential public services and improved patient care to the wellbeing of our economy.

The niche for UV-C disinfection in the age of the pandemic

Richard Mathias, Founder and Managing Director, Lifegate Pharmaceuticals highlights the role of UV-C disinfection in sanitisation

Since the beginning of the pandemic, the essentials services sector had to report to work every day. A large population of these employees risked their lives to ensure the others could be safe at home. In these offices, where it is inevitable to always have your masks on, we must realize a strong niche for UV-C disinfection afterwards or beforehand. UV-C disinfection can occur in an office space at both times, i.e., before and after employees leave every day. It prevents cross-contamination between employees from one day to the next, increasing the safety aspect by many folds.

With the virus being airborne and a dense population like ours, if there are no measures to sanitise the air with solid, reliable science governing its efficiency, we are faced with a conundrum. UV-C harnesses a 360-degree sanitisation, i.e., air and surfaces alike, hence one of the most well-rounded decisions for any business house.

One of the best-known killers of bacteria and viruses, UV-C disinfection, has been around since the 1930s. UV-C light is so highly energetic that it breaks through the DNA and RNA of bacteria and virus, deactivating and destroying their ability to reproduce and with prolonged dosage complete decontamination will take place. In fact, most germicidal UV-C operates at a wavelength of 254nm which is outside the visible spectrum and invisible to the naked eye.

Not just commercial spaces, but significant strides have been made in the hospital and healthcare sector; for example, an in-vitro fertilisation laboratory in the United States installed UV-C cleaning in their HVAC (heating, ventilation and air conditioning) system and increased the clinical pregnancy rates from 38.9 to 62.3 per cent. The Women's & Children's Hospital of Buffalo, NY reported the following. "eUVGI (Ultraviolet Germicidal irradiation) eradicated microbes in HVACs and was associated with a decrease in NICU environmental pathogens and tracheal colonization. Significant reductions in VAP and antibiotic use in NICU high-risk patients were associated with eUVGI in this limited study."

With the virus being airborne and a dense population like ours, if there are no measures to sanitise the air with solid, reliable science governing its efficiency, we are faced with a conundrum. UV-C harnesses a 360-degree sanitisation, i.e., air and surfaces alike, hence one of the most well-rounded decisions for any business house

In mid-October, a UV-C company deployed two superbug-slaying machines at JFK Hospital and ELWA Hospital in Monrovia, Republic of Liberia. They are helping to disinfect healthcare environments where Ebola patients are being treated. To eliminate Ebola at the source, the use of innovative disinfection technology, such as UV-C disinfection, is critical to creating and maintaining a pathogen-free environment for patients and healthcare staff.

We know that masks, sanitisers and maintaining personal hygiene are here to stay for a long time. However, the mutation of coronavirus so far has been unpredictable, and when we analyse the patterns, every time we thought we were safe, another wave has hit us harder. As a result of this, we as a nation must lift our sanitisation standards much higher. Placing our faith in products designed during the wake of the pandemic have every right to encounter scepticism, but to rely on UV-C disinfection which has research backed science behind it is entirely another proposition altogether.

With the UK and the USA taking significant steps in backing and investing in this technology across healthcare, education and transportation sectors surely India must follow suit. The Union Minister of State for Science and Technology, Shri Jitendra Singh recently held a meeting to discuss the installation of Ultraviolet-C radiation (UV-C) system ahead of the monsoon session, which was an extremely positive sign.

In conclusion, when UV-C can attack anything in its path, including mosquitoes, insects and other pests, not to mention the bacteria and virus that sets some of us back once or twice a month, we must give the idea of embedding this technology in our routines a very serious thought.

HERE ARE THE NUMBERS AND TIMINGS ON UV-C'S EFFECT ON BACTERIA

+	**Distance**	**5 ft.**	**6 ft.**	**7 ft.**	**8 ft.**	**9 ft.**	**10 ft.**
	nW/cm2	**1314**	**999**	**778**	**620**	**504**	**417**
K pneumonia	Seconds	18	24	30	42	48	60
VRE	Seconds	30	36	42	54	66	78
MRSA	Minutes	1.2	1.6	2.1	2.6	3.2	3.8
C diff	Minutes	4.6	6	7.7	9.7	11.9	14.4
+	Distance	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
	nW/cm2	1314	999	778	620	504	417
K pneumonia	Seconds	18	24	30	42	48	60
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	nW/cm2	1314	999	778	620	504	417
K pneumonia	Seconds	18	24	30	42	48	60
VRE	Seconds	30	36	42	54	66	78
MRSA	Minutes	1.2	1.6	2.1	2.6	3.2	3.8
C diff	Minutes	4.6	6	7.7	9.7	11.9	14.4

Alternate building materials set to pave the way for the future of healthcare infrastructure

Sudeep Kolte, Vice President-Sales and Marketing, Saint-Gobain India-Gyproc business explains the scope for green and affordable products in the market that could be long term solutions to planning spaces for today and tomorrow

The COVID-19 pandemic placed unprecedented strain on India's public healthcare infrastructure, highlighting the importance of urban design to accommodate the increasing demand for healthcare services during such times of crisis. Limited infrastructure in both, the first and second waves of the virus, left us with the critical gap to bridge between the need and the availability of efficient infrastructure. While a lot of pandemic-infused shifts are already gradually progressing, the evolutions in the healthcare sector, particularly hospital infrastructure, have been taking shape at an expedited pace amidst the pandemic and even now as the world recovers. In the last year and a half, advancements from the western world have been inspiring design, tech and material shifts across hospital chains- big and small, across metros and smaller regions in the country.

Remodelling spaces with solution that promise long-term care

If we were to analyse these shifts, some prominent ones would be going from single speciality to multi-specialities, temporary or make-shift setups for short-term needs, opting for sustainable, modular designs and building materials that maximise safety and health control. Isolation zones are just one of the factors. Doffing units increased space for social distancing, and hygiene spaces are all aspects demanding several infrastructural adjustments as a result of the pandemic. All of this is within the existing, limited space available. While expanding hospital space could be an option, in time-bound situations that require immediate response, solutions that help with minimal resources, are quick in the application and are also sustainable serve ideal results. The building materials industry in fact has been ahead of its time in bringing to the market such solutions, however, the adoption and demand thus far were slow and gradual. The COVID-19 pandemic became a catalyst in helping various industries realise the scope for green and affordable products in the market that could be long term solutions to planning spaces for today and tomorrow. One such solution that proved to be a game changer in addressing the need for faster construction of healthcare infrastructure across the country was the drywalls technology. With focus on patient centric design, that helps reduce healing time and increasing staff productivity, designers and healthcare clients are looking for solutions that provide superior acoustic comfort and help maintain good indoor air quality. This is where Drywalls fits the bill since it provides superior acoustic comfort for the patients and staff. Drywalls are also an apt solution for evolving hospital designs that needed immediate remodeling. Also, when it comes to Acoustic comfort not just with respect to sound insulation, but also sound absorption. Post-COVID, hospitals are very particular about adopting materials that are easy to clean and maintain. Design experts are integrating construction materials that don't gather microorganisms on the surface, such as mould and termites. Ceiling's solutions these days incorporate this aspect of health and hygiene. Even in damp regions, ceiling tiles such as Gyprex tiles and Ecophon Hygiene range have gained widespread adoption for these reasons.

Practical benefits

Another element that encourages the adoption of alternative materials in the industry is the flexibility required in terms of turnaround time and on-site labour. Drywall building, in contrast to traditional methods, is faster and requires less manpower, making itself ideal for application across hospital infrastructure and other industries too. For instance, in Surat, Saint-Gobain Gyproc was able to remodel a 600-bed hospital covering 5,000 square feet over eight levels, in just 17 days using the drywall technology. In conventional ways, this would have taken much longer. This was rather speedy, creating new spaces within existing infrastructure, however, with less labour on the ground and lower costs. Aiding to the benefits, drywalls are also renowned as one of the most environment friendly options, with features like low water usage saving almost 99 percent of water. Made from recycled materials, the solution also contributes to LEED, IGBC, and GRIHA rating points. Gypsum drywalls are helping builders and architects meet green construction goals related to the transportation, manufacturing, recycling, and disposal of building materials because of their low carbon footprint and wide availability. Hence, becoming a popular choice of alternative for environment-friendly buildings at large.

To summarise, when looking at the future of healthcare infrastructure the need of the hour is access and penetrated reach in the country. However, the solution doesn't rest in makeshift setups or rushed infrastructure. Expanding hospitals through designs that are agile, healthy, safe and most importantly sustainable will serve long-term benefits to the country. As India looks at converting more micro hubs to smart cities, the focus on meeting green code standards will signify the growth from these regions. Of course, as an industry that is consistently innovating for lasting solutions, ensuring the rightful application, reach and availability will be crucial. Furthermore, advocating the understanding of alternatives and how its benefit could reach industries, sectors, experts and eventually the larger public. As we trace this journey of recovery and constructing healthcare for the future, this will be the turning point to see the awaited shift in the sector that meets the need of the nation.

The entire healthcare ecosystem has to work collectively towards sustainability

Sameer Mehta, Director of Projects, HOSMAC highlights the important parameters to achieve sustainability in Indian healthcare system

Healthcare is becoming increasingly expensive by the day. From a patient's perspective, sustainability is about affordability. How much is enough? A tough one to answer - but gives us a perspective of what is or is not affordable. Accessibility & affordability are among the key evaluation criteria for healthcare today. This is despite the fact that we operate at a fraction of the costs that one sees in the developed economies - purchase power parity accounted for. And yet, it is true that healthcare costs are beyond the means of most - there are incidents galore of families forced to liquidate their assets. So, the key to affordability is insurance.

At the beginning of 2018, 29 per cent of households had at least one member covered under health insurance or health scheme. And with Ayushman Bharat, the reach has expanded to over 60 per cent in what is possibly the world's largest healthcare initiative by volumes. With insurance taking centre-stage, we have three distinct players emerging - the provider (hospital), the payer (insurance) and the patient. With insurance commanding volumes to the point of dictating prices, it is the hospital that will be contending with the double whammy of price-caps and delivery cost pressures. The inevitable fall out is likely to be an underserved patient that will be pushed out of the system earlier than possibly warranted. There is therefore a very strong impetus for integration of the common objective - better health outcomes, lower medical costs.

> Technology is commonly perceived to be all about the latest. But this is not necessarily true for medical equipment. There is often this impetus to keep up with the Joneses pushing owners towards technology that is clinically not warranted

Sustainability cannot be sustained in isolation. The entire healthcare ecosystem has to work collectively towards sustainability. So, while there are significant pressures from insurance companies to cut costs, is there something we can do as planners & designers to make this objective a little more achievable? We bring to the table some of the pointers that we at HOSMAC have identified & adopted.

1. Elevations are not merely about elevating the look & feel: The façade plan is necessarily a function of solar radiation analysis. While orienting a building may not always be a choice, planning the skin is. A 150 bed hospital in North East secured a saving of 60 TR (air-conditioning load) by way of providing cavity walls. This improves the bottom-line by over INR 35 L every year.

2. Planning to optimise manpower: This can turn out to be a hidden cost that tends to be invisible at design stage. Therefore, locating & positioning staff stations that allows rationalising human resources becomes an important measure of optimising costs. To cite an example, we strive to plan one nurse station for every set of 24 - 30 beds. The nurse station is located so that the staff traverse does not need to exceed 30 m. Where this is not done or not feasible, additional staff base is called for and adds to both resource costs and administrative efforts. In a 100 bed hospital, this could potentially save 20 L per year.

3. Low-maintenance surfaces: Paint is seen as an economical option for internal wall surfaces. However, the best of paints needs a fresh coat every two years or so. Providing for wall surfaces such as vinyls / PVC sheets / tiled dados may marginally add to the capital costs - but saves on both downtime (period for which the space is not available) and redo costs.

4. Technology is commonly perceived to be all about the latest. But this is not necessarily true for medical equipment. There is often this impetus to keep up with the Joneses pushing owners towards technology that is clinically not warranted. A very apparent example would be capital intensive radiology equipment such as CT Scanners and MRIs. We know of some who have opted for high-end technology simply because some other facility in the vicinity had it and the public at large would perceive them as lesser if they did not match up. The cost differential between 1.5 T and 3.0 T alone could be in the vicinity of INR 300 L. Will the facility attract more patients simply because it offers a 3 T? May be, may be not. However, the average cost per scan goes up by approx. INR 750/-. Sure, if there is a clinical indication, 3 T it is - if not, the 1.5 T workhorse is just fine! A good biomedical engineer should be able to help determine the right technology.

5. A common statistic going around is that of 17,00,000 HAI cases in the US that went critical, of which 99,000 did not survive. We are four times the population - and even a conservative extrapolation implies more than 100 lives being lost every day in hospitals in India. Among the causes, airborne infection is one that can be controlled by way of appropriate HVAC design and maintenance. Adaptive cooling in non-critical spaces and set-back modes in critical spaces such as operating rooms can effectively curb the significant air-conditioning energy costs. This will encourage the operations team to maintain the system instead of switching off the fresh air intakes and sometimes, altogether the air handling units. This not only helps maintain optimal IAQ but with appropriate studies, can also influence the antibiotic policies of a hospital.

These are not very difficult and we encourage the readers to try & implement these towards a more sustainable format.

Strengthening rural critical healthcare infrastructure: Crucial in reducing the national burden of disease

Dr Ashwin Naik, Co-Founder, Mission ICU highlights the key factors that, when considered, will help build a robust rural healthcare infrastructure

Even as the world grapples in the aftermath of the raging pandemic that has disrupted the global economies and impacted the lives of millions around the world, the fear of a potential third wave is already looming large. The global pandemic has been an eye opener that reinforces the fact that disease and death do not differentiate between rich-poor or rural-urban dichotomies. However, the divide has been made contrastingly apparent by the visible dearth and underpreparedness of the rural critical healthcare infrastructure in the country. Afterall, 65-68 per cent of India's population is still living in rural areas.

According to a recent report published by National Center for Biotechnology Information, there is a shortfall in health facilities: 18per cent at the subcentre level, 22 per cent at the primary healthcare centre level, and 30 per cent at the community health centre level (as of March 2018). Although these numbers have steadily grown over the years, rural India has still had 3.2 government hospital beds per 10,000 people. Hence it is extremely crucial to systematically build the capacity of existing rural critical healthcare facilities in these areas. Some key factors that, when considered, will help build a robust rural healthcare infrastructure, include:

Reduced burden on urban health infrastructure

Currently, a majority of disease burden, both for the pandemic as well as for other critical illnesses, is falling largely on the shoulders of the already densely populated urban healthcare facilities. Rural areas are still struggling with just basic primary healthcare facilities and clinics, which poses a great threat of overburdening on critical healthcare facilities in urban areas where patients generally rush to. Building new critical care establishments or makeshift ICUs from scratch that will cover rural India in its entirety is a long-term affair and a herculean task. Creating essential, functional and effective healthcare infrastructure in the rural areas, can help reduce this burden on urban centers while also helping uplift the existing facilities to better cater to the population in the vicinity. This can include increasing the capacity and potency of existing hospitals that are being used continuously rather than parachute medical equipment in a vacuum that may go unused.

