

# InnoHEALTH

India's First Magazine of Healthcare Innovations

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**FELUDA paper strip  
test for COVID-19  
detection**

*by Dr. Debjyoti Chakraborty*

**Innovations 2020:  
Siblings of  
COVID-19 Pandemic**

*by Dr. Sarita Jaiswal*

**The Perfect  
Storm**

*by Dr. Swati Subodh*

# Readers Feedback

## A Brief Review on InnoHEALTH

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PERSONA

## PERSONA

### The Human Vaccines Project (HVP)

WORLD

**Dr. Frans van den Boom** has served as the Vice President, Country and Regional Programs and Executive Director Europe of the International AIDS Vaccine Initiative (IAVI) for ten years, he is responsible for vaccine preparedness and community mobilization programs, the social and behavioral sciences program, and resource mobilization. Earlier he served as Executive Director of Policy planning and evaluation at Qatar Foundation and also as Executive director of the Dutch Top sector Life Sciences and Health. He joined the Human Vaccines Project three years ago as an Executive Director.

**Sachin Gaur** interviews him on his viewpoints about the initiatives taken by The Human Vaccines Project amid covid-19 pandemic.

**Q.** Tell us briefly about the organization you represent and if your organization planned any support actions during the covid-19 pandemic.

**A.** The Human Vaccines Project (HVP) is a nonprofit public-private partnership with a mission to decode the human immune system and accelerate the development of vaccines and immunotherapies across major global diseases. The Project brings together leading academic research centers, industrial partners, non-profits and governments to answer core questions about how the human immune system fights disease, and pioneer a new era in human health.

The project has three pillars: the Human Immunomics Initiative, a collaboration with the Harvard T.H. Chan School of Public Health; the Newborn Immunity Initiative, a partnership between HVP and the Telethon Kids Institute; the Newborn Immunity Initiative Cincinnati Children's Hospital; and the COVID Vaccine Initiative (CVI).

The CVI seeks to learn as much as possible from the current COVID-19 pandemic to enable it to better respond to and perhaps stop the next before it starts. The CVI is working with industrial partners to understand how and why COVID-19 vaccines have been so successful, and to understand how well such vaccines work in vulnerable groups such as older adults where vaccines often do not work well.

**COVID-19** will change things for good. This pandemic has taught us that an infectious disease agent can have an enormous impact on every aspect of life. The human, social, cultural and economic toll is enormous. It has been estimated that the current pandemic will end up costing between USD 8 and 16 trillion globally, but there is also an estimate that it will cost USD 16 trillion for the US only. Surely this has opened the eyes of decision makers that a continuous investment in infectious disease R&D and the underlying basic mechanisms to understand infection, disease development and severity, and immune response is necessary. We now have platforms such as mRNA and others that have allowed us to develop vaccines faster than ever. These new platforms rest on decades of research and investment and are capable, as we have seen, of bringing vaccines faster to the public faster than ever. Despite these advances we still have much work to do on the research side in understanding how to generate immunity to disease that works across all populations and including the really tough diseases like HIV or malaria where we need effective vaccines.

**Q.** A shorter vaccine development cycle is raising eyebrows, especially around safety concerns, there are population groups missing in clinical trials that we discover as the vaccine is administered. If we were to do it again, how can we do it better? Also, what can be done to improve the communication around vaccine campaigns in general?

**A.** As always, the future will tell. However, I am optimistic that SARS-CoV-2 and

people with (severe) underlying health conditions were not included in the first trials. Elderly people were included, but not in very large numbers. This means that additional studies are needed, so we are addressing those studies are carried out amongst immunocompromised patients, cancer patients, people with autoimmune diseases, children etc. This is not an easy issue to be faced by clinical trials, however the golden rule is that you need 'healthy' volunteers, usually people between 18 and 35. This needs also thinking and a careful balancing of risks and benefits if you are going to enroll vulnerable populations. Again, this is where post marketing surveillance systems or additional clinical trials after the vaccine is being distributed, can help without slowing down access to a life saving intervention.

Secondly, yes, population groups were missing in the clinical trials, which is common practice in vaccine trials - children, pregnant and lactating women, thereby, improving communication around vaccine campaigns in general. Vaccine hesitancy is a big issue worldwide. WHO identified vaccine hesitancy as one of the top 10 threats to global health. The challenge for public health authorities stretches beyond COVID-19. I believe that we are entering a completely new paradigm around vaccination. Social media and social networks have become important players of the frame, as we have seen in so many countries with the introduction of the HPV vaccine; opinion makers and leaders - whether in media, science, politics, religion - can make or break vaccination programs. Lack of consistency and trust are critical issues.

On top of that, given the enormous amount of time spent on reporting on COVID-19, people are becoming more knowledgeable about vaccines and vaccine development. Local momentum, level and duration of efficacy, side effects, falling trials because of serious or severe adverse events. The public also is gaining an understanding of gaps in our knowledge

after a vaccine has been licensed such as the level of protection against new viral variants, the efficacy of a vaccine in the aging population and in people with pre-existing morbidity. Last but not least, the top 3 categories for vaccine hesitancy (lack of evidence, knowledge and awareness; religious/philosophical beliefs; concerns) remain relatively constant, but even the most cited category (scientific evidence) risk benefit) only accounted for less than a quarter of all categories cited, emphasizing the complexity and variability of vaccine hesitancy globally. To this is a daunting challenge for public health authorities.

I believe it is key to (re)establish trust, and trust is created by being honest / transparent, fair, reasonable and realistic. A vaccine study showed that the most important determinant for being vaccinated is that people believe and are confident that vaccines are important for their own safety and health. That in my opinion is going to be critical. Communicate clearly and consistently about the impact of vaccination on life expectancy (focus on understanding why some are hesitant and some consider) focus on making communication accessible, understandable and acceptable. Understand community dynamics and social and peer group pressure. I believe it is critically important to involve social and behavioral scientists in order to understand the social and behavioral dynamics.

**Q.** What are the barriers that prevent vaccine development and a well-coordinated global effort. If you were to suggest top three recommendations for a healthier and safer world through timely vaccine development, what would they be?

**A.**

- Sharing real time information of an infectious agent as identified as the cause of a (potential) pandemic in order to start working on a vaccine.
- Communicate as much as possible and don't shy away from saying sorry, if new insights require different approaches.
- Develop a (AIQ) (Advanced Information) and the international community (WHO, World Bank) on advance market and advance purchase commitments, and other innovative financing mechanisms.

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*A very innovative way of making people aware of the advances and facts about medicine. Even a common Man can understand the concepts in magazine easily. Keep going. Well organized contents, attractive pictures and precise information about a lots of important topics.*

**Dr. Shubha H. V**

*Dear Team, I am very much thankful and grateful that I got my article published in your esteemed E-health magazine. Special thanks to the chief editor and the team who is behind "InnoHEALTH". Such a great platform where everyone can showcase and express their thoughts in the healthcare through your magazine.*

**Tamanna Sachdeva**

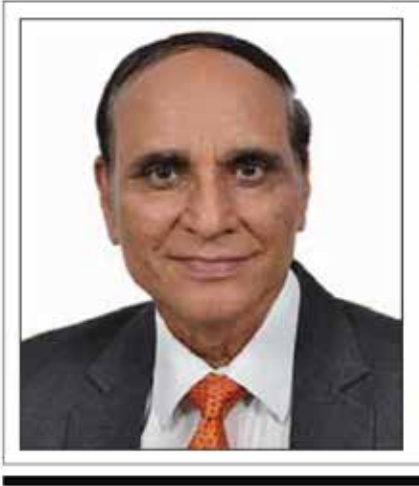
*Very well laid out magazine and are article are so current and reader friendly.*

**Ramesh Kumar Nanjundaiya**

*I would like to express my gratitude to the chief editor and editorial team of "InnoHealth" for the excellent coverage in the magazine published. The positive exposure you gave me on the International Nursing day - praising, thanking and protecting nurses amid COVID-19 challenges segment provided the community with a nice introduction to our goals and services.*

**Neha Lal**

## EXECUTIVE OPINION



Dr. V K Singh

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## Unexplored challenges of pandemic

**W**e are exploring an unknown territory that is COVID-19. We have gone through the misery of one year Lockdown of schools, offices, businesses and problems of migrant labourers unheard in the past. We have come to know many challenges due to Pandemic which was unexplored. Is it a repeat of a century old Spanish flu or is it a new problem? We are experimenting with medical treatment of Covid without any clinical protocol. The vaccines are also having unknown outcomes like how long it could be effective and would it be effective against mutant virus. The Pandemic has brought new challenges and forced the government and community to think about overcoming it and to explore opportunities to handle challenges. Can one calculate human and economic losses and how to overcome them? Vaccination would take many years to completely cover the population as planned now, would it control pandemic. The new spike of pandemic can be told as the second wave of pandemic. We have lost touch with realities by not wearing masks, no social distancing is maintained as seen in political rallies, farmer's protest and religious congregation. Many times, it is photo edited by political leadership for media publicity by giving sermons without following norms themselves. We cannot predict anything except it is a long battle and maybe it turns out to be endemic by the end of year 2022.

India has made its mark in the international community by exporting /donating vaccines. As per Niti Aayog report released on March 30, 2021 India's healthcare industry has been growing at a Compound Annual Growth rate of around 22% since 2016 and expected to reach USD 372 billion in 2022. Pandemic has not only thrown challenges for the health sector but even opportunities. Indian health sector has become one of the largest sectors in terms of both revenue and employment. Pandemic has forced everyone to give due priority to the health sector, a quantum jump in allocation of resources. Whatever may be the scenario of the post pandemic, health sector, would be on the top priority list for development. A lot has been done in the health sector through Atmanirbhar, innovations and National Digital Health Mission. It is known fact that every catastrophe does bring development, growth, and new avenues of survival. The behaviour of community to some extent has also changed for good. We have handled pandemic well compared to many developed countries. We credit both the community and govt for it however we should not be complacent to tackle the second wave.