> While strengthening the rural healthcare infrastructure might, at first, seem like a daunting investment, in the long run, it helps reduce overall healthcare spends, optimises resources and reduces the overall consolidated burden of disease

Faster and effective containment of disease

Another vital benefit of strengthening rural healthcare infrastructure, is the quintessential containment of virulent and other infectious diseases. Every time patients in rural areas are faced by a disease, the lack of adequate infrastructure makes it difficult to accurately diagnose and treat them, forcing patients to rush towards urban cities for help. In the process, unaware about the gravity of his disease, a patient becomes a carrier of the infection, spreading it to unsuspecting people around him, while he tries to reach a well-equipped urban healthcare facility to get himself treated. Having adequately equipped hospitals and healthcare centers in rural areas helps timely diagnosis and treatment of the primary patient and in turn, helps in nipping the spread at the bud - something that could be a life saver in case of fatal diseases like the COVID-19 pandemic.

Optimisation of cost, resources and effort

While strengthening the rural healthcare infrastructure might, at first, seem like a daunting investment, in the long run, it helps reduce overall healthcare spends, optimises resources and reduces the overall consolidated burden of disease. By timely and accurate diagnosis, patients can be treated effectively and faster, thereby reducing the disease progression and need for advanced medical treatments. Having access to quality healthcare in the vicinity, helps limit migration of patients from rural to urban areas, thereby reducing the cost and risks of transportation. Lastly, with the timely management of disease, the cost and effort of treatment are effectively optimized, as against the humongous bills otherwise generated due to late or inaccurate diagnosis, late prognosis or inefficient handling of the patient.

Easy implementation of healthcare technology

With the fast paced digital adoption in healthcare that was accelerated due to COVID, modern hospitals and healthcare centers are increasingly turning to tech enabled solutions for hospital management, diagnosis, and capturing and analysing patient data. Electronic Data collection is set to be the new benchmark for holistic healthcare across the country, which is currently being restricted to only urban facilities, as they have access to relevant technology infrastructure. Building a robust healthcare facility in rural areas will enable these health technology features to also be available to these areas, making it a larger part of the national health technology system. Data capture and analytics has already played a major role in the ongoing vaccination drive as well as in predicting and preparing for the pandemic, keeping a tab on the changing symptoms etc., and focusing on building rural healthcare infrastructure can become vital for gaining access to critical health data in the hinterlands.

In line with the above factors, it is extremely vital to relentlessly keep building a robust and sustainable rural critical health infrastructure. The best way is to keep on adding ICU facilities, train the manpower and fulfil the gap in terms of non-availability of beds, oxygen concentrators and oxygen generation plants. This should be an ongoing priority, a commitment that we must look to fulfill even after we overcome the COVID-19 pandemic or even if we completely escape the third wave.

A solutions-based approach to healthcare in India

Sachin Grover, Head of solutions, Philips Indian Subcontinent highlights the importance of adopting a solutions-based approach to healthcare wherein healthcare facilities and medical device OEMs partner with each other to provide better clinical outcomes

Over the last 25 years, Indian healthcare has evolved, and much progress has been made. Infant and maternal mortality rates have gone down, life expectancy has gone up and we have also seen an increase in penetration of healthcare services across the country. Flagship schemes like Ayushman Bharat, Janani Shishu Suraksha Karyakram and National Health Mission (formerly, National Rural Health Mission) among others have made significant contributions towards improving healthcare in India. The private sector too has played a vital role towards of this improvement. The sector's ability to be cognizant of the needs of the population and its capabilities in deploying and scaling up innovations make it a powerful ally to the Government of India in its mission to provide comprehensive healthcare access to citizens of the country.

One of the greatest benefits of a partnership approach, is that there can be an early-stage partnership between the healthcare provider and the OEM. This enables proper planning and deployment of healthcare solutions to maximise productivity, lower costs, improve outcomes and increase patient and care giver satisfaction

Partnership based model of healthcare

Let us take a step back to see how private organisations have been delivering care in the country. In the last 25 years, the Indian private health sector has blossomed and emerged as the much-needed care provider for the country's citizens. It has also been a partner to the government in its mission to extend the reach of healthcare in the country. Investments have been made and the quality of healthcare has been vastly improved. Level of clinical excellence being delivered in the country is similar, if not better, to the western world. Clinical outcomes have seen a continuous improving trend and both patients and care givers are satisfied.

However, much needs to be done. If the private sector is to adequately support the government in the fulfillment of its healthcare mission, it must explore models and ways of working that will greatly improve efficiency and outcomes. Adopting a partnership model in areas that are non-core to the healthcare providers can be one such approach. Till now the healthcare providers have got into service agreements in housekeeping, security and cooking services and going forward should look at extending the scope and exploring service contracts in other non-core areas as well, for example, in medical equipment planning and maintenance. This will mean that healthcare providers will receive products and services bundled together from the OEM. Through this approach the OEMs will offer strategic support and improved services towards solving healthcare provider challenges in an end-to-end manner.

Why does such an approach work?

One of the greatest benefits of a partnership approach, is that there can be an early-stage partnership between the healthcare provider and the OEM. This enables proper planning and deployment of healthcare solutions to maximise productivity, lower costs, improve outcomes and increase patient and care giver satisfaction. The modules deployed will also be scalable and modular to enable future improvements, expansion and capabilities. This is not possible with a transactional approach where the OEM is required to provide a product at a random moment in the lifecycle of a process.

Let us look at this approach with an example of a radiology department.

In radiology, it is often believed that the job of a radiology equipment is to just acquire a high-quality image to be examined by the radiologist. Expectations from OEMs were restricted to provide a suitable equipment that can take the best quality images. While that was the original scope for OEMs, today there are opportunities for broadening the scope. Healthcare providers can get into strategic partnerships with OEMs to not only provide the best-in-class equipment but also plan for future by mapping technology on a regular basis, offer operations improvement ideas to increase throughput in radiology, regularly train staff to ensure optimum utilisation of the equipment, etc. Similar approaches can be deployed in other fields like oncology, cardiology, and critical care, to name a few.

COVID-19 and new approaches to healthcare

Every generation witnesses a difficult moment or event that drastically alters its thinking and approaches to challenges. SARS-CoV-2 outbreak was one such black swan moment. The country's citizens suffered immensely, and our healthcare infrastructure was swamped by a sudden deluge of COVID -19 patients.

At the same time, COVID-19 accelerated acceptance of digital approaches to healthcare delivery. It would not be an exaggeration to state that the acceptability levels of digital medium, that were achieved, amongst patients and doctors, in one year, would have been otherwise achieved in 10 years! Care moved closer to people and geographic distances no longer presented an obstacle. As medical tourism, both international and domestic, collapsed and people moved less due to restrictions, we saw a rising acceptance for telemedicine. Large healthcare providers also started establishing presence in smaller towns. This led to citizens in tier 3 towns being able to access care by visiting local healthcare facilities where they could avail of expert advice from physicians in the metros through digital means. To enable this rapid adoption of digital medium, healthcare practitioners partnered with technology providers to provide the necessary backbone.

As a country with a bright future, we can only work towards ensuring better access to care for our citizens. As the government and private sector work towards realising this goal, a partnership-based approach to healthcare will greatly improve outcomes while ushering in efficiencies and cost savings. This will undoubtedly have a multiplier effect on care delivery and in the process greatly contribute to the better health of all India's citizens.

INTERVIEW

There is a dire need of digitisation of healthcare services in an emerging economy like India

Sandeep Gudibanda, CEO and Co-Founder, HealthPlix in an interaction with **Kalyani Sharma** talks about the scale of technology in Indian healthcare system and highlights its adoption in the country

> Advanced digital technologies like AI and ML have the capabilities to prevent as well as detect diseases by capturing and analysing various vitals of patients. In addition, research has shown that deep learning algorithms provide insights to clinicians in predicting prognosis and future events in patients. This is where technology has been key in not just delivering superior patient care but also provide life-saving treatments, faster than ever before

Walk us through the journey of HealthPlix in India so far?
We have had an exciting journey since the inception in 2014. We envision to be the digital foundation that co-creates, facilitates, and powers tomorrow's digital healthcare infrastructure needs in the country.

When we started our journey, we were only serving 35 doctors in covering general physicians and a handful of diabetologists and endocrinologists. Today, we have digitally empowered over 6000 doctors practicing across 16 specialities.

Our doctor base and network spans across 370+ cities in India making it the largest EMR software used by doctors to digitize the care in Indian healthcare. We have served over 1.2 crore distinct patient profiles till date. Currently 15+ million patients across India have been treated through HealthPlix EMR and over 6 lakhs new patient profiles have been added every month in 2021.

Can you throw some light on the scale of technology being used in the Indian healthcare system and how much is still needed?
As the impact of COVID-19 lingers on, digitising India's healthcare ecosystem continues to be a requisite to create an integrated health system for years to come. The launch of Ayushman Bharat Health Mission by Government of India is a step in this direction to help create a digital infrastructure for public and private enterprises, providing doctors the access to patient health records. With this, we would be able to build and scale new, innovative healthcare solutions, ensuring timely treatment and diagnosis.

Advanced digital technologies like AI and ML have the capabilities to prevent as well as detect diseases by capturing and analysing various vitals of patients. In addition, research has shown that deep learning algorithms provide insights to clinicians in predicting prognosis and future events in patients. This is where technology has been key in not just delivering superior patient care but also provide life-saving treatments, faster than ever before.

Healthcare sector presents a huge opportunity to leverage technology to improvise critical processes that today pose a challenge in the delivery of quality healthcare. These include reaching millions who are geographically spread across the country, providing a better and more accurate diagnosis, managing operations, and facilitating effective collaboration and dialogue between doctors and healthcare workers.

We, at HealthPlix, are passionate about serving the doctor community by leveraging cutting-edge technologies and making their practice, more efficient, scalable, and reliable. For example - our AI-powered EMR focuses on the needs of Indian doctors. The EMR learns from the usage patterns of the doctors, with an effective use of personalisation machine learning models and we learn from every keystroke that the doctor makes.

In the age of AI, there is a lot of buzz around data analysis. So far, healthtech innovation has not supported doctors in improving care and staying ahead of their competition. We are going one step further, by designing physician-facing intelligent dashboards to easily track the most important aspects of their patients' records with pre-defined algorithms

Our vision is to win doctor's confidence with digital tools that eliminate time-consuming tasks, deliver outstanding patient care, shorten wait times, and elevate in-clinic experience

What are your views on Pradhan Mantri Digital Health Mission (PM-DHM)?
The launch of Ayushman Bharat Digital Mission is set to transform our healthcare system. By enabling Digital HealthID for every citizen, doctors will have access to a longitudinal view of patient health records for better treatment and diagnosis. Availability of medical data in real time will reduce medical errors significantly and help avoid duplicate tests further reducing financial burden. At HealthPlix, we believe that every person should have access to affordable healthcare and with the onset of Ayushman Bharat Digital Mission, patients can have

remote access to specialist doctors and healthcare labs as healthcare delivery will become efficient in the months to come. There is a dire need of digitisation of healthcare services in an emerging economy like India.

Do you think the Indian healthcare industry is still recessive towards adoption of technology? What is the need of the hour in this direction?

Technology has led to techtonic shifts in the way healthcare has been delivered off late. It is a key driving force for advancements in the segment, right from prioritising remote care, implementing digital health technologies, and ensuring sustainable healthcare practices. And the outbreak of COVID-19, has only accelerated the adoption of digital tools, elevating access to proper care. With this, we feel adoption of electronic health records has the potential to drive improved care, reduce margin of errors, make healthcare cost effective and streamline clinical care processes to improve outcomes.

With doctors being the most influential decision-makers in healthcare, enabling them tech-assistants is the need of the hour. It is closely linked to providing a personalised healthcare. Based on the idea of establishing personalised dashboards for patients, building analytical tool that allows a doctor to monitor clinical KPIs in an interactive and dynamic manner is the way forward.

In a diverse country like ours, majority of healthcare happens in primary, secondary, and chronic health clinics and not just in hospitals, it is imperative to serve doctors with advanced decision-making digital tools. A single unified view of patient's insights has the potential to drive better health outcomes. The unified view gives the power in the hands of a doctor to determine patient risk level and categorise them for further treatment.

Digitals tools like EMR also opens many such avenues, allowing healthcare providers make informed and effective decisions.

What according to you are the major parameters in the creation of integrated digital health infrastructure?

Healthcare industry is currently witnessing the digitisation moment that happened to us in 2016 via demonetisation. Digitisation of industries is a herculean task as it calls for changes across the value stream, processes and end beneficiary.

COVID-19 induced need for digitization has made us realize the importance of "Technology" in healthcare. There is a spurt in digitisation across the board.

If there has been a common denominator to integrated digital healthcare, we all know it would be availability of 'data/health information'.

◆ It is the parameter when made available in the right context, time and place leads to a superlative interconnected healthcare environment.

◆ **Application of new age or frontier technologies:** Frontier technologies like AI/ML help elevate the experience of healthcare delivery and lead to the creation of scalable interconnected healthcare models of tomorrow.

◆ Hospitals and healthcare stakeholders have traditionally viewed HIMS as a cost center. Benefits of technology in driving patient outcomes, reduction in TAT, efficiencies in bed/resource management etc is beginning to be seen in a new Light only now. This change in mindset of healthcare service providers will be one of the biggest parameters in Connected Healthcare too.

◆ Med devices integration at patient level will happen, that is the easiest. But this data becoming available at the HCP level and at real time is crucial for the data loop to be valuable. Hence Doctors coming on EMRs is super imperative parameter

◆ **Understanding the need to manage and deal with personal health records:** Proactive participation by various stakeholders like doctors, patients etc in digitisation of healthcare delivery could go a long way in the creation of a true connected healthcare atmosphere

◆ **Standardisation and unification of health records:** In emerging economies like India where traditional practices need a digital push, it is imperative to bring ecosystem players together who currently are operating in silos. Connecting, unifying and standardising of health records should be considered right at design stage.

Having said the above, time has come where India will have to transform itself with the contribution from the medical community-the doctors. Every single contribution in digitizing healthcare information by doctors will lead to the creation of a solid bedrock foundation in the country.

In order to achieve the intended objectives of an interconnected healthcare it is equally important for healthcare practitioners to play the pivotal role of being the driving force for change

Share some details on the recent announcements from HealthPlix. What is the future of HealthPlix for the Indian market?

Our assistive-AI powered EMR Software has been our flagship product ever since 2014. Further we launched the Tele-consult module on HealthPlix EMR, and immediately saw major adoption by the doctors. More than 40 per cent of the doctors used the module more than once within one Month of launch. More than 80 per cent of the consults were follow-up consultations pointing to a strong affinity for known doctors. We also offer a mobile app for doctors called HealthPlix SPOT - wherein doctors can easily build a virtual clinic and do online consultations with their patients.

In a latest development we released "ROBIN - Doctor Insights Dashboard" - India's first AI-led insights dashboard. It is a doctor-facing user interface "designed to easily track the critical aspects of their patient visits with predefined algorithms and quick links to visual charts". It also serves as a digital outreach tool for various healthcare stakeholders including Pharma firms. With the introduction of ROBIN the ultimate AI Assistant to a Doctor, we are elevating the approach and change the way doctors carry out in-clinic activity. India is our priority market, and we aspire to build a digital healthcare stack that will power the end-to-end clinic and patient management for the doctors. Currently we are aiming to grow 8x in the next two years by expanding our team and adding more product depth. We have few exciting launches and updates in the pipelines. We foresee greater adoption and success for HealthPlix EMR in 2022.

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Role of Technology in Dental Healthcare

Dr Mohender Narula, Founder, MyDentalPlan highlights the role of technology in dental healthcare

New technological advancements have the potential to change the face of dentistry and make the trips to the dentist quicker, easier, less painful and more reliable. Just as technology has modified our homes, transformed our workplaces, modern developments may revolutionise the way people feel about going to the dentist. At the same time it can also help dental healthcare to grow by leaps and bounds and evolve significantly.

Better efficiency

With the help of digital solutions, dental clinics have been able to increase the efficiency of the service that it is providing to its customers. All the dental records can be stored with the help of automated clinic management software. This software also assists in an overall dental setup management. Every time the customer comes back, it is easy to access their records and have a complete history on the fingertips with just a click. These digital records can also be passed to other dentists in case the customer shifts cities or wants to visit another dentist at a later stage. Having all the charts and history at one place will enable better treatment for the industry and also faster resolution of the problems.

Augmented reality

The first thing that comes to mind in regards to augmented reality is video games. However, we are just beginning to discover the incredible implications of this technology in modern medicine. With the help of augmented reality it will be possible to explore a computer-generated image of a patient's mouth. Not only will it

come in handy to train the future dentists but also reduce the time that the patient spends on the chair.

Laser dentistry

One of the most important advances in dental technology is the development of laser dentistry. Lasers can make dental procedures less painful, faster, and can help improve and reduce healing times. Lasers also help patients by allowing for less invasive procedures. This would improve the time spent on each patient and enable dentists to be more productive.

Tele-dentistry

The dental care market in India has been highly unorganised and there are more than 80 per cent standalone clinics. Moreover it is also skewed towards the urban centre. There are more dentists in the metros and Tier 1 cities than found in other parts of the country. Due to this distribution a majority of the population in the country is unable to get access to quality treatment.

Tele-dentistry seeks to change that. With the help of technology more people will have access to quality dental treatment at the comfort of their homes. It will also enable the dentists to expand their horizons and reach more people from their clinics. Setting up a clinic is cost intensive and one has to keep in mind a lot of factors before investing in one. With Tele-dentistry picking pace, dentists will not have to invest as much and still be able to reach a greater number of patients.

Integration

Through the effective use of technology, it will be possible to iron out the operational challenges and integrate various healthcare providers.

The ability to integrate various healthcare providers eases out operational aspects as well which further brings down the efforts that used to go into making partners physically present. The seamless integration will ensure that the patients will be able to get access to various treatments under one umbrella.

Towards building a model digital healthcare system

Kazim Rizvi, Founder, The Dialogue and **Karthik Venkatesh**, Program Manager, The Dialogue shares their views on Ayushman Bharat Digital Mission and it's implementation

The stated objective of the Ayushman Bharat Digital Mission ("ABDM") is to make healthcare delivery efficient and universal. ABDM, which was formerly known as the National Digital Health Mission, was launched in September 2021. It aims to change the way healthcare is thought about in India.

The imaginaries of ABDM goes beyond a mere digitisation drive that allows for easy access to the patient records for the healthcare provider. It aims to bring multiple actors within the health ecosystem together and share information amongst all players for "integrated health care" delivery and universal coverage. It seeks to create Unique Health IDs, creates a list of healthcare professionals, facilities, longitudinal patient health records, and allow for consent-based data flows between stakeholders in a digital environment. The public digital infrastructure will be used by both public and private players, who will interact to deliver various healthcare services. While integrated healthcare systems have proven to be beneficial for improving health outcomes in countries such as the UK, there are many foundational questions that we must ask.

Kazim Rizvi, Founder, The Dialogue

In all policy documents relating to ABDM, the emphasis is laid on a user-centric approach, where the patient is in charge of their data and are often referred to as "owners" of data. The Personal Health Record is replete with all information relating to one's health, and it is then allowed to move swiftly between players for various relevant use-cases. The consent artefact of the patient determines the data flows within this ecosystem, as we are made to understand. However, research has shown from time and again that consent is not the best framework for allowing data flows. In some cases, the end-user (patient) is not always fully aware of their consent (due to legalese and complex language). In other cases, they are not able to accurately assess the risks involved in such flows. In the absence of overarching legislation that aims to bring systemic change and impose penalties for unlawful processing, the consent mechanism alone is not likely to yield favourable outcomes. We must ensure revocable, informed, free and outcome-based consent mechanisms.

It is also important to note how far we are in the digitisation journey within the fragmented healthcare space. In India, there are divisions based on- primary to tertiary health centres, private and public health institutions, urban and rural health centres, etc. In implementing the ABDM, it is crucial to remember that the first hurdle is shifting from a paper-based healthcare system to a digital model. We are bound to run into problems stemming from the digital divide, literacy, deficiency of personnel trained to lead this shift. Moreover, it is also crucial to consider all the legacy data that needs to be translated into a digital model for the effectiveness of the electronic health system.

As it stands, there is a vacuum in the laws that protect patients in case of any harm that patients incur from the system. The current laws around data protection are inadequate, and we have not finalised a data protection law yet. Health Data, which is considered "Sensitive Personal Information", is prone to many cyber threats, and we need to evolve a more holistic approach to cyber security. Once the data protection law is in place, adequate security frameworks can evolve that system's effectiveness in harmony with the enacted law. To provide adequate redress to grievances of the users of this system, a tiered structure of grievance redressal can be evolved. This will enhance the user trust in the system and improve feedback loops, which can help in iterating future changes.

Karthik Venkatesh, Program Manager, The Dialogue

> In large parts, the success of any govtech system depends on the attention given to community involvement and improved uptake of the system. Introducing tools and features that are user friendly and make the user experience better will go a long way in incentivising the users in using the system more

In large parts, the success of any govtech system depends on the attention given to community involvement and improved uptake of the system. Introducing tools and features that are user friendly and make the user experience better will go a long way in incentivising the users in using the system more. Engaging with communities and ensuring that they play a significant role in decision-making processes across the board is essential. This will build greater trust in the ecosystem, encourage adoption and minimise the risks of exclusion. In order to build genuinely responsive and accountable frameworks, community engagement must be institutionalised. Developing a participatory and inclusive approach would include conducting workshops, consultations and developing appropriate feedback loops.

Governance reforms would involve developing transparent and accountable structures to achieve universal coverage under the ABDM. This includes expressly laying down the functioning and limitations of the governing institutions and studying the relationships and interactions between multiple stakeholders. Oversight mechanisms must be established over the private players that are allowed to operate within the ecosystem to ensure accountability in handling sensitive patient data. Moreover, Standard Operating Procedures (SOPs) must be developed that consider the purposes of data sharing. When data is shared, detailed privacy audits and assessments must be done to ensure harms do not accrue to the end-user. Once prescribed, anonymisation standards will eventually have to be adopted by all entities charged with maintaining health data.

The potential of ABDM is undeniable; we have seen upticks in efficiency in healthcare outcomes from other jurisdictions post switching to a digital model. It makes interoperability a reality; it has the scope of addressing the capacity problems that we face in India regarding trained doctors, providing continuity of care for the patients with seamless transfer of their history wherever they travel, etc. As we implement ABDM, we must adopt a principled approach to building and iterating the system to drive innovation, enhance user trust, and create a model digital health system that can serve as an example to other countries.

Building a cyber-resilient healthcare organisation

Mark Brown, MD-Cybersecurity, Information and Resilience, British Standards Institution (BSI) talks about the immediacy of cybersecurity in primary healthcare

The COVID-19 pandemic demonstrated the crucial importance of a fully functional pharmaceutical and healthcare ecosystem. As many more staff work from home and the rapid adoption of remote consultations indicates a new era of telemedicine, many healthcare organisations around the world have been subjected to damaging cyber-attacks. These cyber-attacks have exposed the fragility of many healthcare networks and their ecosystems. With the changing landscape of the healthcare industry, from technological advancements, digitisation and complex regulations, organisations need to be resilient to adapt and embrace these changes. Effective information security and data privacy resilience is needed to ensure business security. Whilst the societal and organisational risks of cyber-attacks are high, some of the mitigation techniques can be reassuringly simple. Fear of complexity is no excuse.

Cybersecurity is the foundation of safe patient care, the reputation of the healthcare organisation, and the trust of patients in it. If the technology fails, the healthcare organisation could fail too

Why the immediacy of cybersecurity in primary healthcare?

COVID-19 has both increased the potential impact of a cyber-attack and increased the likelihood of it happening. With unprecedented demand on healthcare, the impact of service disruption caused by a cyber-attack can be devastating. Cybercriminals have tried to take full advantage of the pandemic with Interpol reporting a significant uptick in phishing and ransomware attacks during the pandemic with many attacks focused on primary healthcare organisations. Healthcare is particularly susceptible to phishing attacks with the aim of harvesting information, such as login details to systems that hold valuable data, or bank details. This information is often resold on the dark web for a fee. Healthcare data is more valuable to cybercriminals than any other data as it is permanent and not subject to easy changes. An average stolen data set is worth about £20 (US$25) per record; clinical data can be worth up to £100 (US$140) per record.

The adoption of remote and online working at speed has significantly increased the risk of employees using their personal devices, working in potentially less secure environments, and using unfamiliar technologies like teleconferencing for remote care provision. Sharing unsecured data and relying on potentially vulnerable information systems does expose gaps in cybersecurity which can be exploited by 'hackers'. Hackers can launch attacks with the intention of disrupting data and systems.

What could a cybersecurity breach mean for healthcare providers?

A breach of cybersecurity means criminals can access, freeze, manipulate and publish data. For a primary healthcare facility, this could include blocking access to email, online appointment booking and triage systems, patient records, staff rotas and contact details; manipulating or corrupting data, removing 'red flag' alerts from clinical records, changing test results or even publishing confidential clinical records.

In 2017, the UK National Health Service (NHS) was infected by ransomware, malicious software which froze clinicians' access to the data in what has been called the Wannacry attack. Affected users in primary and secondary care were unable to access patient records, online diagnostics, appointment booking systems or emails. The hacker issued a ransom demand, in an attempt to extort money to unlock the files. Primary and Secondary care serve as 'soft-targets' for such attacks and the attack caused great damage. Some hospitals and clinics had to temporarily close their admissions and cancel outpatient clinics, while inspecting, disinfecting, and restoring clean backups of hundreds of machines. Healthcare industry reports show that ransomware attacks have even been the cause of at least one death.

Mitigation of cybersecurity risks

Many of the risks outlined above can be managed by basic cyber-hygiene. While nothing can guarantee 100 per cent safety from an attack, following the basics of cyber hygiene can substantially reduce the risk. Good cybersecurity means applying layers of security measures in case one fails. By adopting a layered approach, organisations can make themselves a less attractive target to attackers and reduce the chance of an attack being successful.

◆ **Physical security**- Healthcare providers need to ensure the physical security of devices used to process or store sensitive information, such as laptops, tablets and smartphones. Users need to be educated to lock devices away securely when not in use. Removable devices such as USB memory drives should never be used to store clinical information. Staff should be discouraged from lending their device to others due to the risk of loss or infection of the device with malware.

◆ **Safe information storage** - Information stored on devices is protected, so if devices are lost or stolen, the information cannot be compromised. It is vital for organisations to check their devices encrypt data while at rest. Preemptive measures may need to include the ability to remotely 'wipe' data from devices, should they be lost or stolen. Healthcare organisations should implement real-time visibility of the devices people are using, so that they can spot anomalous activity early and if need be, respond to it remotely. Providers need to ensure that devices are updated as per the industry standard with antivirus and antimalware protection.

◆ **Safe use of information systems** - Healthcare providers need to ensure that a system's information is kept secure. Effective access controls, such as strong and regularly changed passwords with two-step authentication, are recommended. Education is also important in helping staff recognise phishing emails seeking access to information systems. Phishing is still a popular strategy for cybercriminals to try to breach your organisation and it is therefore important to educate staff on what an attack can look like by providing them with some training.

Cybersecurity is the foundation of safe patient care, the reputation of the healthcare organisation, and the trust of patients in it. If the technology fails, the healthcare organisation could fail too. In the face of a global pandemic, the huge strides made in recent times have allowed healthcare organisations globally to continue to function.

Protecting all aspects of healthcare information against theft, breaches or corruption will ensure that health services not only continue to function, but also succeed. Ensuring cybersecurity systems are in place, and staff are educated and supported to use them, is an essential part of today's healthcare management.

Upswing in rural vaccination: Thanks to sustained, 'out of the box' efforts

Pearl Tiwari, Director and CEO, Ambuja Cement Foundation highlights the vaccination drive in rural India and its implementation

There has been a marked increase in vaccination uptake in rural India over the last two months, as more vaccine becomes available and organisations on the ground 'think outside the box' to overcome the challenges that have stood in the way of a fully vaccinated nation.

Whilst some communities are resorting to gimmicks, such as 2-wheeler lotto's and free tomatoes, to lure villagers in for vaccination, dedicated development organisations are providing sustained education, awareness, logistical support, infrastructure and trained manpower to fill the gaps - collaborating with the government health bodies along the way. And it's working, with the rural share of daily vaccinations increasing from 50 per cent (in May 2021) to 70 per cent (September 2021).

Whilst the challenges have evolved over time, effective strategies have emerged which have helped provide a solution to the initial problems with rural vaccination. And whilst there is a long way to go as this increase is not even across the states, the work is so far, promising.

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Vaccine hesitancy tackled with campaigns & awareness

With widespread myths and rumours surrounding the vaccine, vaccine hesitancy was initially a major issue in rural communities. Widespread efforts to generate awareness and educate people have included door to door visits to educate families, use of loudspeaker messages, dissemination of IEC materials, creation and dissemination of local language videos/voice messages/messages, and use of banners, wall painting and hoardings to dispel fears. This has been effectively rolled out by harnessing the power of community leaders such as the Sarpanch or religious leaders, and volunteer health workers who, having been trained and empowered, have been key drivers of vaccine awareness in rural communities.

Logistical problems overcome with hand-holding support

Once the concerns and fears of villagers had been overcome, the next challenge that emerged was in terms of logistics and access. With a vast digital divide in rural India, villagers (particularly vulnerable populations like the elderly) struggled to register on the CoWIN app and required digital support for the registration process. And many required transportations support to physically access vaccination centres, with non-profits coming forward to fill these critical gaps and provide hand holding support.