There is going to be enormous digital data generation and increased online traffic by conducting online webinars, conferences and training, Cybersecurity is a new discipline which healthcare workers must acquaint themselves with. New technologies and tools like Artificial Intelligence and blockchain are becoming part of the healthcare delivery system. One also must take guard of social media providing distorted information or at times misinformation. These are new challenges in the post pandemic era.

India has already made a mark in the global community by excelling in many areas related to healthcare. We have become exporters of many items needed to handle pandemic. We need to revamp the healthcare system in view of learnings from this biological disaster. There is a need to strengthen the public health system and improve quality of life to overcome this type of menace. We can not be complacent and must take all possible precautions to fight the pandemic.

Vaccination is not the only answer but basic protocols should also be adhered like wearing a mask, maintaining social distancing and frequent hand sanitization. A slogan to be always remembered. See visuals to know how badly we are following it. Sincere efforts are required by everyone to implement.

“*Pandemic has forced everyone to give due priority to the health sector, a quantum jump in allocation of resources. Whatever may be the scenario of the post pandemic, health sector, would be on the top priority list for development.*”

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# PERSONA

## FELUDA paper strip test for COVID-19 detection

Dr. Debjyoti Chakraborty is presently a Senior Scientist at CSIR-IGIB, Delhi. His lab is engaged in developing genome editing tools for contributing to sustainable healthcare solutions including therapeutics and diagnostics. Apart from this the lab also focuses on understanding neuro-developmental diseases using brain organoids.

Dr. Debleena Bhattacharya interviews him regarding his views on his recent achievements on developing a cheaper, faster and simpler alternative to RT-PCR, the gold standard in the diagnosis of COVID-19 known as FnCas9 Editor Linked Uniform Detection Assay (FELUDA), a paper based strip test for coronavirus.

**Q. Three important events happened in 2020 linked with life sciences and the topic that you work upon. COVID-19, Noble prize for the work of Clustered regularly interspaced short palindromic repeats (CRISPR) and AlphaFold winning the Critical Assessment of protein Structure Prediction (CASP 14) challenge. What is your reaction to them? What is the impact of these events in the next 3-5 years on life science research?**

**A.** The impact of each of these three things will be unprecedented in coming years. CRISPR Nobel Prize was only a matter of time, however the award going to two terrific women scientists in a year when women have excelled in almost every field from politics to science is hopefully going to improve gender inequalities and inspire young female scientists to take up a career in scientific research. AlphaFold's development can potentially revolutionise custom protein design and is only the beginning of our understanding of what AI can do and achieve. Finally the pandemic, with all the negativity that it has created across every spectrum, has truly brought science to the doorsteps. The collective action of the medical and scientific fraternity to fight against this pandemic through innovations and discoveries will hopefully prepare us for more challenges to come. Importantly, it reemphasizes the importance of funding good science consistently.



**Q. FnCas9 Editor Linked Uniform Detection Assay (FELUDA) that employs a direct Cas9 based enzymatic readout for detecting nucleotide sequences and identifying nucleobase identity without the requirement of trans-cleavage activity of reporter molecules. How is this study different from Cas12 based lateral flow assay detection used by WHO and US CDC assay?**

**A.** The difference is in the mechanism of detection that the individual Cas proteins employ. Cas12/13 causes collateral cleavage of reporters while FELUDA uses direct binding based readouts. The USP of

the former is the sensitivity to ultra low copy numbers while the USP of FnCas9 is its high specificity to mismatches and remarkable accuracy. This is to put to test with RAY (Rapid variant AssaY) that can diagnose CoV2 variants that are different by a single mismatch ([https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)00470-0/fulltext#articleInformation](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00470-0/fulltext#articleInformation)).

**Q. You are also focused on CRISPR related work with sickle cell anaemia, which is an important topic for India. When do you expect the implementation of the successful treatment using CRISPR based methods in India? Also, will these be affordable solutions for the larger population?**

**A.** That is my primary work and we are extremely passionate about bringing it to people at some stage. We are at a point where we have finished with lab studies and are soon going to investigate if our approach is feasible on non human models. We have extensively worked on engineering the FnCas9 to make it more suitable for therapeutic editing. Actual implementation would require thorough trials and most importantly the support of the policy makers. Doing genome editing in human cells for therapy will require understanding and discussions across various strata of stakeholders and the common public.

**Q. We have seen numerous collaborations around COVID-19 where researchers are developing diagnostic tests for vaccines. Being a researcher yourself, what was your journey like for the past one year? If you can also share your pivot from working on sickle cell anaemia to developing Feluda and then Ray?**

A. The pandemic showed the power of collective work. In addition to our industrial partners (Tata Medical and Diagnostics) we have continuously benefitted from discussions and support from scientific colleagues across institutes, startups, policy makers, clinicians and common people. As a researcher most of our time is spent in the lab in normal times; this, this experience over the last year has been remarkable. Not only did we learn how to implement experimental workplans but also to discuss and understand the views of different types of partners in this process. When we were working on the SCA, we devoted our skills purely from the scientific viewpoint. We realised its application in CoV2 diagnosis very early (Jan 2020) and thanks to the unrelenting efforts of a talented bunch of students, were able to implement the FELUDA prototype at break-neck pace. Under normal conditions, innovations from lab to market are long and arduous routes. The pandemic taught us that this doesn't necessarily have to be so. While working on FELUDA and the tech transfer to the product TATA MD CHECK, both me and Dr. Souvik Maiti had multiple roles to play, several of which we learned on the job. The support and constructive enthusiasm of Dr. Anurag Agrawal, Director IGIB has been phenomenal during this whole process.

**Q. Many industries have suffered due to COVID-19 impact, especially travel and tourism. WHO and others are talking about a vaccine certificate based passport which allows people to move. Do you think CRISPR based tests can get wider acceptance cross border such as RT PCR. What can be done to ease out pressure on these distressed sectors? Why are CRISPR based tests**

**not mainstream globally despite being developed already last year in some parts of the world?**

A. I totally agree and if the current work reaches some sort of conclusion we hope to have CRISPR tests done more frequently (particularly for the RAY based variant detection). One has to remember that technologies become better as more and more people use them and improve them. qRT PCR was popularized in 1994 and it took so many years to get it ready for mainstream diagnosis. CRISPRDx is only about 2-3 years old (and even younger in India) and it is going to get better, faster and cheaper as more people use it and make it more robust. It is important for regulatory authorities to have faith in new and promising science and promote it as an investment that will pay rich dividends in the future.

**Q. What inspires you to do research in life sciences (around CRISPR)? Any Indian / global scientist/personality that inspires you on a daily basis? If you could also recommend a book to younger readers that may inspire them to take up science?**

A. My approach towards science has been one of problem-solving. The excitement of solving a biological question is what inspires me. Once I started working on genome editing I have been getting mails from parents of kids who have a lot of hope in this technique and feel one day it can save their children from some of the incurable diseases that they are suffering from. This is my greatest inspiration and something that I am happy to focus on priority over other scientific pursuits.

A lot of scientists inspire me. Feng Zhang, George Church, David Liu, Jennifer Doudna, Marina Cavazzana are few of the contemporary names in my field. I am intrigued by George Church's approach to science as an innovator and the fresh ideas he comes up with. Among contemporary Indians, Gagandeep Kang, Shahid Jameel and our very own Anurag Agrawal are some of the personalities I admire for their depth of knowledge and outlook towards scientific and clinical problems.

My choices for books would be The double Helix, Sapiens and the newly released The Code Breaker.

**Q. In the CRISPR journey we have seen some fundamental basic curiosity driven research leading towards important applications. What is your message to students and young researchers who aspire to take the same path? What should we focus on in India in the next 3-5 years for example, to get good results from the incorporation of CRISPR / AI in life sciences?**

A. It is important to remember that at the end of the day, CRISPR is a technology and like any other technology it will evolve, get better, have more applications and be eventually replaced. Thus it should not be seen as the one-stop solution to your problem. Every problem requires critical thinking and innovative approaches, a one-size-fits-all need not be the best or the most apt way to solve a range of biological questions. The best minds will find ways to learn from nature (like scientists learned in the case of CRISPR) and come up with improved solutions.

**Q. We have seen many scientists embrace the arts route in infusing the new ideas in their scientific journey. Being associated with music, in your opinion how does hobbies play an important part in teaching us life lessons?**

A. Arts and humanities teaches us to appreciate and enjoy life in a non-objective manner. I would insist that pursuing an alternate interest (outside science) should be done seriously and not just as a hobby. This is because it pays rich dividends even in one's scientific career. Practice associated with perfecting an art improves the analytical skills of a scientist and helps make friends and contacts in unexpected locations. It is a release point for stress and anxiety.

**Interviewed by**

*Dr. Debleena Bhattacharya,*  
Associate Editor, InnoHEALTH

# THEME

## Current digitized healthcare sector challenges in India and new tools and avenues decoded

■ Ramesh Kumar Nanjundaiya



One does not fail to notice that the entire medical services sector and hospitals in India are undergoing a major transformation in the delivery of services, monitoring and patient care. New hospitals are busy opening up specialty hospitals in tier 2 and tier 3 towns across India at a rapid pace.

While this sector has been growing in traction for over a decade now with super-specialty hospitals springing up all over India has catapulted to still higher levels in the last 12 months due to the noticeable ongoing technology support and digital transformation for the healthcare sector. This has got due recognition due to the aftermath of the covid 19 pandemic and its tracing mechanism.

The government of India's top priority is to ensure, facilitate, encourage timely manufacture and delivery of covid 19 vaccines to the local population as well as undertake the exports to about 50+ countries across the globe. Some of the supplies are purely commercial export whereas few donation supplies are appropriately termed as vaccination diplomacy.