Lack of infrastructure addressed with key donations & initiatives

Infrastructure in rural India is often ill-equipped and these already stressed services struggled to meet local needs in the height of the pandemic. Even during the vaccination phase, centres often required logistical support to support patients, including provision of shade/rain tents in summer and monsoon, drinking water stations and seating arrangements keeping social distancing protocol in mind. By effectively working in collaboration with local health authorities, NGOs have been able to make a marked difference in this area. Additionally, there has been a shortage of vaccine carrier boxes to transport vaccines to remote locations - the donation of these has been a key support to district health care departments.

Manpower shortages filled by COVID volunteers

During the second wave, the shortage of manpower emerged as a key issue, when health administrators were grappling for support in high-risk identification, skilled support in securing oxygen cylinders, concentrators, ventilators on one hand, and manpower on the other, to manage patients and vaccine beneficiaries. In an innovative move, onecorporate foundation developed a cadre of trained COVID-19 volunteers to offer support to local health administrations. Educated boys, girls, youth, farmers, women SHG members, and panchayat members who were willing to work voluntarily from their village were selected and underwent 5-day training - going forth to conduct door to door visits, provide awareness on corona virus, take temperatures and oxygen reading through oxymeter, use of thermal gun and mobilisation for vaccination. Additionally, the government has launched a Volunteer Scheme calling forth volunteers to help in the fight against COVID. Many villages have achieved 100per cent vaccination thanks to the success of programs like this.

With just 20per cent of Indians fully vaccinated, with approximately 70 per cent of the eligible population receiving at least one dose, there is a long way to go - particularly in rural areas where nearly 70 per cent of the population resides. However current efforts provide an optimistic outlook for the future of COVID19 vaccination and as long as people continue to work together - supporting the government and existing efforts - there is much hope for us all to see the back of the pandemic in the near future.

INTERVIEW

COVID might have caused a spurt in demand for health insurance, this is a drop in the ocean

Aniruddha Sen, Co-Founder, Kenko Health in an interaction with **Kalyani Sharma** talks about the healthcare insurance market in India and highlights the current challenges

> The current health insurance market in India is roughly $8bn. At this level, it covers around 3-4 per cent of the total health expenses in India, by value. This is perhaps the lowest penetration level in the world with several emerging markets being ahead both in terms of healthcare spends as a percentage of GDP as well as health insurance penetration amongst the population

Walk us through the journey of Kenko Health?
Kenko has been founded by two former health insurance folks. Dhiraj Goel is an actuary who has been working for various Insurance companies in India over the last 15+ years. Aniruddha Sen, an ISB alumnus, has spent well over a decade in health insurance leading digital roles. Together, these guys have invested well over a year in building Kenko from the ground up and have imbibed all of their experience and passion in the fabric of the company. A deep distaste for treating customers like numbers, an appreciation for the complexities of health insurance risk management and frugal innovation are some of the tenets that they have built this company on.

Start-ups these days are challenging institutions, businesses and age-old industries at a progressively faster pace. Most of the time, they provide early adopters with financial savings, tech-driven convenience and a vastly superior consumer experience. Therefore, it was only a matter of time someone challenged the status quo in health insurance - a sector untouched globally for over a century.

By keeping things lean, costs low and inefficiencies at near-zero, the team at Kenko are attempting to bring in revolutionary low prices. Kenko has been built with the personal funds of this duo and, therefore, is as much their vision of a better healthcare system as it is an attempt to disrupt archaic business practices that just don't work anymore.

Financial and risk management being at the core, Kenko sets aside an amount of money equal to its revenue, solely for the purpose of delivering customer benefits. This is then rebalanced every quarter to make sure the team has enough funds set aside.

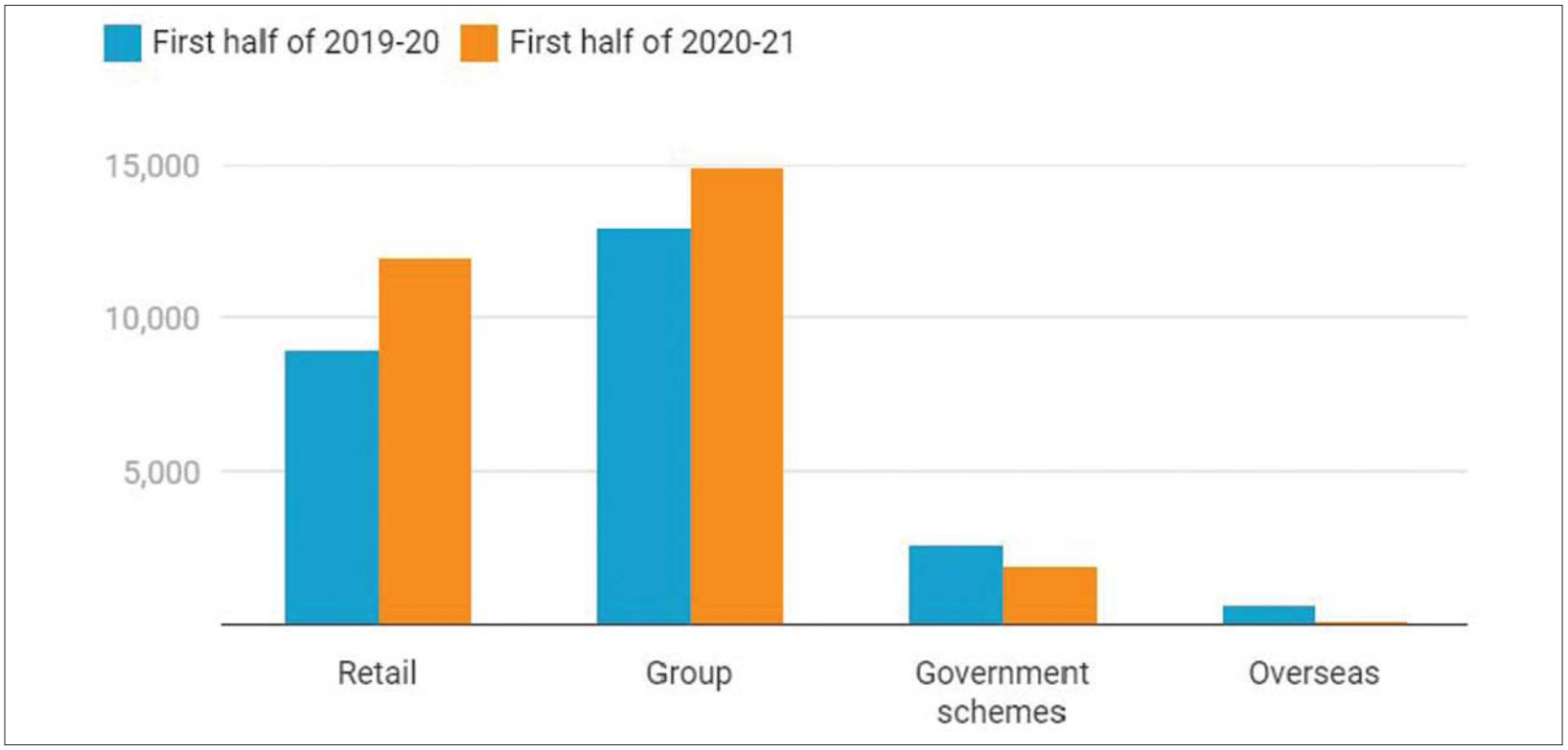
Kenko is a challenger brand in an under penetrated category which is cluttered with large players who over-promise and under-deliver. Hence, leaving a negative experience and a bad taste with the customer to never consider health insurance again.

Kenko Health plans are available as easy monthly subscriptions and they cover OPD as well as Hospital expenses at pocket-friendly prices. Customers choose the plan that is best suited for the size of family and life stage and proceed to get a Kenko Score which gives them an objective rating of their health and personal finance. This is based on over 40 parameters and the questions are super easy to answer. The whole process is online, automated and takes no more than 4-5 mins. Once done, customers get their personal Kenko scores ranging from 0-1000. A minimum of 700 is required to qualify for a Kenko plan. If eligible, the customer makes the first month's payment and also provides an e-mandate for future payments. Kenko organises a medical test for the customer which is done at the convenience of their home. The results are made available within 24 hours and the score is recalibrated automatically. If the Kenko score is still 700+, then the plan is activated and the account unlocked. This entire process is fully automated and takes no more than a day or two to complete.

Can you throw some light on the current healthcare insurance market scenario in India?
The current health insurance market in India is roughly $8bn. At this level, it covers around 3-4 per cent of the total health expenses in India, by value. This is perhaps the lowest penetration level in the world with several emerging markets being ahead both in terms of healthcare spends as a percentage of GDP as well as health insurance penetration amongst the population. There are approximately 28 general insurance and specialised health insurance companies that are licensed to offer health insurance plans. However, only about 6-7 have made any serious attempts. For the rest, health insurance is a smaller line of business amongst others such as motor, corporate liability, fire, marine, theft etc.

Can you highlight the pre & post-COVID scenario of the healthcare insurance market in India?
The prospect of hospitalisation due to COVID-

AS A RESULT, THE SHARE OF INDIVIDUAL POLICIES IN THE HEALTH PREMIUM PIE INCREASED FROM 36 PER CENT TO 41 PER CENT



Source: General Insurance Council

19, and high medical costs in private hospitals have driven more Indians to sign up for health insurance. In the six-month period from April to September 2020, health insurance became the most valuable segment for non-life insurers in terms of premiums collected, leapfrogging motor insurance. This is happened for the first time since the industry was thrown open to private players about 20 years ago. Historically, health premiums have been driven by 'group policies', or organisations buying an umbrella cover for their employees.

In the post-pandemic phase, the momentum came from individuals buying policies. Premiums paid on individual policies increased by 34 per cent in the Apr-Sep 2020 period compared to the year-ago period, against 16 per cent on group policies.

While COVID might have caused a spurt in demand for health insurance, this is a drop in the ocean. Results from the last National Sample Survey (NSS) study on health expenditures, conducted between July 2017 and June 2018, show that about 86 per cent of individuals in rural areas and 81 per cent in urban areas had no health cover. That's about 1,135 million Indians.

The prospect of hospitalisation due to COVID-19, and high medical costs in private hospitals have driven more Indians to sign up for health insurance. In the six-month period from April to September 2020, health insurance became the most valuable segment for non-life insurers in terms of premiums collected, leapfrogging motor insurance

Do you think there are still some challenges and gaps that need to be filled? What sort of changes at the policy level are required for better strengthening of the market?

There are many challenges that hamper progress. The healthcare infrastructure beyond tier 1 cities isn't great, most hospitals don't have a Hospital Information System (HIS) that can be integrated with. There is no central repository of medical records that is reliable although NDHM is working towards it. Insurance companies don't have much incentive for innovation and it is difficult for non-insurance folks to start a venture in this space and get a manufacturing licence from the regulator. Until we get fresh blood into the sector with no baggage of legacy, insurance is likely to remain muted in terms of breakthrough innovation.

Some policy level changes that are required are: divestment of all PSU's both in General Insurance (GI) as well as Reinsurance, risk-based capital adequacy guidelines, 100 per cent FDI limit, licence for small insurance companies with lower capital requirements and not from large business houses, mandatory integration with NDHM's registry, at least 10-12 more GI and small licenses should be issued.

What is the need of the hour as far as 'Accessibility & Availability' of healthcare in India is concerned?

We need the universal health ID scheme to be scaled fast, a uniform system for closed insurance networks of doctors, clinics, hospitals etc., broadband and 5G penetration for adoption of tele-consults, e-pharma services and even remote diagnostics. We also need drastic drops in cost for sensors that aid in diagnostics such as Continuous Glucose Monitoring (CGM's) etc.

Please highlight the future plans of the company? Any new partnership or collaboration in the pipeline?

We are constantly exploring partnerships in distribution, product enhancement, OPD services, Computer Vision / AI capabilities and more. Some of the ones we have recently forged are with ImpactGuru for crowd sourcing in case of very large medical bills, Sova.Health which is a diet and nutrition management platform, Sabka Dentist for dental coverage, Nova Benefits - an employee benefits platform, Medulance - an emergency services provider. Many more partnerships are in the pipeline across sectors from elder care to neobanking.

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INTERVIEW

The pandemic has now made us accept the fact that airborne infections are a stark reality

Dr Rajvi Mehta, Microbiologist and Scientific Consultant, Trivector Biomed in an interaction with ***Express Healthcare*** talks about airborne infections in hospitals amidst the pandemic and technological advancements in controlling the same

> Many air-purification technologies like HVAC, UVGI, bipolar ionisation, chemical sterilisation is in use for a few decades and some new solutions like cold-plasma air-disinfection are being effectively used. This pandemic has made us open to accepting the existence of airborne infections in hospitals. This is a positive step

How medical technology has evolved and is innovating to control airborne infections in hospitals amidst the pandemic?

Hospital Acquired Infections (HAIs) are an unfortunate reality. There are professional societies like the Healthcare Infection Society in the UK and Hospital Infection Society in India. However, for the longest period of time, one did not consider airborne infections could occur in well-maintained hospitals. Although there are scientific publications referring to airborne infections, most hospital administrators were under the impression that hospital-acquired infections were mainly through person to person or surfaces/equipment. And the focus was on hand and surface hygiene only. Even the Infection Control guidelines by the Center for Disease Control or the WHO or the ICMR/NABH hardly emphasised airborne infection control. I think that the pandemic has now made us accept the fact that airborne infections are a stark reality. Many air-purification technologies like HVAC, UVGI, bipolar ionisation, chemical sterilisation is in use for a few decades and some new solutions like cold-plasma air-disinfection are being effectively used. This pandemic has made us open to accepting the existence of airborne infections in hospitals. This is a positive step.

With the worldwide spread of COVID-19, the airborne infection has become a significant topic of conversation. How much help did the healthcare sector receive through technological advancement in controlling the spread so far?

Yes. It is true that the world became more sensitive to airborne infections and it is a topic of discussion among the common man as well as professionals. Wearing a mask is a simple example of understanding the spread of airborne infections. I hope that this sensitivity prevails and we work equally hard to control another airborne infection - tuberculosis. In 2019 alone, India recorded 24 lakh cases and 29000 deaths due to TB. Unfortunately, the infection manifests slowly and often go undetected. I sincerely hope that once the pandemic ends, we still keep our guard on for hospital-acquired infections.

Healthcare received the brunt of the pandemic. Not only were they overworked, exhausted but under tremendous stress too about their own safety - especially in the early phase of the pandemic. A report in May 2021 states that "at least" 115,000 health care workers died of COVID. We don't have the actual figures but many young promising lives were lost serving others!

Many organisations came forward to support the healthcare workers and hospitals in many different ways. For example, our organisation, Trivector had been a distributor of a unique disinfecting device called Novaerus NanoStrike for the past 5 years. This device contains plasma, the fourth state of matter, and anything that comes in contact with it gets completely destroyed to base molecules in nanoseconds. This plasma is contained within the device. When air containing microbes enters the device - the microbes are destroyed. We realised the high risk and stress experienced by the doctors and nurses in COVID wards and those collecting samples for the testing way back in May-June 2020. At that time, we had no experimental evidence that our technology would work against the SARS-COV2 virus although we had a lot of data and publications that it worked in controlling other hospital-acquired infections as well the microbiological load in healthcare settings. Logically, we knew it could help in the control of the spread of the COVID virus - as long as the air got sucked into the device - the plasma within the device did not differentiate between this virus or other bacteria or viruses. Trivector donated and installed a few units at various public hospitals treating COVID patients in Mumbai (Kasturba Hospital, St. George Hospital, Jumbo COVID Care center) and Ram Manohar Lohiya Hospital, New Delhi.

A bio-burden study of air samples was carried out in the COVID ICU of St. George Hospital. From the feedback received from the hospitals where NanoStrike air-disinfection devices were

installed - the microbial count indeed came down drastically and the spread of infection to health care workers was contained. Technological advancements, as well as humanity, thus surfaced during the pandemic.

There are traditional manual air purification devices available. However, newer disinfectants with no-touch decontamination and self-cleaning technologies are now favored as they improve air and surface disinfection in hospitals. What are your thoughts on this?
In my opinion, no-touch technology is always preferable especially in high-risk areas as well as around patients who are at a greater risk of getting infected.

The traditional air-purification like AHUs with HEPA filters, fumigation, UV Irradiation, Photocatalytic oxidation (PCO) and ionisation etc., have their limitations.

I think all hospitals have infection control specialists who along with the management are aware of the risks of hospital-acquired infections. But sometimes that is "hushed" or not spoken about. Possibly, they feel that if they do acknowledge the problem then patients and the management may question the services and competence of the infection control department. To me, that is the biggest problem

HVAC (AHUs) are not adequate in controlling infections, they are expensive to maintain and could pose a problem of colonisation of bacteria. UVGI, Ionisers, Oxidisers (PCO), etc., and chemical disinfectants cannot be used in patient-occupied rooms as they generate by-products that may affect the patients. Riding on the fear generated by COVID, many "Old" air purification devices were re-introduced in the market with unsubstantiated tall claims. One needs to be cautious as these devices may give a false sense of protection. The NanoStrike that I referred to earlier has been tested in experimental as well as clinical studies to drastically reduce the microbial count in the rooms. It is being used worldwide as it is easy to use and maintain, consumes less electricity, silent in operation.

Hospital Acquired Infections have long been a looming concern for hospital management. How do you advise them in tackling this issue as a microbiologist?
I think all hospitals have infection control specialists who along with the management are aware of the risks of hospital-acquired infections. But sometimes that is "hushed" or not spoken about. Possibly, they feel that if they do acknowledge the problem then patients and the management may question the services and competence of the infection control department. To me, that is the biggest problem.

Like, the risks from surgery or anaesthesia or some kinds of treatment are explained to the patient and if things do not go as expected patients don't blame the hospital. But, as far as hospital-acquired infections are concerned, patients and caregivers are in the dark. They are not even aware that the infection that they have got is from the hospital. In my opinion as a common person, this attitude has to change. Most hospitals and healthcare facilities do not acknowledge this reality and always feel that things are "fine". If this attitude is changed and 'acknowledge" a looming problem then one would be more open-minded to existing and newer solutions to reduce this threat to the patients.

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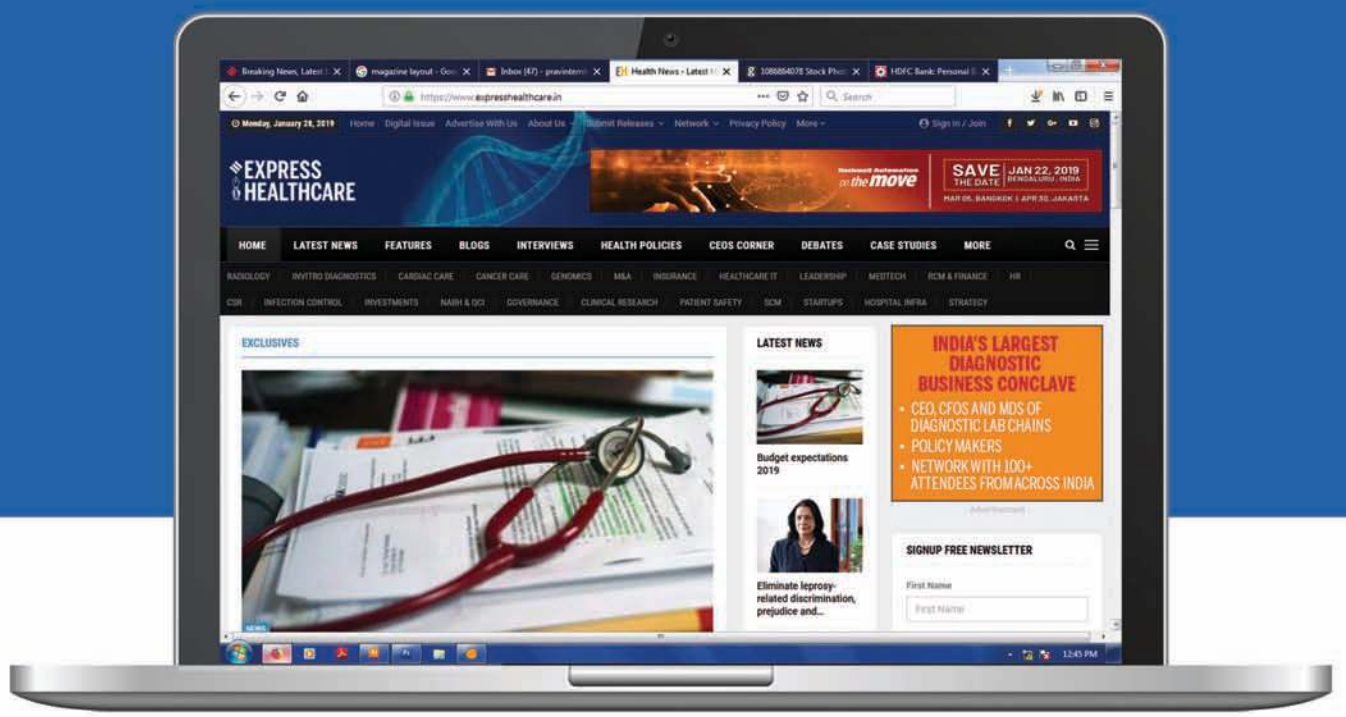

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INTERVIEW

Need for telemedicine equipment will inevitably increase in the future

As the COVID-19 pandemic accelerates the non-face-to-face trend, more and more people sympathise with the need for telemedicine. Although it is an issue that has now risen to the surface, experts predict that the need for telemedicine equipment will inevitably increase in the future. As a result, companies that develop and launch telemedicine equipment are getting more attracting attention than before. Bionet, which researches, develops, and manufactures telemedicine solutions and wireless medical solutions, also drew attention by achieving the highest performance even in the face of COVID-19. Bionet, localised ECG equipment in Korea first, has a 30% market share for ECG, patient monitors, and fetal monitors. These bio-signal devices are being exported to more than 30 countries around the world, and in particular, the patient monitors that can be applied for severe COVID-19 patients recorded high export performance during the pandemic. In addition, good reviews are also received for remote wireless monitoring to establish a telemedicine environment and wireless mobile ultrasound to respond to the medical environment transitioning from wired to wireless. **Steven Sangwon Minn**, CEO, Bionet in an interaction with ***Express Healthcare*** talks about implementation of consumer-oriented management to grow Bionet as a company that responds to the quickly changing medical environment

Under the complicated situation of COVID-19, you also launched new product plans and development. What kind of product have you launched?

Last August, we received manufacturing certification from the Ministry of Food and Drug Safety (KFDA) for five models of SonoMe, wireless mobile ultrasound scanners. It has been on sale in Korea since September and plans to release a total of 8 models, including three additional models, next year.

Mobile ultrasound products have already been released or are about to be released in Korea and abroad. We released "wireless" mobile ultrasound because the existing mobile ultrasound equipment is costly and works wired, so health care providers and patients must go through complicated procedures for diagnosis or treatment.

Due to the COVID-19 pandemic, a medical environment that enhances

> Due to the COVID-19 pandemic, a medical environment that enhances individual convenience, such as non-face-to-face treatment, is being built. The change from wired to wireless is also a way to improve this convenience. Wireless mobile ultrasound maximises usability and efficiency by using personal mobile devices, and at the same time, realises performance comparable to existing expensive cart-based ultrasound equipment

individual convenience, such as non-face-to-face treatment, is being built. The change from wired to wireless is also a way to improve this convenience. Wireless mobile ultrasound maximises usability and efficiency by using personal mobile devices, and at the same time, realises performance comparable to existing expensive cart-based ultrasound equipment.

Bionet's SonoMe has a higher image quality than other companies' equipment. The number of channels usually applied in the existing equipment is 128 channels, whereas SonoMe has 192 channels. The ultrasound image is clearer as the number of channels increases, advantageous for making clinical decisions

Several companies are launching wireless ultrasound. How is SonoMe differentiated?
Bionet's SonoMe has a higher image quality than other companies' equipment. The number of channels usually applied in the existing equipment is 128 channels, whereas SonoMe has 192 channels. The ultrasound image is clearer as the number of channels increases, advantageous for making clinical decisions.

In addition, the existing equipment usually has only two separate types, Linear and Convex, and SonoMe implemented a dual-head type by integrating the two types into one model. This one device can cover almost all clinical applications.

Compared to equipment manufactured by other companies, it is small in size and light in weight, minimising the fatigue of users who use it for a long time. We have already installed the equipment in many hospitals in Korea, and users have responded well.

We heard that you are preparing for remote medical services, which have emerged rapidly due to the COVID-19 crisis.
The need for remote and wireless medical services is recently recognized in Korea and abroad due to the COVID-19. Now, there is no alternative but to use a platform of personal wireless communication devices.

Globally, companies are already distributing these solutions, and individuals are aware of this need, so the market for wireless communication-based home care devices is increasing.

Most of the personal self-diagnosis devices still have reliability problems for use in hospitals. Many companies indeed enter the growing market only by looking at the growing demand in a situation where there is no clinical basis. In addition, start-ups equipped with the technology cannot commercialise in earnest due to difficulties in production facilities and certification.

Bionet's differentiated strength is a solid foundation in the medical field and has production facilities and specialized certification infrastructure. Based on that, we are preparing a solution that can be genuinely achievable. Our Remote Patient Monitoring (RPM) solutions' objective is to provide accurate monitoring service and transfer the monitoring data to the professional healthcare provider to connect patients and hospitals in real-time for the patients to receive an immediate response at a low cost. That way, our society can expand professional medical care before any critical symptom develops. At the same time, the more vulnerable patient groups can be brought into healthcare service saving lots of social costs.

What areas should you focus on to draw a positive future?
When I was doing business in the US, I realized that Korean medical manufacturers make high-quality products, but there are limitations in a marketing capacity. I came to Bionet thinking that we could create a global company by combining high-quality products and market-oriented strategies.

We are currently putting a tremendous amount of time and resources into understanding the market demands, especially our customers' needs. In other words, we would like to be a standard healthcare platform provider rather than a medical device manufacturer so that anyone who uses our platform can guarantee a healthier and happier life anytime, anywhere.

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This is why you should NOT be REUSING single-use syringes for your CT/ MRI injections systems

There are multiple reasons why single-use devices should be re-used with caution like cross-infection due to design and others. Bayer Syringes for MEDRAD® Injection Systems ensure optimal device performance, thereby enhancing patient safety

The problem

Automatic injectors are now commonly used in MDCT and MRI for intravenous contrast / saline administration. Considering the increasing volume of investigations, these are indispensable. Although it is very convenient to use the SAME syringe for multiple consecutive patients to save time and cut costs, it can be a potential source of infection. Multiple use of syringes is known to be associated with increased risk of infection, which is particularly important in sick patients. For example, a study conducted by Buerke et.al found that the first four samples of each simulation experiment were sterile, and the subsequent probes were found to be contaminated with typical dermal bacteria, such as staphylococci [1]. The use of a one-way valve too does not guarantee prevention of cross-contamination(1). as documented by Nandy et.al in their study published in the American Journal of Infection Control [2].

There are multiple reasons why single-use devices should be re-used[2] with caution. These include [3]:

◆ Single-use devices may not be designed to allow thorough decontamination.

◆ Reprocessing may alter device characteristics, and performance may be compromised as a result.

◆ Single-use devices do not undergo extensive testing validation and testing for reuse.

◆ Single-use devices may cause cross-infection due to design (for example, fine bores of tubes).

◆ Some materials can absorb certain chemicals, which can gradually leach from the material over time.

◆ Chemicals may corrode or change device materials.

◆ Device material may experience stress during reuse and may fail, stretch, or break.

◆ Inadequately cleaned equipment can carry bacterial endotoxins, which remain after bacteria are killed.

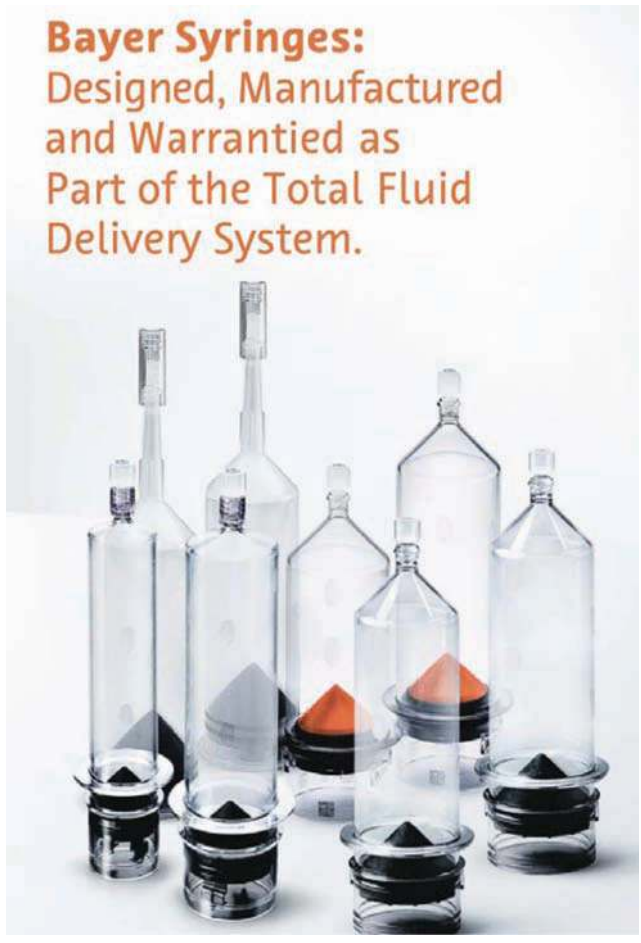
Owing to these, re-use of single use medical devices is banned in many countries including China, France and the UK [4].

The Solution

Buerke et. al in another study published in the American Journal of Radiology proved that single use prefilled contrast and saline syringes revealed no bacterial contamination as opposed to multiple use of conventional saline injection for patients which revealed contamination with coagulase negative staphylococci in two saline syringes (5). A simple analogy is that of reusing medical syringes and the increased incidence of infections often encountered in IV drug users. Although there is a far higher risk in IV drug abusers, cross contamination of contrast syringes does pose a potential health risk.