While one does notice very positive efforts in developing covid 19 vaccinations, challenges have also come in hand-in-hand including manufacturing delays, raw material supplies, storage, manufacturing capacity constraints, balancing demands, staggering rollout mechanisms, transportation and logistics

at the same time ensuring that proper safeguards are in place via the use of digital tools and telecommunication, data storage and standards, hospital listing, data protection frameworks, encryptions, and identification systems. For delivery of vaccinations from the manufacturing site to the patients, involves a huge supply chain management service strategy that has been the need of the hour.

As an example, the country urgently needs technical support to ramp up the vaccination activity to double from the present 3 million /day to at least 6 million/day. For this to happen, one needs strong access to digital technologies, mobile devices to expand capacity via secured cloud-based services for such a huge campaign.





Digital technologies are playing a critical role to support the production, planning, monitoring, storing delivery, and management of vaccination programs on a pan India basis by successful use of digital logistic applications via electronic communication, mobile networks, and a special app to reach the nook and corner of India. The digital vaccination recording and follow-up systems have started working well lately by using standard (Pan and Aadhar) ID systems to determine eligibility and track patients between doses.

Most of us have heard about the Aarogya Setu app. An Indian COVID-19 contact tracing, mapping, and self-assessment digital service is primarily a user-friendly mobile app, developed by the National Informatics Centre under the Ministry of Electronics and Information Technology (MeitY).

Statistics indicate that by September 2020, the Aarogya Setu, the country's Covid-19 contact tracing app, has more than 15.7

crore registered users and is growing month by month. This itself depicts a success story. It is widely clarified in the media that the app's data is fully secured to protect confidentiality and encrypted in transit and idle state. Fully encrypted personal information is stored with necessary firewalls and protocols along with an appropriate transparency. The World Health Organization has lauded the Aarogya Setu mobile application for helping health departments in a vast country like India to identify COVID-19 clusters. This clearly shows that the healthcare industry has seen a massive shift in its dependency on technology.

Today in India, the digital transformation efforts and adaptability has moved forward in leaps and bounds which initiated about a decade ago with just computers in hospitals for billing, appointments and scheduling.

Tech-savvy hospitals in the metros not only have sophisticated medical devices, MRI machines but also fully interactive websites and online platforms. Technology and digitizations have enabled error-free online appointments, consulting, video consulting and conferences, and telemedicine. Apart from these the highly sophisticated medical devices that modern

**The government of India's top priority is to ensure, facilitate, encourage timely manufacture and delivery of covid 19 vaccines to the local population as well as undertake the exports to about 50+ countries across the globe.**



hospitals across the country use for detection and curing mean that hospitals have up-skilled themselves via integration of medical knowledge with AI-enabled medical devices and electronic health records.

In a nutshell, this summarises the whole doctor-patient relationship and communication that has culminated a huge transformation via timely decision making in regards to planning treatments schedules, operation theatres for optimal use, data sharing and outcomes to bring in the "patient is the king" mindset.

Thus data integration is being actively used in extending medical services and for the increase in data aggregation that

can assist in the activity of preventive care, proper staff allocation and monitoring the reduction of medical errors to provide a high level of care. Of course, the medical expenses have also increased with inflation. Today the focus of hospital management is to build loyal patients. Nowadays, hospitals are using technology to conclude the patients' predictive analytics via medical records data, family history, health insurance cover via cashless treatments.

When applying predictive analytics to the data generated by each patient and combining this data with those points collected from medical health records, healthcare providers will be able to build loyalty with their patients, manage their

health intelligently and provide them with the seamless healthcare experience as per their expectations.

Some digital enablers also could be rapidly expanded, scaled up, or deployed to support the effort. For example, strengthening and expanding the coverage of foundational ID systems, working with governments and private sector service providers as well as expanding access to the internet with a provision of mobile devices for program delivery, or rapidly expanding capabilities of existing information systems through private, secure cloud-based service providers. The current scenario is addressing challenges and rectification via the use of technology.

Given increasing costs, covid restrictions, patients in the urban area seemed to equip themselves to the use of digital technology with such devices as self-monitoring of BP, sugar, oximeters and temperature monitoring and arranging house visits for blood sample collection. Patients want to increasingly make use of digital devices for their self-care. All this is to ensure that they receive continuing healthcare facilities at their homes due to a shortage of hospital beds which means an increase in tele-monitoring services and devices.

The object therefore will be for hospitals and medical practitioners to integrate digital technology in upskilling and installing Health records and information systems. This will help in real-time monitoring and remote diagnostics or tele home care. The technology that is used includes telemedicine and diagnostics, mobile device healthcare, RPM sensors, webcams, video-conferencing, videophones, and WebPages for monitoring of patients. Wearables for recording heartbeat, pulse rate, blood pressure, blood sugar, etc. shows that digital Healthcare holds tremendous promise and opportunities.

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# Innovations 2020: Siblings of COVID-19 Pandemic

■ Dr. Sarita Jaiswal



A very famous speech by John F. Kennedy in 1959, defined the crisis in an altogether different perspective. He pointed that if “crisis” is depicted in Chinese characters 危机 (wēi jī), it translates to danger (wēi) opportunity (jī). Even though it is not an exact translation, his thought-provoking words have deep connection even in the present world crisis.

During World War II nuclear energy in the form of destructive bombs caused catastrophic damage to the humankind. However, we have also witnessed its tremendous benefits in various sectors and transforming industrial development. This race of crisis and human evolution is a continuous process. History itself shows that crises or extreme conditions can be useful for directing individuals, a country, and even the world to a solution.

Ironically, evolution on earth is also a result of disasters. The cold war between two major world powers led to the invention of “internet” and converged the world into a global village. This connectivity across global villages with enhanced ‘Air Travel’ in the last six decades showed exponential potential of epidemics converting into global pandemics. Thus, it’s cyclic and progressive i.e. emergencies put human life at risk, technological innovations provide solutions yet in longer term become causative factors for another emergency. Coronavirus disease 2019 (COVID-19), first identified in December 2019, became a global health threat by March 2020. The pandemic, together with the extensive lockdown measures introduced by most countries in response, resulted in an unprecedented global socio-economic crisis. As countries grapple with the serious impacts to public

health systems and socio-economic development caused by the COVID-19, innovation and emerging technologies have come to the rescue on both fronts – providing solutions to health challenges as well as enabling people to adapt during lockdowns and activity restrictions.

On March 24, 2020 India also decided for lockdown measures. The challenges were no different from other countries but population density and unequal distribution of resources among different states triggered a quest to resolve multiple issues. The lack of decision support system is one of the first challenges to ensure optimal usage of resources and workforce. In such scenarios, predictive dynamics such as the Susceptible Exposed Infectious Recovered (SEIR) model developed by DRDO, INMAS can be very useful. Shortage of Personal Protective



Equipment (PPEs) and testing facilities was another hurdle. Multi-use PPEs can provide tremendous support in such situations. “Protection” and “India 365” Masks developed by DRDO in compliance with NFPA 1999:2018 global standards are example Multi-use PPEs which can be washed and used again. This innovation can reduce PPE waste by 30-50 times in higher risk zones (isolated wards) and up to 100 times in moderate risk zone operations (disinfection drives). Snood mask with anti-viral coating by Virustatic Shield and Indigenous N95 masks by various industries, also introduced during 2020. Indian industries in these sectors started evolving for bulk manufacturing and some even started exporting to other countries, which never happened earlier.

Another revolutionary development was digital transformation of contact tracing methods globally. Aarogya Setu (India), Samparc (DRDO, India), ArriveCan

(Canada), all are examples of country specific apps for contact tracing. “Spot Robot” by Boston Dynamics introduced in Singapore to maintain social distancing at streets. “Colivery platform” in Germany provided the most efficient route for delivering essential goods. AI supported video conferencing “Krisp” removes all background noise during online meetings. “Cabana mobile” hotel services allow travel along with isolation within the USA. “Thermal Rebellion” helps in screening temperature while passing through gates and its holographic scanning view of air with pollens and multiple particles and helps in detecting safe environments. UV-C, once used as primary sterilient into HVAC systems gained popularity in neutralizing microbial load. Ventilator(s) by DEBEL Bangalore; ATMAN (AI based system for identifying patients by using X-ray inputs) by CAIR are also examples of novel R&D achievements. Diagnostic capacities increased rapidly across

countries during the first six months of the pandemic, based on the application of a technique called reverse transcription polymerase chain reaction (or RT-PCR). Rapid Antigen based testing kits, Paper based kits for indication of infection and RT-PCR based diagnostic kits added new dimensions to plethora of innovations. “Covin application” for vaccination program is a new introduction for reducing wastage and targeting maximum population coverage in India.

Sanitization practices became the new norm in 2020. From work places to household premises sanitization/sterilization of surfaces at multiple times using alcohol based solutions, raised another issue of multiple exposure induced toxicity and potential fire hazard. A self-sustainable, cost effective sanitation mechanism for household supplies including fruits and vegetables, vehicles, shoes became a new necessity of COVID times. Some of the technologies launched by DRDO target these requirements. Ozonated Radical Confined Space Sanitization (ORCS) Unit “Poorn Swachh” sanitizes both commercial/ domestic spaces and vehicles. It utilizes 33% of global

**History itself shows that crises or extreme conditions can be useful for directing individuals, a country, and even the world to a solution.**



acceptable limits of ozone (0.01 ppm X 8h) i.e. 0.03 ppm and in combination with Triyogani (fumigant) neutralizes microbial load even in hidden spaces. Ultra-swachh and Ati-swachh are innovative and cost effective cold sterilization technologies for PPEs, heat sensitive healthcare equipment and biomedical waste.

The miniaturized version of ambient air based ozone generator is game changing technology in this field. Neem botanicals infused ozonated water technology “Tri-netra hand sanitization unit” provides an alcohol free hand sanitizing solution. Samgrah Swachh and similar mini ozonizer(s) provide self-sustainable solutions for, sanitizing fruits/vegetables, in house hand sanitizer, mouthwash and even useful for cleaning flowers in bouquet shops. Sanitization mats with sodium hypochlorite gel, for office or home entrances manage infection spread via shoes. “Covid Coat+” is a nano-encapsulated formulation, which provides sustained release of biocidal agents for 90 days. “Automates UV-C system” developed by DRDO can be used for decontamination of N95 masks while maintaining Sterility Assurance Level (SAL). Foam based beds are often too costly to disinfect especially in Isolated Wards and Operation theatres. Covid coat technology with viscoelastic gel addresses this problem. A tightly

closed polymeric structure with microbial protected surface (s) makes it ideal for isolated wards and operation theatres.

COVID-19 pandemic has challenged healthcare facilities throughout the world. In many regions, the need for acute inpatient healthcare services has exceeded the capacity of hospital systems, and field hospitals are being utilized as one part of the response strategy. The congregated efforts of different ministries resulted in successful establishment of dedicated hospitals for COVID-19. It started from New Delhi and covered many regions afterwards. Containerized Test Module by R&D Engrs (Pune) provides mobility for covering remote locations.

Some of these novel technologies are not only important for managing pandemic within India but also have export potential to provide economic boost for the country. There is huge demand for such innovative products all over the world. India, as a country has potential to become a major supplier for such products. However, these products need to qualify stringent standard systems to gain access in the International market. National Registry of Goods and Standardized Quality Parameters both for indigenous and imported goods require databases/ innovative digitized solutions. The framework for stringent quality testing

functional in developed nations is still evolving in our country. The disparity in framework results in cascading challenges for Indian manufacturers in the domestic market, thus limits domestic production. This raises production cost for Indian manufacturers. Even after a product qualifies for “export quality” it fails the cost challenges from bulk manufacturing countries like China, Bangladesh etc. Support from the policy framework of Govt of India can provide required solutions, which will benefit not only India but also whole world as evident in case of Vaccine production and supply management.

**Dr. Sarita Jaiswal** is an experienced plant biochemist working at the University of Saskatchewan and Ex Chief Scientific Officer Carpere, Canada. Her area of specialization is carbohydrate structural chemistry, metabolism and nutrition. She has sixty research publications inclusive of R&D articles, books, manuals/modules, and book chapters. She has worked in many academic and industrial research projects. She also has keen interest in cosmetic formulation development and working on her own brand development.

# The Perfect Storm

■ Dr. Swati Subodh

According to a recent McKinsey Global Survey, the pandemic has brought in years of change in a matter of months at the levels of organizations and industry. For example, the digitally-enabled products and portfolios within organizations have accelerated by a whopping seven years! Organizations that quickly adopted new strategies and practices while speeding up their own experimentation and innovations are the ones which successfully navigated through the new economic and business environment brought in by the pandemic. Interestingly, most of these changes are predicted to continue even beyond the pandemic.

As the world collectively continues to adapt and evolve to the 'new normal', there are new opportunities that emerged while others have faded into oblivion. This new equilibrium has not only nudged us to think differently but also prepare ourselves for new challenges.

The pandemic is turning out to be the necessity for the emergence of many innovations as countries struggle to contain the spread of coronavirus with a mix of technology and social strategies. Innovations in public health messaging and communication has been a huge success story in causing behavioural shifts for containment of this infectious virus and dispelling fears of the new vaccines. However, we'll zoom into a few technology innovations here that were bubbling under for a long time that found a vent of opportunity ironically due to the onset of the pandemic. Our collective strides pre-COVID-19 towards a digital economy suddenly found wings and have accelerated aspects of communication, education, financial services, e-commerce, and health & pharma to a receptive user base in ways that are expected to stay in the post-pandemic era as well.

## The Vaccine Chronicles

Unarguably the biggest achievement that emerged out of the pandemic is the



## This new equilibrium has not only nudged us to think differently but also prepare ourselves for new challenges.

development of the COVID-19 vaccine within a year of the onset of the pandemic! Not just one but multiple vaccines have reached the market with many more in late-stage regulatory approvals. On an average, vaccines otherwise take about 10 years for its journey from discovery research to manufacturing and delivery costing nearly \$500 million. The COVID-19 vaccines came to the market within 10-12 months of the first case being reported with billions of dollars in funding from different agencies pouring in for supporting the different stages of vaccine development.

The vaccine roll out has been equally unprecedented with nearly 70 million doses of the vaccine being administered in India with 4.3% of the population having received at least one of the two doses till early April 2021, i.e. within less than 3 months! This is enough to vaccinate 2.6% of the Indian population. For India this was indeed a feat as both the vaccines were indigenously developed, manufactured and distributed. Globally, 628 million doses of the vaccine had been administered by early April, enough to cover roughly 4.1% of the world population.

The next phase will require innovation on how we deliver more doses of the vaccines faster, to even the difficult to reach geographies, thereby opening up the largest logistical challenge ever for vaccination. This will now be the defining factor for how soon the world populations are vaccinated and protected against COVID-19. When a vaccine needs multiple doses to develop sufficient immunity, a healthcare worker for its administration, visit to a healthcare facility during a pandemic, and transport and storage in sub zero temperatures, then it is difficult to reach scale with the vaccination drive, especially in resource poor settings. Fortunately, oral COVID-19 vaccines are in development and are at various stages of pilot testing. They might be able to address the challenge of larger-scale vaccination efforts provided their safety and efficacy is sufficiently proven, in addition to its obvious logistical advantages.

### Genomics-back to basics

Another technology that catapulted due to the pandemic was the DNA and RNA sequencing technology. These have been around since the advent of the human genome project for nearly two decades but had been confined to the domains of scientific research (so called 'theoretical backwaters') and small scale clinical studies. For the first time the study of the genome (termed 'genomics') came into the public health domain for real-time monitoring, diagnostics, surveillance and critical decision making.

In January 2020 the sequence of the SARS-CoV-2 was published, post which various diagnostic, therapeutic and vaccine efforts launched simultaneously. Now with the emergence and spread of the coronavirus variant, sequencing technologies are again being positioned to tip the scale between the virus vs vaccine dilemma.

Although 2021 is the year of the vaccine, it is also the year of the COVID-19 variants with the last two months seeing an increase in their spread leading to second, and at many places a third, wave of infection escalation. Genomic surveillance has come of age during the pandemic and is at the forefront of strategies for tracking and containing the virus.

In the past year, nearly 360,000 SARS-CoV-2 had been sequenced and stored in GISAID, a non-profit online database for sharing viral genomes. Similar efforts have been made in the UK as part of the COVID-19 Genomics Consortium (COG-UK). These efforts helped in identifying the B.1.1.7 variant in the UK leading to travel restrictions and policy interventions.

Closer home, the INSACOG (Indian SARS-CoV-2 Genomic Consortium) is funnelling genome sequences from 10 network labs for public health decisions. Sequencing has become so important during this pandemic that the slow rate of sequencing in INSACOG due to hiccups attributed to resource and logistics is being considered as 'potentially disastrous' at a time when the variants (UK strains, South African strain and Brazilian strain) are being reportedly on an upswing in the Indian population with many states re-imposing partial curfews and lockdowns. For the period January-March 2021, only 1% (7664 samples) of the total positive samples were sequenced, as opposed to the target of 5%. Hopefully, the efforts will soon be stepped up considering the renewed urgency.

### TeleHealth-doctor at a click of a button

Another domain which has been around for many years but that suddenly gained a lot of traction during the pandemic is the telehealth services and platforms. As the hospitals closed doors for non-emergency and non-COVID-19 cases across the countries last year, patients with chronic ailments and those requiring regular monitoring and medical advice were suddenly left high and dry. To maintain the continuum of care during social distancing norms, self quarantines and lockdowns, many hospitals, clinics and private practitioners aligned with telehealth platforms to cater to this cohort. Businesses thereby re-invented their business model and implementation strategies in favour of digital interventions to stay relevant and profitable while providing the much-needed medical services to those who could afford and access it.

As compared to pre-COVID-19 times, the telehealth consultations increased by three times in India. Besides having obvious provider-side advantages like, expanding access to care, reduction of disease

## Innovations in public health messaging and communication has been a huge success story in causing behavioural shifts for containment of this infectious virus and dispelling fears of the new vaccines.

exposure to health workers and patients, optimizing use of the scarce personal protective equipment (PPE) and reduction in dependency on specialized facilities, and cost of maintaining infrastructure, there are patient-side advantages as well. Other than convenience of accessing care, the telehealth platform also served well in maintaining patient confidentiality, especially for diseases which have social stigma attached to it. Women, who are less likely to seek medical care for themselves due to social factors and domestic factors could also avail these services. This was evident as the men:women ratio for care seeking increased from 75:25 to 68:32 during the pandemic. Gynaecologists and general physicians were the most consulted by women. Interestingly, there was a 502% rise in online consultations by patients above 50 years of age and a 25% rise in late night consultations. Consultations for mental health issues also saw an upward trend.

Although these are promising trends, they are limited mostly to urban India. Similar trends were seen in developed countries as well. However, penetration of telehealth services in the underserved regions was low. A hybrid physical-virtual model is being tested by many to increase traction and acceptance in geographies with low uptake of telehealth services. A McKinsey

Global Institute report of 2019 states that if telemedicine services were to replace 30%-40% of in-person consultations in India then the country can save upto \$10 billion in healthcare costs by 2025.

With the government coming up with a new telehealth policy for online consultations by video, audio or chat, this trend is expected to grow further in times to come.

**Artificial Intelligence & data analytics-making sense of chaos**

Needless to say, the adoption of digital technologies and vast quantum of data generated in healthcare, either through digital devices or due to electronic patient records, has brought about a higher growth in AI and big data, a sector that was already accelerating leaps and bounds.