Hence, the re-use of single-use CT/ MRI injector syringes should be avoided. An important downside to this practice is loss of time efficiency due to the increased number of syringe changes required. However, Buerke et al. in the same study found that using the single-use protocol the time required for assembly of the automatic injection system to be only slightly longer (2.3 ffl 1.1 minutes) than that for the multiple-use protocol (2.0 ffl 1.4 minutes), which amounts to hardly a few seconds [5]. Use of prefilled syringes can help to cut down the time required for CT / MRI injections [5].

Bayer Syringes for MEDRAD® Injection Systems



These are manufactured in the United States facility, and so far, Bayer has supplied over 300 million syringes to 20,000 hospitals and imaging centres worldwide - testament to the quality and trust radiology professionals have placed in Bayer Syringes. Their goal is to continue providing syringes and disposables of the highest quality, so you can provide the best quality care to your patients.

Why choose Bayer syringes over other products?

◆ Quality

Bayer syringes are made according to strict quality and reliability controls at every step of the production process. Only Bayer Syringes and disposable products have been specifically designed, manufactured, and validated to work reliably with corresponding systems, this means your injector is ready to perform even the most demanding protocols.

◆ Designed for your MEDRAD® Injector

Bayer Syringes are designed, tested and warrantied as integral components for your Bayer MEDRAD® Injection Systems.

◆ Strict Vendor Qualification

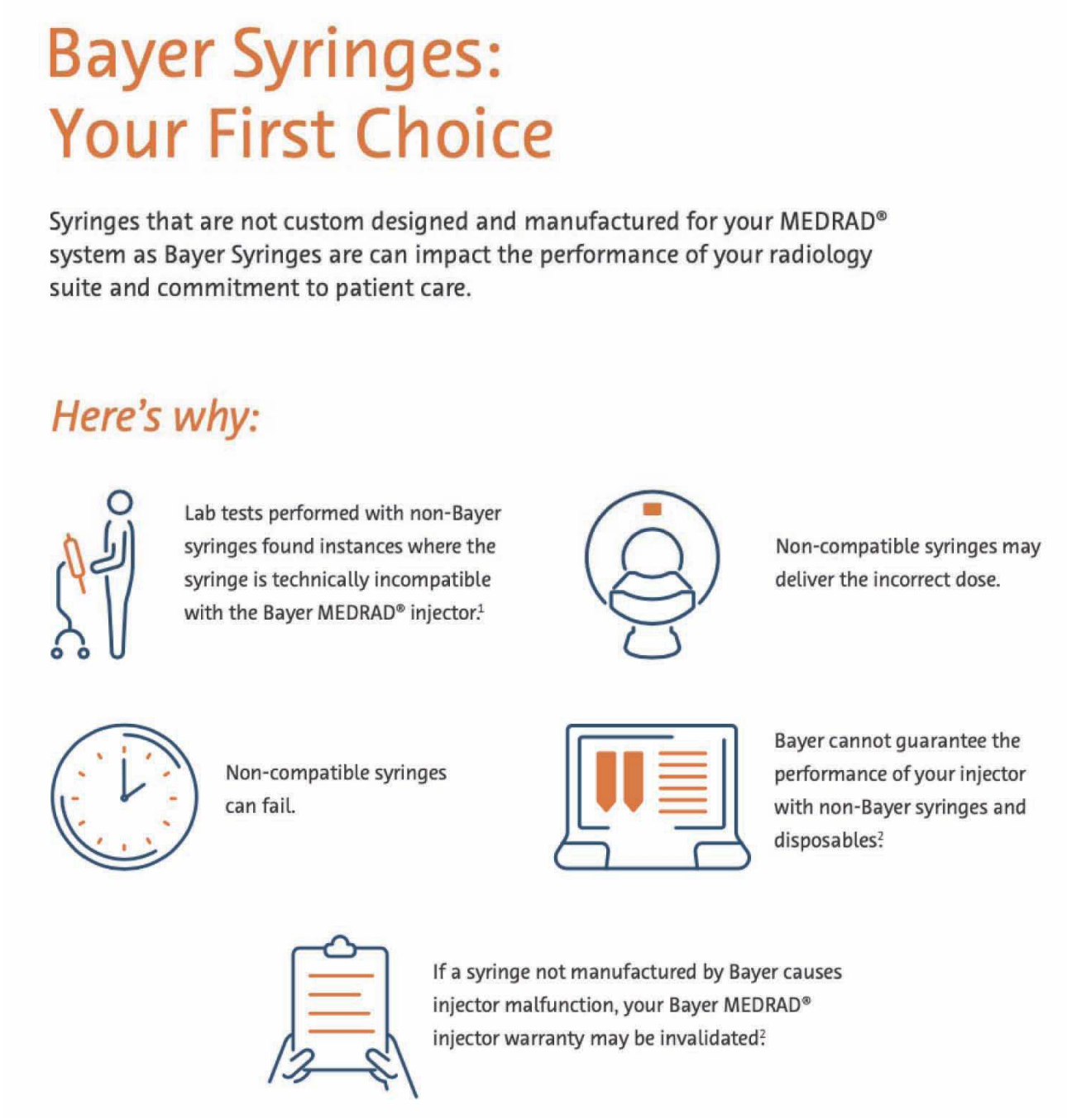
Each supplier has been carefully chosen, audited and certified to provide materials that completely adhere to our chemical composition and purity specifications.

◆ Precision Manufacturing

Our US-based manufacturing facility produces syringes to extremely tight tolerances. The volume of silicone coating inside the syringe barrel is precisely controlled. This facilitates optimal device performance and accurate fluid delivery.

◆ Robust Packaging

Every syringe package adheres to strict specifications and rigorous environmental



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and transportation simulation testing. This ensures your syringes arrive at your facility sterile and uncompromised.

◆ **Material choice**

Specific, medical-grade materials are selected via a strict vendor qualification process to ensure optimal injector performance and patient care. Bayer's development sourcing procedures adhere to internationally required biocompatibility standards, ensuring the safety profile of your syringes. Bayer thoroughly inspects each and every syringe barrel for particulates. That reduces patient risk and provides an additional level of patient safety.

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Point of care testing in critical care diagnosis

Thomas John, Managing Director, Agappe Diagnostics talks about point of care testing in critical care diagnosis

Point of care testing (POCT) & critical care diagnostic market in India

Intensive care products or critical care products are the segment of healthcare dealing with diagnosis & management of life-threatening conditions, demanding sophisticated organ support & invasive monitoring. Diagnostic equipments contribute substantially to this class along with catheters, ventilators, patient monitoring devices, I.V. disposables etc. Critical care supports patients with life-threatening injuries & diseases. It can be emergencies from surgery, accidents, infections, severe breathing problems.

Major advantage of the POCT is speed & shortening of clinical decision-making time, at any point of a therapy, when laboratory service is not proximate to perform detailed investigation instantly. If a patient goes to a hospital or to a physician at midnight with chest pain, first step for the doctor is to ask for a Troponin POC testing/ECG. This is most useful for clinicians in OP clinics or medium level hospitals, where the physician wants an instant decision on the immediate medication of the patient, esp. on temperature, cardiac functions, hypoglycaemia, acute anemia etc at odd hours. It's reported that the critical and chronic care products market is growing at a CAGR of 5.2% from 2018 to 2023.

Market awareness & increased dependency on self-operated e-Health platforms also have played an important role in the growth of POCT in critical care. Market awareness on preventive diagnostic solutions as well as low doctor-to-patient ratio also contribute to the upward trend. Similarly, increase in the ICU beds also is a growth inspiring factor since pandemic

COVID-19 as a booster for POC devices

COVID-19 made a big boost in healthcare in organic growth due to quantum leap in medical cases related to cardiac, pulmonary & nephrotic emergencies. Restrictions on travel & movement had contributed much to the development of AI based A & advanced algorithms to extrapolate expert human reasoning. Research based on Machine learning tools to identify patient's symptoms & suggest appropriate course of action is another trend, COVID has created. Indian health infrastructure showed more than 3-fold rise in critical care demand with the pandemic.

IOT based new segment

IOT medical devices market demand, by product (continuous/blood pressure monitor, glucometer, cardiac monitor, pulse oximeter, infusion pump), by type (wearable, implantable, stationary) and by connectivity technology (bluetooth) has grown by leaps & bounds for the last 2 years.

The global IOT medical devices market is projected to grow at a CAGR of 28.9% during 2021 to 20126. The growth of this market is attributed to the need for cost effectiveness in healthcare delivery & rising focus on active patient engagement & patient-centric care deliveries. Government initiatives to promote digital health are expected to drive more growth in the IOT medical devices market, during the forecast period.

New technologies like microfluidics, biosensor, cartridge-based systems etc

Microfluidics is capable of analysing small sample volumes & minimizing costly reagent usage as well as automating sample preparation & reducing processing time. The merging of microfluidics & advanced biosensor technologies offers new vistas for POC diagnostics, including high-throughput analysis, portability and disposability. New technologies of DNA and protein biosensors, recent advances on engaging the biosensors to microfluidics are good growth drivers of the time, in terms of POC diagnostic applications. Development of POC systems will require incessant improvement & validation of biomarkers & development of bioreceptors for those biomarkers. Microfluidic biosensors will appear one of the strongest contenders for a real-world tool in coming days.

Cartridge based equipment in IVD is also picking momentum in different principles. Mispa i3, the intelligent breed Nephelometry analysers from Agappe also are in very high demand, owing to their ease of use, accuracy, repeatability & flexibility of MOQs in testing reagents. Newer & newer cartridge-based systems are in the pipeline on various applications.

Manufacturing facilities, R&D expenditure

High deployment cost of connected medical devices and the associated infrastructure are the constraints as of now. Cost of inter-operability and connectivity solutions for different medical devices is considerably high. Moreover, IT support and maintenance services, which include modifying and upgrading software as per changing user requirements and maintaining an efficient IT infrastructure, warrant recurring expenditure.

Market awareness & increased dependency on self-operated e-Health platforms also have played an important role in the growth of POCT in critical care. Market awareness on preventive diagnostic solutions as well as low doctor-to-patient ratio also contribute to the upward trend. Similarly, increase in the ICU beds also is a growth inspiring factor since pandemic.

Data security issues is one major challenge of the automations. The increased use of automated technologies in healthcare integration, and health information exchanges have helped expand the healthcare privacy and security landscape. The electronic exchange of patient data offers greater reach and efficiency in healthcare delivery but has high-security risks due to the broader access. Concerns over the security of proprietary data and applications form a major challenge to the growth of the IOT medical devices market.

Agappe, best partner in diagnostics, is marketing POC testing range of accurate, high quality Hemoglobin meter called Mispa HbX, which can give results in 3 seconds, with one finger prick. This hand-held HbX equipment is very handy & user friendly, comparable with lab-quality accuracy of CV < 1.5%. It's working on a principle of multi-wavelength spectrophotometric analysis for detection of haemoglobin in capillary blood, which can be used by gynaecologists, physicians, small clinics, pharmacies, ambulances, primary care centres, hospital wards, like any other POC TESTING machines.

Besides, another compact machine called Mispa Revo, on Immunofluorescence platform for faster analysis of Troponin, NT-pro BNP, cardiac Triple, T3, T4, TSH, Vit-D is also available for Point of Care testing. This is very handy, 7" touch screen with internal printer with USB port facility. However, the critical care testing scenario will be highly benefitted by IOT based, compact, cost effective, faster point of care devices in the coming years.

D-Dimer test critical during COVID-19 treatment

Jatin Mahajan, Managing Director, J Mitra & Co highlights the correlation between D-Dimer and COVID-19

During the corona pandemic, as part of the post-confirmation protocol, the D-Dimer test is regularly administered. So, what is the correlation between D-Dimer and COVID-19?

To understand the correlation, we must first understand what does the D-Dimer test does. The D-Dimer test checks the blood sample for the presence of substantial blood clots within the human body.

Blood clotting is another symptom associated with acute corona infection. Blood clotting is a natural body mechanism that prevents us from losing too much blood during an injury, internal or external. Typically, our body's natural defense mechanism dissolves the blood clot once the wound has healed.

COVID-19 can cause serious inflammation within the body in severe corona infection, leading to blood clotting. The body's autoimmune system gets into action mode to counter the blood clotting. But, this condition of blood clotting can be severe and even life-threatening since the infection in the body is widespread, leading to clotting that remains unaddressed. This clotting may lead to strokes, heart attacks, and pulmonary embolism. It is also dangerous because blood clots can restrict the free flow of blood within the blood vessels. The combined aspect of blood clotting, immobility, or highly restricted patient movement, makes the situation further alarming and complicated.

The D-dimer test helps to gauge the patient's progression to COVID-19 related cytokine storm. In addition, the test helps trigger timely medical intervention to reduce severe complications and fatality. D-dimer is a protein fragment (small piece) formed during blood clot dissolution in the body. When the healing is complete, the natural body mechanism breaks down the fibrin, creating fibrin degradation products or FDPs. D-Dimer is one of the FDPs.

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Excessive blood clotting in COVID-19 positive patients leads to several complications like

◆ **Heart Attack:** Blood clot may result in blocking of the arteries, resulting in heart attack and other heart conditions, including permanent damage to the heart

◆ **Stroke:** A blood clot that travels to the brain, leading to a stroke with severe complications

◆ **Deep Vein Thrombosis (DVT):** Formation of a blood clot in one of the deep veins in the leg or the pelvis results in fatalities with a month of being diagnosed. Generally results in severe pain, swelling, or redness in the leg

◆ **Pulmonary Embolism (PE):** A clot that travels to the lungs results in Pulmonary Embolism. It can be fatal and thus requires immediate attention. Indications are slow breathing and breathlessness, chest pain, and a rapid heart rate

◆ **Kidney Damage:** Blood clots in the kidney may block the tiny blood vessels, resulting in decreased kidney function. The damage could be so severe that it may require dialysis treatment.

Factors in COVID-19 positive patients that compound blood clotting includes old age, excessive weight, hypertension, diabetes, heart conditions, medications that cause blood thickness, inactivity, recent surgery, smoking, or a family history of DVT and PE.

Thirty-one percent of critical ICU patients experienced complications related to blood clots, as per research by the US medical research agency National Institute of Health (NIH).

Lancet has also conducted a study on the subject. As per their study, in patients hospitalised with COVID-19, the platelets were found to be hyperactive, with increased activation and aggregation (clumping). Thus, the COVID-19 virus appears to cause increased activation in body cells responsible for starting the blood clotting process.

D-dimer tests are conducted when patients showcase symptoms of clotting, such as:

◆ Swelling, pain, and changes in skin color

◆ Faster heartbeat, acute chest pain, breathing issues, or blood in cough

◆ Bleeding gums, Nausea and vomiting, severe stomach pain, muscle pain, seizures, and decreased urine

J Mitra has various tests to cater to the diagnostics needs of potentially COVID-19 positive patients. J Mitra also has the D-Dimer Microlisa test kit for the in-vitro quantitative determination of D-Dimer in human plasma. J Mitra's D-Dimer test is based on the Sandwich ELISA principle. The test has an accuracy of more than 99.5 %. The D-Dimer test is part of the J Mitra initiative to fight against the pandemic.