AI in healthcare has been enhancing chronic care management, care delivery, clinical decision support, selfcare, fitness, prevention/wellness, and remote diagnostics. With many hospitals and healthcare providers already tuning into remote patient management and diagnostics, the quantum of data has increased alongside. Applying analytics and intelligence by putting this data to use for upgrading their existing services and

predictive care is another step. Many health APIs have now opened up that would provide resources and data sharing across healthcare institutions and datasets.

In summary, the pandemic has proven to be an unlikely catalyst for many innovations which were in the wings but came to the forefront by leveraging the opportunities that came along. Innovators and technologists have adapted quickly to this evolving environment and have not just created wider market opportunities for themselves, have discovered and reached a bigger customer segment within a few months which would otherwise have taken them years. These trends, which are likely to continue beyond the pandemic, now need to be contextualized to reach even the low-income segments to truly scale and create wider impact.

**Dr. Swati Subodh** is a scientist and healthcare professional in the field of Infectious Diseases. Her work spans from basic research to identification of high potential innovations for better public health outcomes. She has published widely and has led her research team in various government and industry supported projects.

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# ▶ INNOVATIONS

## AI MODEL TO DETECT ASYMPTOMATIC COVID-19 PATIENTS JUST BY THE SOUND OF THEIR COUGHS RECORDED OVER PHONE CALLS



The asymptomatic covid-19 patients are more difficult to trace as these people do not know that they are sick. However to overcome this problem, MIT has found out a solution the answer to which lies in the use of Artificial Intelligence. In this direction, Researchers at Massachusetts Institute of Technology (MIT) in one of their latest researches have found out that asymptomatic cases of COVID-19 may differ from healthy individuals in the way they cough. The study shows that an AI model can detect asymptomatic covid cases by analysing the sound of their coughs.

To conduct the study, researchers used forced-cough recording submitted by volunteers via smartphones, laptops and web browsers. Using this collected information, the AI model was then trained using tens of thousands of spoken

words and coughs. The AI model is based on four algorithms which analysed the data and resultantly it accurately identified 98.5% of coughs from confirmed cases of COVID-19 and detected those cases who had no symptoms but tested positive with



100% accuracy. The study is published in the IEEE Journal of Engineering in Medicine and Biology.

The uniqueness of this model lies in the fact that it can detect who may be a carrier

of COVID-19 even without any visible physical symptoms, just by hearing the way a person coughs. The human ear cannot differentiate between the cough of a healthy person and that of an unhealthy one but this can be picked up by Artificial Intelligence.

The study also emphasises that a person's sentiment is embedded in the way he/she coughs. AI by analysing one's cough easily pick up things like the person's mother tongue, gender or even emotional state. In the long term, the research team intends to incorporate this AI model into a user-friendly application so that it can be made accessible to a large number of people. In the form of an application this model can be convenient, free and non-invasive screening tool for coronavirus.

SOURCE: [www.businessinsider.in](http://www.businessinsider.in)

## SUPER SPECIALISED DEMENTIA AND ALZHEIMER'S CARE CENTRE FOR ELDERLY OPENED IN BENGALURU

**D**ementia is the most common disability and dependency in older people worldwide. India alone has nearly 53 lac elders suffering from dementia which makes it number 2 in the world as far as the caseload is concerned and Karnataka itself has 3 lac such cases. The forecast is that India's Dementia and Alzheimer's burden will reach nearly 7.5 million by the end of 2030. Despite the prevalence of such a number of cases only a tiny fraction of them are formally diagnosed and treated. Taking care of one's mental health is still considered a stigma in Indian society and sadly by most Indians memory loss is considered as an unavoidable part of ageing rather than a degenerative disease that must be looked into and treated just like any other medical condition. So to cater to such group of suffering elders, a Geriatric Care specialist, KITES Senior Care has launched an exclusive, super-specialised Dementia and Alzheimer's Care Centre in Bengaluru, Karnataka.

The facility is located in HBR Layout in North Bengaluru, headed by a team of well trained and highly specialised medical experts. The state of the art facility has Superior rooms, Counselling rooms, Consultation rooms, Cafeteria, Library, Activity room, Yoga and Exercise hall, Prayer room and a Terrace Lawn with 24 beds. The place provides Day Care, Residential Care, Family Counselling Services and Memory Clinic for elders with Alzheimer's and Dementia. Patient safety was the most important point kept in mind while constructing the world class facility specially designed by Healthcare Architects in conjunction with the medical experts.

Doing effort to treat such patients with the right kind of care, provided at the right time becomes imperative now in India that out of the 1.3 billion population nearly 11 crore Indians are above the age of 65 years which is likely to grow to about 24 crore by the year 2040, making elderly

care an essential service to be available throughout the country. It is sad that as a Nation, presently we are under-served to provide the right care for these illnesses. So every endeavour should be made right now to take care of the elderly with such disabilities.



KITES Senior Care has received a funding of INR 4 crores which it intends to use to expand its infrastructure and is looking to raise more money so that it can provide its services to more number of cities soon.

SOURCE: [www.cxotv.news](http://www.cxotv.news)

## THE INDIAN DIGITAL HEALTHCARE PLATFORM "MEDIBUDDY" RAISES FUNDS

**C**hennai-based Digital healthcare platform, Medibuddy is India's leading digital healthcare platform for inpatient, outpatient, wellness and fitness needs that gives its users 24\*7 access to quality healthcare allowing them to have doctor consultations, book lab tests and order medicines by letting them enjoy the comfort of their homes. The healthcare platform has a partner network of more than 90,000 doctors, 3000 diagnostic centres, 2500 pharmacies and 7000 hospitals covering 23,000 pincodes and a team of 1000 members located across 22 cities in India.

Medibuddy attends to the needs of more than 35,000 users everyday across India. For the online consultations with medical specialists via video or voice call in real-time the specialities include Cardiology, Dermatology, General



Medicine, Gynaecology, Neurology, Paediatrics, Psychiatry and more. In February 2021, Medibuddy has raised \$ 40 million from multiple investors with the aim to bringing more healthcare, disease management and wellness curative services and with the objective to scale up its market penetration and provide affordable and accessible healthcare

services to the entire Indian population. The vision of Medibuddy is also to expand its infrastructure technology, team members and network of doctors, labs, pharmacies and hospitals.

SOURCE: [www.cxotv.news](http://www.cxotv.news)

## GENE EXON SKIPPING THERAPY DELIVERED FOR DUCHENNE MUSCULAR DYSTROPHY FOR THE FIRST TIME IN INDIA



**D**uchenne Muscular Dystrophy (DMD) is a genetic disorder affecting mostly the male children who suffer from muscle wasting and they typically live only until 35 years of age. Until 2019 there was no definitive treatment of DMD but in 2019 FDA approved a Genetic Engineered Medicine called Vyondys 53 for its treatment. A total of 26 children have been given this medicine since then and have shown promising results. Vyondys 53 is a Gene codon correction at the defective DNA level.

In India Kenmax Multispeciality Hospital, Madurai has become the first in the country to receive the 'Gene exon Skipping therapy' which has been delivered to a 10 year old patient suffering from DMD under the guidance of Dr. K. Raghavan, a renowned paediatric Neurologist. The patient was diagnosed with DMD at the

age of 3.5 years. This young patient is the 27th patient in the world to receive this advanced treatment. JOGO Health which provides the patient neuromuscular assessment and then the digital neuro-rehab therapy has been roped in to evaluate and help in the functional recovery of the child. As opined by specialists Vyondys 53 is by far the most advanced and definitive treatment of DMD. As per the neuro-therapists from JOGO Health, the patient has shown very good progress since the administration of Gene Therapy alongwith the digital therapeutics from JOGO.

Kenmax multi-speciality hospital is 50 bedded, located in the heart of Madurai which specially focuses on people with rare Genetic neurological disorders like Muscular Dystrophy, Neuro-Rehabilitation, Behavioural disorders in

children and Special Education needs. Kenmax Multispeciality hospital has now tied up with JOGO Health to take care of such patients collaboratively. Kenmax is one of the Government of India Clinical Trials Registry of India (CTRI) registered institutions for clinical research and are presently involved in Gut-Brain Axis study in collaboration and funded by University of Okinawa, Japan. This study is an approved CTRI study. Current work is also going on the influence of Yoga on Neurotransmitters in Autism.



SOURCE: [www.techplusmedia.com](http://www.techplusmedia.com)

## PORTABLE ULTRASOUND SYSTEM - 'BUTTERFLY IQ'

**C**onnecticut-based company, Butterfly Network has launched an ultrasound system which has recently won the CE mark and so is going to release its Butterfly iQ portable ultrasound system in Europe. The device is already available in the US at a price of \$2000 per unit and the company has recently opened to take orders for the European market and some other

qualifying countries.

The product has a transducer that plugs into an iPad or iPhone via the lightning port, by using a matching application to display live images, change settings and review previously obtained scans. There is an ultrasound-on-chip ultra wide band matrix within the transducer which lets the product as if it has three

different transducers built in. The microelectromechanical sensors (MEMS) are fixed in the matrix of the transducer system and are a part of an integrated circuit that contains all the necessary electronics. It is this tight integration which leads to a fast, high-resolution device that can perform tasks that only full-sized ultrasound machines were capable of just a few years ago.



This product can now be used by a clinician anywhere as he/she is able to perform a variety of scans using one portable device. This device may be the most versatile ultrasound machines in the market today. The uniqueness of Butterfly iQ lies in the fact that the company compares its technology to how photo camera sensors have been integrated within smartphones, allowing a person to have high quality photo imaging in their pocket.



SOURCE: [www.mobihealthnews.com](http://www.mobihealthnews.com)

## TO SCALE UP VIRTUAL HEALTH PROGRAMS ‘EVIDATION’ RAISES FUNDS

# evidation

California-based company, Evidation has recently raised funds worth \$153 million to expand its virtual health programs on Achievement Platform which is America’s largest digital health network. Evidation via its virtual health programs make it easier for individuals to manage their health. Alongwith the expansion of its virtual health programs, the company will also invest on building on its trust relationships with individuals and analysing person-generated health data

for its stakeholders across healthcare. New programs to be launched by Evidation intend to transform how individuals interact with the ecosystem of care by providing personal insights and tools to empower and motivate people to take evidence-supported actions to understand, manage and improve their health in a better way. With these steps Evidation becomes the first company that can help digital health and Biopharma companies generate evidence about their treatments and then empower and enable

individuals to use that evidence to take their own health-related actions.

As a company, Evidation measures health in everyday life and enables anyone to participate in ground-breaking research and health programs. Privacy of its user and control over permissioned health data form the foundation of Evidation. It partners with leading healthcare companies to understand health and disease outside the walls of a hospital or clinics. Its mission is to include,

enable and empower every individual to participate in better health outcomes. Evidation works with various public health organisations, medical speciality societies and academic institutions and has till date since its inception conducted more than 100 real-world studies across different therapeutic areas. In 2020, the firm touched the milestone of more than 1 million individuals participating in different researches and health programs.

The company has been able to make rapid, virtual research at scale possible and it is believed that company's innovative platform can be leveraged to guide patients on their journey to a healthy

living. In 2020, the company launched its first virtual health initiatives including Achievement for Heart Health- a first of its kind health program to help people monitor and improve their cardiovascular health outside clinical settings with the initial focus on heart failure. This program was launched in collaboration with the American College of Cardiology. LumiHealth, another personalised program that partnership with Apple and the Government of Singapore. These privacy-safe health programs seamlessly connect care and research, fastening the discovery and dissemination of evidence-supported practices which improve health outcomes.



SOURCE: [www.businesswire.com](http://www.businesswire.com)

## '54GENE' - THE MOST INNOVATIVE START - UP OF AFRICA



Recently launched Nigeria-based start-up, 54gene is considered to be the most exciting and innovative start-ups to come out of Africa. The basic aim of 54gene is to address the significant gap in the global Genomics market where the pharmaceutical researches use almost 90% of the genetic material from Caucasian region and less than 3% from Africa. This statistic is prevalent despite research saying that Africans and people of African ancestry are genetically more diverse than all other world populations combined and also less than 1% of global drug recovery happens in Africa. 54gene seeks to solve this problem by including the underrepresented Africans in Global Genomics research.

Presently the company has operations in Nigeria, Africa and United States of

America. When African population is not included proportionately in research, then we see potentially sub-optimal treatment outcomes as a result of which one cannot expect good health outcomes for them. It has been proven that when Africa is properly included and made to participate in research it produces better treatment and diagnostic outcomes in the long run. 54gene is a health technology company which is deriving insights from the world's most diverse populations i.e African to solve some of the biggest challenges in the healthcare sector. It is more than just a Biobank wherein it wants to collaborate with pharmaceutical companies to advance basic research and not just sell anything and everything in the market. Since there are no pharmaceutical companies located on the continent, 54gene intends to facilitate these

companies working in various locations of Africa. 54gene also runs clinical programs that help to test drugs and treatments that ensure that they have optimal medicines for their population.

The spread of COVID-19 pandemic is proving that research needs to be carried out inclusively leaving no population unrepresented proportionately as we have witnessed that covid has shown disparities on how it affected different populations. By getting diverse participants into research a broader picture of treatment and diagnostics can be developed to help get better health outcomes.

In 2021, 54gene has also launched its first whole genome sequencing laboratory with the help of American Biotech company, Illumina. The facility will now enable them



to sequence and generate the data which informs whether or not any variance is noticed and then such observations can lead to well-regarded publications. 54gene seems to be a very promising endeavour which will represent what true Africa is to the world in the healthcare domain with the aim of improving lives of many Africans witnessing better health outcomes.

SOURCE: [www.techcrunch.com](http://www.techcrunch.com)

## ISRO to establish 'Space Technology Incubation Center' at NIT Rourkela

The Indian Space Research Organisation (ISRO) is going to establish a 'Space Technology Incubation Center' (S-TIC) at the National Institute of Technology Rourkela to carry out research and product development in space technology and applications. This Centre will enable start-ups to build applications and products that could be used in future space missions. NIT will extend its state-of-the-art laboratories, facilities and expert faculties to meet these objectives. The upcoming centre will promote startups, capacity-building, innovations and research in Space Technology in the States of Odisha, West Bengal, Bihar and Jharkhand besides the Andaman and Nicobar Islands. The MoU between ISRO and NIT Rourkela for setting up the S-TIC was signed on 18th March 2021 virtually. This collaboration with ISRO will open up new opportunities for research & development as well as space start-ups.

It will also offer a great opportunity for academia to collaborate with industries and contribute in this Aatmanirbhar Bharat Abhiyan in the Space Technology sector initiated by ISRO. Congratulating NIT Rourkela on this occasion, Dr. K. Sivan, Chairman, ISRO and Secretary Department of Space, Government of India, highlighted that the space technology-related research and the products from the S-TIC will be utilised in future Space missions and will help nation building through 'Aatmanirbhar Bharat Abhiyan' in space technology and applications domain. Students and research scholars will execute real projects given by ISRO of NIT Rourkela taking



ISRO team at MOU signing occasion

guidance from expert faculties, mentors from ISRO and relevant industries. Prof. Animesh Biswas, Director, NIT Rourkela, said, "I heartily thank ISRO Chairman and Director of CBPO (Capacity Building Programme Office) for selecting NIT Rourkela in the Eastern Region for setting up of S-TIC. NIT Rourkela's Sponsored Research and Industrial Consultancy is one among the best in the country.

ISRO's support will further enhance our research infrastructure." The Key Outcomes envisaged from the S-TIC include research & innovation in Space technology, product development, IPR, prototype development, space start-up and business Incubation. A project book 'YUKTI - Sanchita 2021' was also released by Dr. Sivan during the occasion. ISRO will provide an annual Grant-in-

Aid of Rs. 2 crore for a period of up to two years to NIT Rourkela as seed money for setting up the S-TIC. The seed money would be utilised for facility augmentation to carry out the research projects and product development taken from ISRO. NIT Rourkela will provide the required infrastructure inside its academic campus under the supervision of Prof. Susmita Das from NIT Rourkela.

SOURCE: *India Science Wire*

Compiled by:

**Dr. Avnatika Batish**, working as the Director Strategy and Healthcare at International Health Emergency Learning and Preparedness. She is also a guest faculty for MBA (HR) and MBA Healthcare Management at various B-Schools and is a soft skills trainer.



## WHY VIRTUAL EVENTS?

# VIRTUAL EVENT as a SERVICE

### OUR EXPERIENCE?



Low Cost with a Higher Return on Investments



Modular and Repeatable



Interactive and participative



Great value for participants



Greater Outreach



Scalable and Measurable



## HIGHLIGHT PROJECTS

### PARTICIPANTS

### WEBINARS

European Union ICT Standardization

1800+

27

European Higher Education Virtual Fair 2016

16000+

87

European Higher Education Virtual Fair 2015

13000+

73

Knowledge series webinars with European Union & Indian clients

2000+

30

Fight Corona IDEathon

5400+

SAMADHAN

9000+

Smart India Hackathon 2020

10000+

ScanBalt Digital Forum 2020

~ 200

The Cancer Genome Atlas 2020

1500+

## PARTNERS



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# ► WELL BEING

## Effects of Covid-19 on medical student stress levels and coping mechanisms; implications for individuals in stressful environments.

■ Dr. Siddhanth Rangineni

"First day in Medical School they get a stack of books and a dead human being. That, I'm afraid, would change you" does anyone remember this line from the TV show The Mentalist?

Well, it's true that studying medicine and stress go together. Everything from the humongous syllabus to handling patients in the hospital, in addition to the pressure from parents & professors and let's not forget the RAGGING. All of these things in just the first few months, it's nothing short of overwhelming.

Most medical students who are around 17-18 years of age, go through some of the most competitive entrance exams to get into medical school. A lot of them stay away from home and live in residential facilities of their college, which to put it politely are "sub-par". Did I mention the examination process during college; the voluminous syllabus, theory exams with high passing marks, along with practical exams which go on for an entire day or sometimes longer in my experience. These exams consist of at least 4 viva voce sessions usually dealing with actual microscope slides, organs, bones & sometimes real people. I can't think of any other course outside of medicine that has such a strenuous examination process.



Hence, it has become vital for medical students to develop healthy coping mechanisms, especially in the present situation, with the additional strain on the

medical community. For budding doctors to avoid burnout and stress, they need to be provided with the right guidance & support.

**It has become vital for medical students to develop healthy coping mechanisms, especially in the present situation, with the additional strain on the medical community.**



**STRESS**

**DAY TO DAY**

► **Classes & postings**



Let's dive into what causes the stress; the classes where one is exposed to a humongous amount of information, which trust me can be a pain to sort out later. Next, we move on to either the dissection hall or to clinical postings depending upon which year they are in and here they face a barrage of questions from any corner of the book (if they have figured out which book and author to read from); irrespective of whether it has been covered in previous lectures or not, by not only professors but sometimes residents as well. In addition to practising their clinical skills, only if the patient feels like it of course.

► **Mental pressure**

In the midst of all this at some point, they will have a break (if the unit in charge allows it), which is often spent writing records, and followed by more classes or labs. Now, if the students have made it this far, they can happily exit the building with some time to socialize & vent; unless they are in their first year, then they have to watch out for groups of idle seniors looking for their next prey.

It doesn't end here, if you are a medical student you have to face pressure from parents, extended family or even from themselves to get distinctions, gold medals or even about entrances into residency programs; to get everything absolutely right! Imagining that, you have started to scratch the surface of what it feels like to be a medical student.