Advocating for safe and effective active packaging for increasing the shelf life of medical devices

Active packaging solutions provide a reliable mechanism for ensuring the product efficacy and safe storage and delivery of various medical devices

Over the last several decades, innovative thinking has given birth to various medical devices that have changed the scope of medical practice. Rapid diagnostic kits, for example, provide a fast and cost-effective way of diagnosing diseases more accurately from a variety of patient samples. Stents provide a lifeline for patients that would otherwise suffer cardiovascular complications owing to obstructed blood flow. Prefilled syringes, on the other hand, offer a convenient alternative for parenteral delivery of drug products. While all these examples highlight the excellence and value of these new and innovative medical devices, the real challenge lies in the ability to deliver them to clinical facilities across the world in such a manner as to keep them in the best working condition. This is where active packaging provides a simple and effective solution for preserving the efficacy and ensuring the safe transportation of these medical devices to the healthcare facilities where they are most needed. This article will outline some examples of active packaging solutions that are available for some of the widely used medical devices on the market.

Active packaging solutions for enhanced safety for rapid diagnostic kits

With many diseases having an increasingly significant risk of epidemic-level spread, rapid diagnostic kits have become the new and improved way of diagnosing diseases. Rapid diagnostic kits are fast, cost-effective, and can be used to accelerate the diagnosis of disease and initiation of treatment. One common challenge affecting several standard rapid diagnostic tests is the need to deliver kits to both urban and remote clinical locations safely without exposing them to packaging conditions that reduce their efficacy. Ineffective test kits are unreliable as they can give inaccurate readings, potentially endangering the lives of several patients. By supplying rapid diagnostic kits with active packaging solutions, clinicians get more accurate readings that make them better equipped to diagnose their patients.

Several rapid diagnostic kits share a common blueprint that is designed around a hygroscopic test strip protected in a plastic cassette. The test strip is infused with antibodies or several other markers that help diagnostic laboratories and clinicians determine whether an individual is positive or negative for the tested condition. Due to the hygroscopic nature of the test strip, it must only be exposed to moisture at the point of testing; otherwise, the results can be unreliable. CILICANT's nontoxic desiccant pouches enable a safe, end-to-end solution for moisture control in rapid diagnostic test kits. By effectively removing moisture from the packaging environment of rapid diagnostic test kits, CILICANT desiccant pouches keep the test kit safe and preserve its efficacy for longer.

Active packaging solutions for improving the safety of prefilled syringes

Prefilled syringes have gained popularity worldwide, with a net positive year-on-year growth in market share and adoption due to their convenience and safety. These medical devices provide therapeutic agents in a self-contained format that clinicians can administer directly, minimizing the potential for exposing patients to toxic by-products. Additionally, prefilled syringes reduce drug wastage as they often have the correct quantity of the therapeutic agent. Notwithstanding the unique advantages of prefilled syringes, designing effective packaging solutions can be challenging as these medical devices are often vulnerable to oxygen ingress.

Innovative active packaging solutions that proactively protect oxygen-sensitive biopharmaceutical formulations in prefilled syringes from degradation have been instrumental in the success of these medical devices. CILICANT's self-activated oxygen absorber sachets are designed to protect prefilled syringes with various formulation types, including gene therapies, live vaccines, and cell therapies, among others. Each sachet actively absorbs oxygen from the headspace of prefilled syringes while also counteracting the effects of ingress through the packaging material. Self-activated oxygen absorber sachets not only extend the shelf-life of each prefilled syringe but they ensure that patients receive a safe and potent dose of medication every time.

Protecting stents with active packaging

Stents are small medical devices that are used by cardiologists to unblock clogged arteries in patients at risk of heart attack or severe cardiovascular disease. Once they have been surgically inserted into a patient's arteries, stents serve as a scaffolding device that may remain in the ar-

tery for extended periods, allowing such individuals to experience a better quality of life. As there is a risk of restenosis (clogging of the scaffolding device) with bare-metal stents, drug-eluting stents have become the preferred choice for cardiologists conducting angioplasties. These stents slowly release a therapeutic agent that prevents restenosis and reduces the need for repeat angioplasty procedures on the patient.

As drug-eluting stents are potentially life-saving devices, it is critical to ensure they are delivered in a safe and reliable manner from the production line to the operating room. Depending on the pharmaceutical agent used to coat the device, drug-eluting stents may need protection from exposure to oxygen &/ or moisture, both of which could drastically reduce their efficacy. Depending upon the concern, CILICANT active packaging solutions will adsorb/absorb from the packaging environment of drug-eluting stents, protecting the therapeutic coating from the harmful effects of oxygen &/ or moisture exposure.

Innovative active packaging solutions that proactively protect oxygen-sensitive biopharmaceutical formulations in prefilled syringes from degradation have been instrumental in the success of these medical devices. CILICANT's self-activated oxygen absorber sachets are designed to protect prefilled syringes with various formulation types, including gene therapies, live vaccines, and cell therapies, among others

Delivering safe reagent strips with active packaging

Just like rapid diagnostic kits, reagent strips enable clinicians to quickly assess key biochemical markers in a range of body fluid samples from patients. Reagent strips typically consist of a plastic handle with a series of dry pads impregnated with different reagents. Each reagent pad is designed to have a colour change reaction upon contact with target analytes in body fluids such as urine and blood. Each colour change on the several pads of reagent strips can be correlated to a diagnosis that helps clinical laboratories rapidly diagnose the presence of pathological conditions in patients. Reagent strips minimize the time delays and prohibitive costs that would otherwise be experienced with running several wet-lab assessments of body fluid samples from patients.

Reagent strips need to be kept in a dry environment for optimum functionality. If the test pads on reagent strips are prematurely exposed to moisture, this may produce inaccurate results leading to misdiagnoses that endanger patients' lives. While most reagent strips are packaged in low relative humidity containers, it is best to supplement the passive protection of the container with reliable active packaging solutions. With CILICANT desiccant pouches, reagent strips are actively protected from moisture damage from the point of the packaging right up to the point of testing. CILICANT desiccant pouches are 21 CFR compliant, dust and leakproof for reliable humidity control within the packaging environment.

Safe intravenous therapy with active packaging solutions for infusion bags

Infusion bags are some of the most widely used primary packaging devices for intravenous therapeutic agents. The widespread use of infusion bags is attributable to the fact that they help shorten the time it takes to deliver therapeutic agents to the patient's body. Some frequently prescribed intravenous medicines such as acetaminophen, edaravone that are packaged in infusion bags tend to be oxygen sensitive and it is necessary to protect them from oxidative degradation through the use of active packaging solutions.

With the aid of CILICANT oxygen absorbers, intravenous medications supplied in infusion bags can be protected from oxidative degradation ensuring maximum potency and patient safety. CILICANT's nontoxic iron-based oxygen absorbers protect the formulation from oxidative degradation by actively removing free oxygen from the packaging environment of the infusion bag. Additionally, CILICANT oxygen absorbers are supplied in Generally Regarded as Safe (GRAS) packaging that is safe to be used within the primary packaging.

Medical devices continue to push the boundaries of innovation in clinical diagnostics as well as therapeutics, and safe delivery is critical to their effectiveness. With product efficacy and patient safety at stake, it is crucial to ensure medical devices function properly at the point of testing or during therapeutic intervention. Active packaging solutions provide a reliable mechanism for ensuring the product efficacy and safe storage and delivery of these various medical devices. With a range of active packaging sorbents available in CILICANT's portfolio, there is a solution for each of the various medical devices on the market.

Connect with our technical team that will help you with the right active packaging solutions for each of your unique medical devices and visit *www.cilicant.com*

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Bolstering India's diagnostic ecosystem with in-vitro diagnostics solutions

Vivek Tiwari, Founder & CEO, Medikabazaar highlights his company's recent collaboration with Korea's leading point of care testing and in-vitro diagnostic company, Boditech Med

In addition to therapeutics and vaccines, diagnostics is also an essential tool for reducing and alleviating the burden of diseases. However, in many parts of the world, some of the most treatable diseases and conditions remain health burdens due to a lack of appropriate or available diagnostics.

In Vitro Diagnostics (IVD) has for long remained an underutilised and undervalued segment, where the focus has largely remained on treatment over diagnostics, especially in India and other low and middle-income countries. There has also been an acute lack of awareness of the role of early and accurate diagnosis in disease management.

However, the onset of the COVID-19 pandemic generated massive awareness on the importance of timely and reliable diagnosis. But even with the rapid advancements, a recent report by The Lancet Commission on Diagnostics noted that nearly half (47%) of the global population lack access to basic diagnostics for many common diseases such as diabetes, hypertension, HIV and tuberculosis.

The partnership would see Medikabazaar distributing Boditech's automated desktop analyzers such as the AFIAS 1 and AFIAS 6 immunoassay analyzers with a range of reagents and diagnostic kits. These will provide diagnosis of COVID-19 as well as diagnostic solutions for cardiac, cancer, diabetes, hormonal and other infections such as dengue, rota and adenovirus

AFIAS: A path breaking solution

Accessibility to diagnostic solutions and facilities remains a major challenge as a vast portion of these are highly centralised and often limited to expansive metropolises, depriving people living in tier-II, III and IV cities along with rural areas.

With Medikabazaar's exclusive collaboration with Korea's leading point of care testing and in-vitro diagnostic company, Boditech Med Inc, we are looking to solve this widely prevalent problem.

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The AFIAS-1 is a compact immunoassay analyzer with an all-in-one cartridge system. It has a single channel lateral flow immunoassay platform and uses disposable cartridges that include all the reagents necessary for the test. Small, compact and light, it offers ease of use with proprietary C-tips for fingertip blood and quick test results with reliability.

The AFIAS-6 is an automated Immunoassay analyzer with the all-in-one cartridge system that is uniquely integrated sample-to-answer system. It allows 6 parallel tests of differing parameters with fast turn-around and high sensitivity rivalling those of the full-featured systems in commercial labs. It is US FDA 510(K) cleared.

Medikabazaar will distribute these diagnostic solutions across India, reaching the remotest corners of the country by utilising our robust, comprehensive and extensive supply chain, thus contributing to significantly improving the nation's testing and diagnostic ecosystem. Point of care testing will help in making rapid clinical decisions for monitoring, treatment and making operational decisions as to allocation of resources, and also save time and lead to long term societal and economic benefits.

AFIAS's point-of-care testing is a one-of-its-kind diagnostic solution that maximises user convenience by offering a wide range of immunological test parameters, just with a finger-prick based sample. It enables physicians to perform tests within the clinic or hospital and helps them to make quick decisions to undertake evidence-based treatments, which proves crucial in critical care facilities where immediate test results are essential. Our partnership with Boditech will be another step in achieving decentralisation of testing facilities. With Medikabazaar's extensive reach in tier-II, III and IV cities, more than 1.5 Lakh medical practitioners and over 50,000 medical establishments will benefit from AFIAS's high-speed results.

Open-source revolution in changing HC

Amit Mohan, Business Head-LCS & LCS Digital, GE Healthcare, South Asia highlights the role of multifaceted open-source technology in transforming the Indian healthcare from bench to bedside

Technology in healthcare, whether directly or indirectly impacting patients, eventually saves lives. The use of digital health comes with the promise of customising treatment and care best suited to patient needs. The continuous evolution of emerging technologies such as Artificial Intelligence, Internet of Things (IOT) and big data have already begun impacting the continuum of care with respect to the quality, efficiency, and cost-effectiveness.

Of the various options of IT solutions available for healthcare today, open-source tools are considered the most affordable and accessible. Built from a collaboration among developers and organisations with similar interests, open source allows for constant engagement with the developer community at large. This results in a constantly evolving software that is crucial for healthcare IT infrastructural requirements.

In a country like India, where there's a huge disparity between urban and rural areas in terms of availability and accessibility of quality healthcare, open-source technology is making great strides in making available good quality healthcare for all.

Currently, almost 300 million people in India live below the poverty line. As healthcare costs continues to rise, it is only pushing more people below this line. While rural areas are home to 70% of the population, only 39% of the country's hospital beds are found here. To make matters worse, there are only 0.65 doctors, 1.3 nurses and 1.3 hospital beds per 1,000 people.[1,2]

This is where technology, particularly open source has been helping strengthen the Indian healthcare infrastructure.

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Open-source technology enriches healthcare

Open source (OS) has been a part of software programming and code development since the advent of Linux (an OS operating system) in the 1990s. As the name suggests, open source means the source code is accessible to everyone. As opposed to the proprietary software, which only gives the end user access to machine code, open-source software allows its end users to access and modify source code under a licensing agreement. This access allows developers to make new machine code as per new requirements.

Modern economies need healthcare, that is equally modern; where standardisation of patient care, innovation in patient care and treatment, affordability, and patient safety are a given. Here are some of the aspects of healthcare supported and strengthened by open source.

a. Telemedicine - The World Health Organization (WHO) defines telemedicine as, "The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities."

Tele-medicine is seen as a great opportunity in a country like India where the current doctor-to-patient ratio is 1:1000, which is much below the WHO recommended ratio. With the global pandemic straining the healthcare system, in March 2020, the Indian Ministry of Health and Family Welfare had issued new guidelines for telemedicine practice which enhanced the telehealth services practice across the country. This came as a huge relief to patients during the pandemic when they couldn't visit hospitals or failed to get doctor appointments.

b. Remote monitoring - Use of remote monitoring for elderly patients through smart surveillance cameras and analytical software has been widely accepted as it helps the caregivers keep a track of patients' progress without spending on hospitalisation. Remote monitoring has also helped physicians reach more patients and customise treatment according to the patients' needs.3

During the global pandemic, remote monitoring was used to treat patients while reducing the exposure of the virus amongst doctors and nursing staff. Since the patients affected with COVID required regular monitoring and steady supply of medicine, remote monitoring equipment helped doctors keep a check on the patients' condition and taper medication accordingly.

c. Tele-ICU services - As per the 2018 study by The Lancet, every year 2.4 million Indians die of treatable conditions.4 Most ICU beds are concentrated in tier 1 and tier 2 cities with limited to no critical care capacity in districts and smaller towns. While the total number of doctors with intensive care training in India is unknown, the Indian Society of Critical Care Medicine (the largest critical care body for the country) has 12,046 members (including consultants and in-training members) across 87 branches.5

With limited physicians per 1000 patients and the ICU care costs skyrocketing, home-based care becomes a lucrative alternative to hospitalisation for most of the population, unless the case requires critical care.

The ICU set-up at home is integrated with the data center, which alerts the clinician of patient conditions, empowering physicians, and nursing staff to be available for more patients than what is physically possible.

During the pandemic tele-ICU enabled

- remote screening and triage of patients
- reinforcement of infection control measures for caregivers
- remote monitoring of patients & minimising exposure time for healthcare workers
- management of multiple wards and ICUs from a single command centre
- counselling to families and caregivers

d. Technology-based medical devices - Medical devices such as BP monitors, pulse oximeters, sugar test kits were already gaining traction due to the need for patient convenience. There is also an increase

in the use of wearable medical devises with the patients becoming more aware and digitally experienced.

e. Telerobotic surgeries - With remote technology redefining healthcare, physicians are turning to robotics to assist them in surgeries as well. A Global Market Insights report estimates the market value of tele robotics at USD 5.5 billion in 2018. With 5G soon to be a worldwide phenomenon, surgery using robotic arms is going to be commonplace.