► **Prevalence of mental illness among medical students**

Medical students go through a very high depression & anxiety, though fifth-semester students having the highest stress scores among medical students, however, the prevalence of stress among 1st-year students was found to be around 91.1%. Erratic sleep schedules go hand in hand with medicine students.

**DURING COVID-19**

After years of writing tests, slogging, surviving the academic and management pressure comes the time to enter clinical postings and all of a sudden the pandemic showed its prevalence.

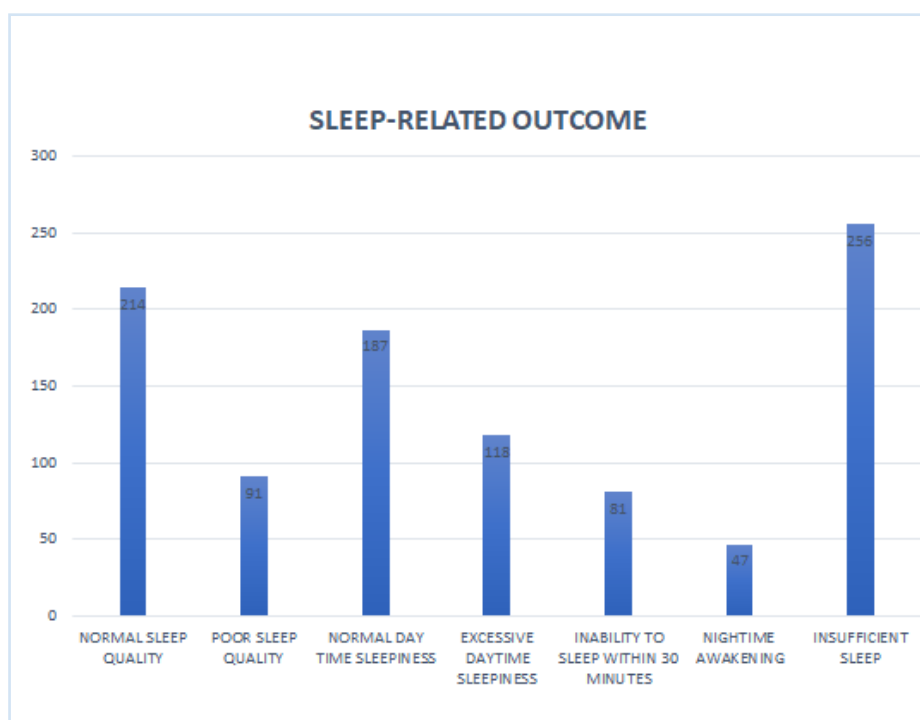
► **Cessation of clinical postings**

Medical students are proven to be at a higher risk of developing mental health disorders during their training period. With the added stressors related to the pandemic, the abrupt cessation of clinical postings for medical students will expose them & their family members to risk if they do decide to participate in clinical postings. These circumstances have placed the medical students in a real catch-22 situation. The decreased interaction with their peers will pose difficulty for those students who had higher levels of depression, anxiety, and stress, to begin with, leading to exacerbation of symptoms.

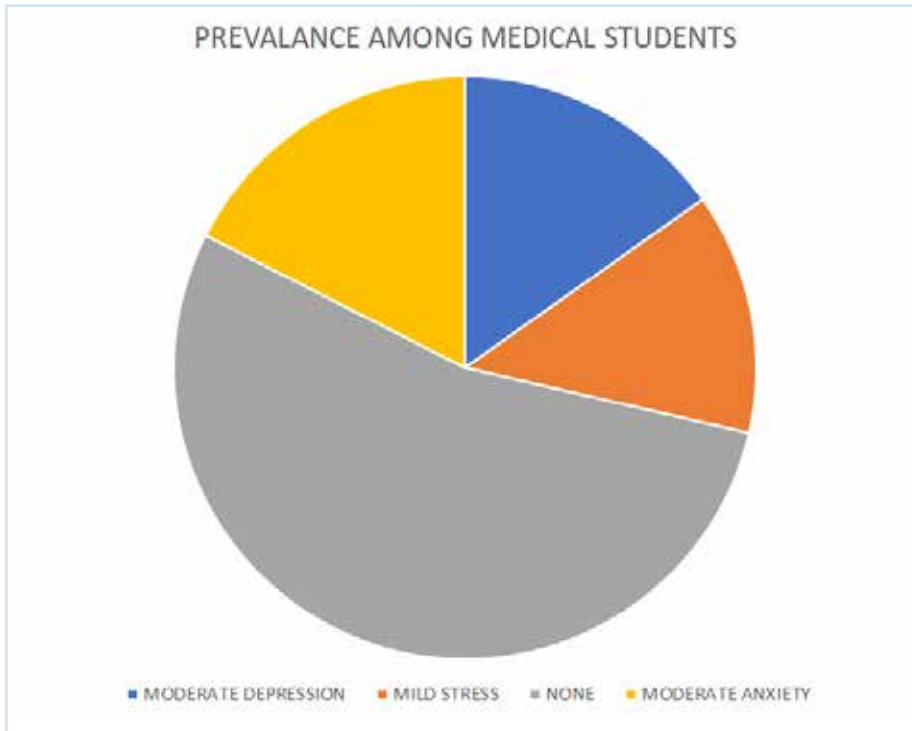
► **Online classes**

Amid all this chaos, online classes have played a big role in controlling their anxiety symptoms due to being distant from the perceived risk of COVID-19. One study revealed that 87% of students perceived less income knowledge from online classes and over half of the students were totally satisfied with it, and in another study, anxiety levels significantly decreased and knowledge score stopped being a predictor for medical students' anxiety after switching to the online learning, in contrast with their non-medical peers. Another reason for this could be that minimization of medical students' presence in hospitals.

► **Exacerbation of mental illnesses during COVID-19**



PERSONA  
THEME  
INNOVATIONS  
WELL-BEING  
IN FOCUS  
RESEARCH  
NEWSCOPE



According to some studies, 35.5% of the undergraduate medical students, including residents & interns showed symptoms of depression, anxiety, and stress respectively during COVID-19 outbreak with the majority with moderate depression (15.2%), moderate anxiety (17.5%), and mild stress (13.4%). Findings show that poor sleep quality is both a cause and an effect of increased depression, anxiety, and stress symptoms in medical students during this pandemic. Thus, worsening of one could exacerbate the other.

**ABOUT THE FUTURE**

**NEED FOR PSYCHOLOGICAL SUPPORT**

► **Necessity**

There is nothing new about hardships for Doctors and Medical students, this year being one of the toughest for the medical fraternity. Nonetheless, in order to have long thriving careers, it is crucial for students to learn the importance of support systems like friends and family to rely upon and develop coping mechanisms to help buffer the various stressors & prevent burn out.

► **Coping mechanisms employed**

According to surveys done among Asian medical students, there is a complex relationship between the various stressors and the coping strategies employed by students; which include

- Positive reframing
- Planning
- Acceptance
- Active coping
- Self-distraction
- Emotional support
- Humour
- Religion

whereas on the other end of the spectrum; negative Coping Styles like,

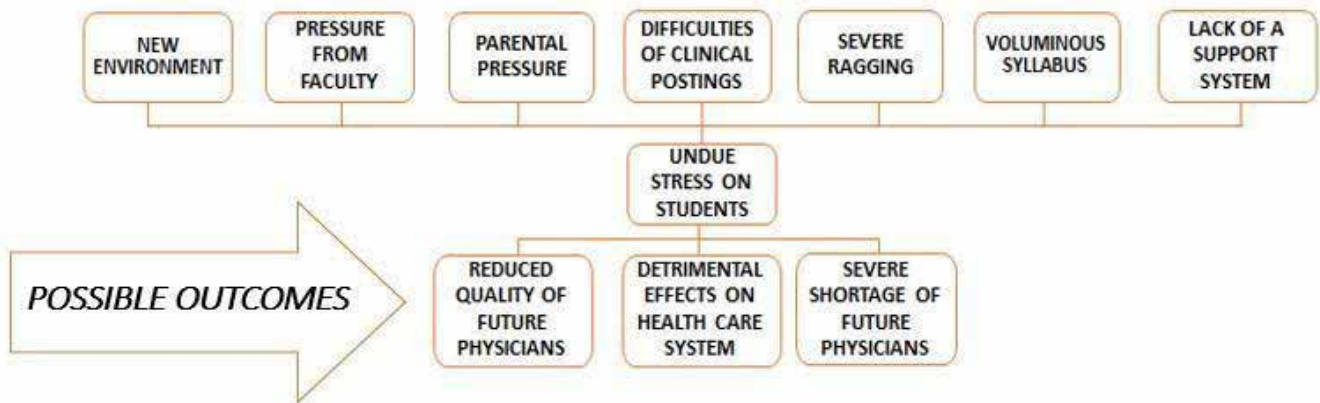
- Blame
- Substance Use

► **Responsibility of medical institutions**

There is a need for medical institutions to show more initiative, to aid their students as they go through drastic changes at a vulnerable stage in their lives.

- The students should be taught different stress management techniques to improve their ability to cope with a demanding professional course.
- The living conditions of the students and their recreational facilities should be improved.
- There is also a need to bring about changes in the quality of teaching and evaluation system.
- Accustom the medical students to have healthy expectations & avoid perfectionism (factors like self-expectation and expectation from their significant 'others' may influence students' perception of their marks).Hence, the contents, teaching ,learning methods and the evaluation process needs to be analysed and improved.
- Providing an exam schedule at the beginning of the year.
- Encouraging cooperation instead of competition.
- There should be a psychologist exclusively for this group who could foster healthy interpersonal relationships with the student, and, thereby, be in a position to nurture their potentials, as well as see them through the stressful periods.
- There should also be frequent workshops on enhancing coping techniques.
- Since all the behaviour and responses pass through the filter of personality, there should also be programs which help the student to identify strengths and weaknesses in his/her personality, and make changes accordingly.