Conclusion

Every step ahead in technology is a step towards touching a million lives, especially in healthcare where saving lives is the priority. While increasing expenses, lack of doctors and sufficient infrastructure adds to the already burdened healthcare system, leveraging emerging technologies such as open source could bring some relief to the system by increasing the outreach, improving outcomes, reducing the need to be hospitalised thus impacting cost, providing relief to doctors, and nursing staff, and saving more lives.

To bridge this chasm, present in the healthcare system, the Government of India initiated the Ayushman Bharat Digital Mission (ABDM)6. Focused at developing the backbone necessary to support the integrated digital health infrastructure of the country, this programme is aimed at creating a seamless online platform to strengthen the accessibility and equity of health services, including continuum of care with citizen as the owner of data, in a holistic healthcare programme approach leveraging IT & associated technologies and support the existing health systems in a 'citizen-centric' approach.

Expected to significantly improve the efficiency, effectiveness, and transparency of health service delivery overall, the ABDM programme is designed to enable better continuum of care.

An innovative, integrative, interoperable, affordable, flexible, and safe technology, from being used for research, diagnostics, and administrative operations, today open source is striding towards improving the quality and efficiency of healthcare.

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GE Healthcare's clinical accessories

The clinical accessories portfolio supports the GE Healthcare monitoring and acute care system products in the after-market. All clinical accessories are certified for use by GE engineers to help ensure quality and support products in anesthesia and respiratory care, diagnostic cardiology, maternal infant care, and patient monitoring

As a leader in the healthcare manufacturing and device industry, GE Healthcare is responding to customer demand by re-entering the clinical accessories market. Announced in 2020, GE Healthcare spent the last year strengthening its portfolio of clinical accessories available for sale.

The clinical accessories portfolio supports the GE Healthcare monitoring and acute care system products in the after-market. All clinical accessories are certified for use by GE engineers to help ensure quality and support products in anesthesia and respiratory care, diagnostic cardiology, maternal infant care, and patient monitoring.

Although clinical accessories were always available at the time of purchase, GE Healthcare's customers were asking for more support during the equipment lifecycle, along with a single-source purchase option. Currently customers have direct access to hundreds of clinical accessories and GE is continuing to focus on what they refer to as "MVP products". This includes CO2 absorbents that are free of caustic chemicals, a universal connection system for blood pressure cuffs, and water traps, a proprietary accessory that protects monitoring equipment from viral and bacterial contamination.

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Around the world and in India, the COVID-19 pandemic has led to social distancing minimising all human contact and prompting companies to work towards providing technology solutions that enable contactless commerce. GE Healthcare's Service Shop, a first of its kind online e-commerce portal, driven by "hygiene-centric value proposition," is working towards making a huge expanse of clinical accessories available online to minimise contact and ensure higher productivity and better patient care.

Here is a quick glimpse of the portfolio:

◆ **Patient Monitoring** - NIBP cuffs, pulse oximetry, patient spirometry, ECG, respiratory and other hemodynamic monitoring

◆ **Anesthesia & Ventilators**- Breathing circuits, CO2 absorbents, flow sensors, filters and exhalation valve assemblies

◆ **Maternal & Infant Care**- Transducers, intrauterine pressure catheter and cables, T-piece resuscitation and ECG recording papers

◆ **Diagnostic Cardiology**- ECG cables, leadwires and sets, papers and other supplies

"GE Healthcare's commitment to clinical accessories is really a way to connect the patients with customers care for; with the GE equipment they trust."

For quick buy, kindly contact us at 1800-102-7750, 1800-419-7750, 1800-425-7255 or 1800-425-8025. Existing GE customers can place their orders on www.services.gehealthcare.in

INTERVIEW

How NICUs help shape the neurological development of preterm infants

Babies born any time before 37 weeks of gestation are termed pre-term. Although it is common for babies to be born early, when they are born too early, it could impede their brain development, leading to complications at the time of birth and later in life. Over the past several decades, improvements in technology in the Neonatal Intensive Care Unit (NICU) have led to improved survival of preterm infants. State-of-the-art equipment and expert clinicians have helped reduce the mortality rate and enhance the quality of life of pre-term infants. **Dr Raja Ashok Koganti**, Consultant Neonatologist & Pediatrician, Anu My Baby Hospital, Vijayawada talks about the importance of neurological development in premature infants and how they are equipped to provide pre-term infants with the best neonatal care

How many pre-term babies do you see in a month on average?
Although Anu My baby is only a couple of months old into operations, we have already seen 35-40 infants in the NICU with 5-6 of them very pre-term. Some deliveries take place in our hospital, and some babies are referred from other hospitals from across the city. Sometimes we also get complicated cases from tier 3 cities within a radius of 100 km from the city. Though the cases of pre-term births are high, technological advancements have helped in not only reducing the mortality rate but also enhance neurodevelopment to ensure greater Quality of Life.

What complications arise in pre-term infants?
In pre-term births, we anticipate a lot of challenges and therefore assign dedicated experts in the NICU. The most common complication that occurs in preterm babies is hypothermia. When the baby is born in our hospital, we maintain a warm chain right from the delivery room to the NICU and ensure timely care to avoid further complications. However, in the case of babies being transported from other hospitals, complications arise due to the lack of proper warm chain and respiratory support in the transport system, which leads to babies suffering from hypothermia and respiratory issues. Babies born preterm are also at risk of acquiring infections (sepsis) due to their immature immune system. Immature gastrointestinal system and formula feeds sometimes contribute to a serious condition called necrotizing enterocolitis (NEC). The fragile blood vessels in baby's brain poses them at a risk of intraventricular hemorrhage (bleeding in the brain). Babies who undergo a stormy course in the NICU are also at risk of PVL (Periventricular leukomalacia), wherein there is injury to white matter in brain. All these complications can impact the proper development of the brain.

The Giraffe Incubator care station helps maintain a normal temperature in preterm infants, which is very critical for their neurodevelopment. It protects them from heat loss while the bi-directional air flow maintains thermal stability. The infant receives uniform heat regardless of the position

What's the treatment regimen followed for these babies?
The treatment is decided considering the baby's birth weight, gestational age, and level of sickness. All inborn deliveries are attended by qualified neonatologists who ensure recommended best care practices from the very first minute after birth. As most of them are at risk of hypothermia, the immediate thing after being shifted to NICU is to keep them in a radiant warmer or incubator, which helps maintain a normal temperature and help the baby adapt to the new environment gradually. Babies born very preterm are preferably nursed in incubator to prevent convective heat losses, sometimes they also require ambient humidification in addition to warmth. Majority of them require CPAP support initially, however in some cases, we have also had to give surfactant therapy and occasionally put the babies under a ventilator if they haven't been supported with the proper respiratory system during transportation.

Why is neurodevelopment very important for the QoL of the infant?
Preterm infants are at higher risk of adverse neurodevelopmental disorders as compared to full-term infants. Therefore, it calls for earlier identification and intervention to avoid complications and ensure a greater quality of life. It also requires regular monitoring of developmental milestones to eliminate any deficits that may arise later.

How is the NICU at Anu My Baby equipped? What factors did you consider

before deciding upon the equipment?
NICU plays a very important role in any hospital as it nurtures the hopes and happiness of parents and families. To provide the best quality and timely care possible to our little patients, we have a fully equipped level III NICU with the best machines and staff. As we didn't want to compromise on the quality of care, we procured the best devices available.

How does GE's equipment help in neurodevelopment?
The Giraffe Incubator care station helps maintain a normal temperature in preterm infants, which is very critical for their neurodevelopment. It protects them from heat loss while the bi-directional air flow maintains thermal stability. The infant receives uniform heat regardless of the position. As I mentioned earlier, maintaining a normal temperature is very critical at that point and GE's Giraffe incubator is an expert in that, helping in nurturing the baby and enhancing neurodevelopment. The SLE 6000 ventilators are equipped with TTVplus and HFO volume guarantee option which allow us to provide volume targeted ventilation to babies as low as 400gm, thereby minimising damage to the lungs and developing brain. Lullaby LED phototherapy systems and Bili soft phototherapy systems provide intensive phototherapy, preventing bilirubin induced neurological damage in babies with high jaundice levels.

What was your personal experience using GE's Giraffe incubator?
GE's Giraffe Incubator is perfectly designed. I love the way the Omni beds are designed. It is comfortable to use, clean, and maintain. It is also technologically sound, helping us take care of the babies in the best possible way. The nurses also find the machine very convenient to use.

Preterm infants' neurodevelopment is highly determined by the NICU care and therefore it becomes essential to evaluate the right equipment and time for interventions that shape their neurodevelopment and quality of life.

Transasia launches India's first and only high sensitivity Hepatitis C testing kit

Based on the latest method, the ErbaLisa HCV Gen 4 Ag+Ab kit, is India's first and only indigenously developed 4th gen ELISA kit and has been evaluated by the National Institute of Biologicals (NIB)

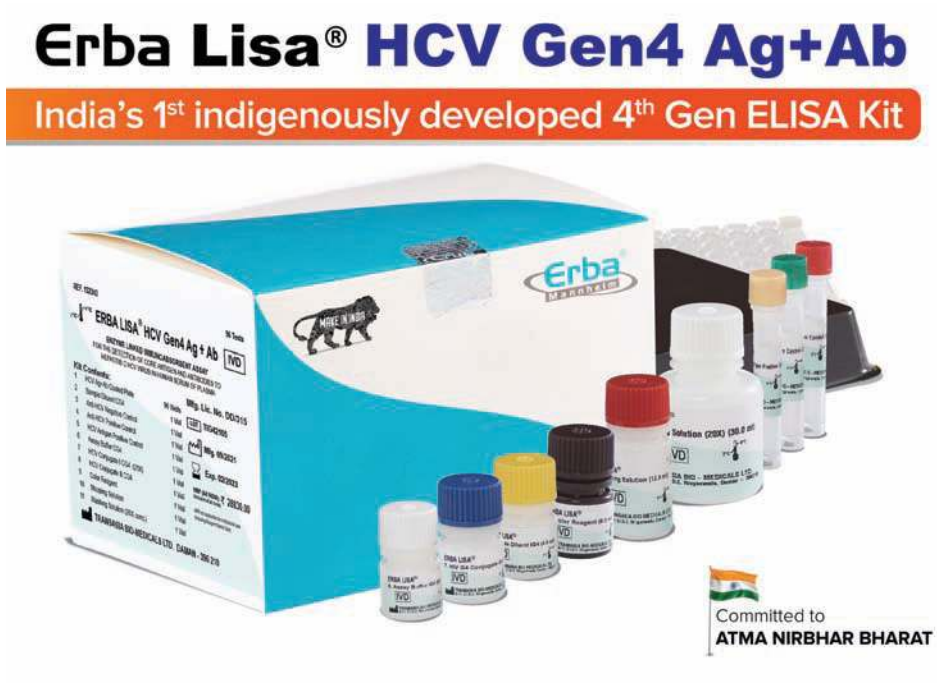
Transasia Bio-Medicals Ltd., India's Leading in-vitro diagnostic company, committed to a Healthier India, is at the forefront for providing quality and affordable diagnostic equipment and test kits to pathology laboratories and hospitals in the remotest areas of the country.

It recently announced the launch of India's first, high sensitivity testing kit for hepatitis C virus. Based on the latest method, the ErbaLisa HCV Gen 4 Ag+Ab kit, is India's first and only indigenously developed 4th gen ELISA kit and has been evaluated by the National Institute of Biologicals (NIB).

Hepatitis is a term used to describe inflammation (swelling) of the liver. It can be caused due to a viral infection, often shows no symptoms, and leads to jaundice and other conditions. Hepatitis C is caused by the Hepatitis C virus and is transmitted through blood-to-blood contact. As a result, it is imperative for blood banks to check for HCV among other Transfusion Transmitted Infections (TTIs) before blood transfusion.

Currently majority of pathology labs in India perform HCV Elisa testing based on 3rd generation assays that detect antibodies against the infection only. Though this has been the current method, 4th generation assay offers additional advantages that result in early and more accurate detection of the HCV infection.

ErbaLisa HCV Gen4 Ag+Ab kit is intended for the detection of HCV core antigen (viral protein) and anti-HCV antibodies, simultaneously, in human serum and plasma. It has a sensitivity of 100% and specificity of 99.67%.



Features	HCV 4th Generation ELISA	HCV 3rd generation ELISA
Detects HCV Antigen	?	?
Detects Anti-HCV IgG Antibody	?	?
Detects Anti-HCV IgM Antibody	?	?
Window period	< 28 days	> 66 days
Accuracy	Highly accurate due to antigen detection	Accurate

A window period is the time between the first infection and when the test can reliably detect the infection. Any third-generation kit usually offers a window period in the reported range of 15 - 180 days. The simultaneous detection of antigen and antibodies with ErbaLisa HCV Gen4 Ag+Ab will greatly aid in screening HCV more accurately, as the window period for HCV detection will be reduced to less than 28 days.

Suresh Vazirani, Founder Chairman & Managing Director, Transasia-Erba International Group of Companies said, "In the last two years, the focus has been on COVID-19. Needless to say, there are other infectious diseases too, that need immediate attention. Viral hepatitis continues to be a growing concern in India, and is equated as a threat comparable to the big three communicable diseases - HIV/AIDS, Malaria and TB. It is crucial to screen blood donors for HCV. ErbaLisa HCV Gen4 Ag+Ab kit on one hand offers better and reliable screening of blood in blood banks prior to transfusion and on the other hand for the labs and patients, it allows an opportunity for early detection and better management of infection."

As per WHO, in India, as of 2020, about 60 lakhs to 1.2 crore people are infected with hepatitis C, primarily a result of blood transfusions. With international organizations such as WHO running campaigns such as 'Hep Can't Wait' and the Indian government aiming at a nationwide eradication of hepatitis by 2030, accurate screening along with the screening of reduced window period samples with a product such as ErbaLisa HCV Gen4 Ag+Ab is the need of the hour.

The ErbaLisa HCV Gen4 Ag+Ab kit is fully adaptable on reputed automated ELISA processors. The assay can be run in 150 mins only and is pre-programmed on Transasia's Elan 30s, a fully automated ELISA system and Lisa XL, a fully automated, six plate microprocessor.

To conclude, Dr Anusha Rohit, Sr. Consultant & Head of Department-Microbiology, and Chair Infection Control, Madras Medical Mission, Chennai, quoted, "If we do not keep up with newer technologies, we cease to progress and grow in our fields and quality. The newer technology of using a 4th generation test that can simultaneously detect antigen and antibodies has been successfully used in HIV and dengue to greatly improve the sensitivity and enhance early detection and diagnosis. Now Transasia has come up with the first Made in India 4th Gen HCV kit, the ErbaLisa HCV Gen4 Ag+Ab ELISA kit that will ensure early detection of cases of HCV. This will be a game-changer for many hospitals, labs and blood banks."

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