## OPPORTUNITY FOR PERSONAL GROWTH

For anyone, this can be a discombobulating time; when it is incredibly difficult to learn, with all of our plans in a state of disarray. It can be a good time to take our blinders off & try to look at other things.

Your mind could be scrambling for things to do during this phase & it might be a good time to expand “what defines you”, to slow down and re-evaluate your priorities.

If you are a medical student, doctor or in any intense field it only gets tougher, not easier. Now, this is not one of those toughen up & push through speeches. In our journey to heal & help other people or should I say in our rush; there are some things we should internalize.

First, the work we do is good work, but it is also a difficult work. Not that this should stop us, but it is worth the acknowledgement. Second, the empathy



we show to others, learn to show some of it to ourselves. Third, to pay attention to the intricacies of our own mind; our values, the things that excite us, what makes us

special, how we like to spend our time, what we want & how much we are willing to put up with to get it; with the same attention we pay to our books. Fourth, especially for anyone in the medical field It is important to learn to heal our patients however, it is also equally important to learn to heal ourselves as well. Finally, it is okay to ask for help, whether it be from our loved ones, our classmates, or from our institutions.

**Dr. Siddhanth Rangineni** is an intern in Shadan Institute of Medical Sciences, Hyderabad. He is interested in psychiatry as a specialization & enjoys writing.

Understanding the your emotions, triggers & biases.

Learning to accept uncertainty.

Discovering or rediscovering things besides medicine that matter to you.

Learning to self care.

Understanding the importance of stillness & reflection.

# The Truth about Self Love and Ways to Love Ourselves

■ Dr. Nitika Kohli



**W**elcome the most romantic time of the year with all your heart & love. It's a perfect time to embrace the annual opportunity to show "yourself" the kind of love & kindness you're missing upon. As love is not just about those valentine promises, red heart & roses, it is about the act of deep adoration- SELF LOVE.

Whenever I say self love, quite a few people think it's just a fancy tagline of being selfish or self-obsessed! But that isn't the truth. If you're wondering what the real truth behind self love is, how it works and what are the ways to love yourself - you're at the right place!

## What is Self Love or Self Care as per Ayurveda?

As an Ayurveda practitioner and firm believer of incorporating ayurvedic principles into our everyday lives, I feel self care or self love is the first step towards

healing. Just like you can't solve a problem unless you acknowledge its existence; similarly, no medicines or treatment can work on your body and mind unless you make positive changes and take proactive steps to keep yourself happy.

Talking about the act of self-care Ayurveda presents an insightful description of self-love in form of "dincharya" or daily routine. By following these simple yet very effective procedures we can keep ourselves better and healthy on every single day.

Although those small day to day practises work like miracles for you and your body. But might not work the same for your friend – like you maybe a tea person while your friend or companion needs

her morning coffee! Therefore, to identify the key principle it's important to identify your dosha type and make sure your daily habits are in line with it. This can help you give your mind and body that coveted inner balance.

## The Three Ways of bringing Self Love into your everyday LIFE

There are three primary ways of bringing self care into your daily routine, that includes-

**Healthy daily diet, proper lifestyle and peaceful sleep routine.** Simple little changes in these three aspects of your life can make your body and mind happier than you can imagine!

Don't believe it? Let's delve deeper...

**As love is not just about those valentine promises, red heart & roses, it is about the act of deep adoration- SELF LOVE**



### Diet & Ayurveda

Well, your love for potatoes will not really make you a potato, but the essence is that our body craves for certain types of foods and it ultimately decides our overall fitness, moods and much more!

Small dietary changes that might help you feel better -

- **FOR REFRESHED MORNING-** Begin your day with a cup of warm herbal tea as it detoxes your body & soothes your systems. It also helps you to kick start your day with energy.
- **FOR HYDRATED AFTERNOON-** consume cool green smoothie and enjoy it while it's still fresh- as sunny days bring nothing but dehydration & to overcome its adverse effect of your body-
- **FOR LOW EVENING-** Enjoy that bar of dark chocolate you've been saving for something special!
- **FOR HUNGER STIVE-** Reach out to a stash of guilt free nuts and dry fruits to snack on

- **FOR CONSCIOUS EATING-** Incorporate healthy greens and sprouts into your diet & no matter what you're eating, eat mindfully and chew every bite properly
- **FOR SOOTHING NIGHTS-** End your tiring day with a glass of warm milk with turmeric

Following them all is hard right? Don't worry adding any one of these in your routine will make a huge difference



### Lifestyle & Ayurveda

Our crazy work routines, stress and everyday chores are literally never ending, and this pandemic (with WFH, less help and kids staying home) has brought that into focus like never before. But what is life if we can't enjoy a few little pleasures every single day?

I suggest doing a little something for yourself every day. That "something" may

not be a costly spa session or a vacation. Here are a few simple things that you can do everyday -

- Start your day with a 3 minute self face massage or facial (with a suitable natural oil) to invigorate your senses and your skin!
- Practise 5-minute everyday meditation session just by closing your eyes and staying away from screens (and other distractions) works wonders for your body and mind
- Not exercising every day? Start today! Even if it's just for 10 minutes to begin with.
- Yoga person or gym enthusiast? No matter what's your exercise style, let's bring it out in the open! The fresh air and greenery around can double the benefits of your everyday exercise routine.
- Read that book you've been wanting for! Even if it's just a couple of pages to begin with.

- Watch a relaxing movie!
- Soak yourself in a hot bath tub or take a warm shower. Light some essential oil candles to truly relax yourself
- Show your feet some TLC - soak them in a hot tub and follow up with a foot cream massage before you tuck in for the night

- Dedicate 6-8 hours to peaceful sleep every night
- Switch off all screens at least half an hour before your sleep time
- Make sure your bedroom light and temperature is perfect for a good night's sleep
- If you are restless, avoid intake of caffeinated drinks before bedtime
- A glass of warm milk can help you sleep better
- Soft instrumental music can relax your mind and help your body unwind
- Light essential oil diffusers by the bedside to soothe your nerves

### Sleep & Ayurveda

On an average, we spend one thirds of our lives sleeping. Yes! It's THAT important. So if you've been ignoring your sleep routine, it's time to wake up (pun intended!).

Things you can do to improve your sleep -

- If you've been missing sleep due to work or other reasons, sleep debt can pile up. Prioritize your body and put everything else on hold - sleep 8-10 hours at a stretch to help your body refresh and recharge.
- On a regular basis, try going to bed and waking up at the same time everyday - weekday or weekends don't matter!



#### Start Loving Yourself - Today

There is no right time to indulge in self-care, once you start loving the act of self-love, every day will be a valentine's day for you & your surroundings. Practising these very beneficial tips every day, brings in the change you have been looking for. Start with just one idea of your diet, lifestyle and sleep every day and feel the change. So here I am signing off with more power & positivity to you & unless you're in that "smitten in love" phase of life! – true love is nothing but self-love.

**Dr. Nitika Kohli** is a prominent Ayurvedic Expert and the leading maestro of AIMIL healthcare Delhi. A versatile and high result-driven Ayurvedic Physician who has delved her study in the search of social well being. She is known for her marked contributions to society for the welfare of Vitiligo patients.

**AYURVEDA**

VATA KAPHA PITTA

ETHER AIR EARTH WATER FIRE

# ► IN FOCUS

## Three Key Pharma Marketing Trends in 2021

■ Irene Trivett



The product has always been king in the pharmaceutical industry, but pharma marketing comes a close second. Pharma marketing is a huge industry on its own, earning nearly \$30 billion (\$233 billion) in the past 20 years—a 70% increase in that timeframe as per the latest research. As the world acknowledges the importance of drugs and pharmaceuticals, especially following the pandemic outbreak, it's clear that pharma marketing has a bright road ahead.

With the fast-evolving technology and rapid change in consumer behavior, one question remains: How will pharma marketing change moving forward?

### Zero-click search

More than half of all online searches now occur without even clicking, thanks to Google's new zero-click search. A zero-click search is one in which Google displays an answer in a snippet at the top of the search engine results page (SERP), eliminating the need to visit the webpage. This way, one site is chosen to be the

authority on the specific search query. This is bad news for websites that don't even make it to the first SERP. More often than not, users will click on the read more button on the result snippet than go through the other results.

On the other hand, this could also be an advantage for smaller pharma companies that don't end up at the top of the SERP.

**A zero-click search is one in which Google displays an answer in a snippet at the top of the search engine results page (SERP), eliminating the need to visit the webpage.**



As the zero-click search is reliant on content, these companies could create specific content that may earn them a snippet. Digital marketing firm Ayima highlights the importance of expertly written content, as this doesn't just help you rank in the SERPs, it also attracts your target market to your site. Furthermore, these snippets could be viewed as free advertising for your pharma brand. Invest in strategic SEO content and optimize your Google Ads campaigns to stay as relevant as possible, and snag a potential snippet.

**Telemedicine**

The spike in telemedicine spending during the first peak of the pandemic showed how in-demand the service really is in Indian. In August 2020, the National Digital Health Mission (NDHM) pledged to support the universal health coverage with a budget of \$4.7billion (\$63.6 million).

A caveat of this new method of delivering patient care, however, is that doctors, hospitals, and pharmaceutical companies need time to get comfortable with the new arrangement. As we previously talked about in our 'Marketing approaches in the Era of Digital Healthcare Transformation' write-up, the change in health's digital landscape has led to a mass transformation of business models as the healthcare and pharmaceutical sectors, as well as the consumers, are coping. In fact, these changes all lead toward a connected care paradigm in which you'll need to integrate social media, and other mobile and online platforms with healthcare, including pharmaceutical marketing.

**AI & hyper personalization**

Mass media marketing may be making a swift exit as more and more physicians and consumers—the key opinion leaders (KOLs) in pharma—are searching for more targeted information. Artificial

intelligence (AI) allows pharma companies to have access to real-time data and insights due to the AI's machine learning capabilities. AI-driven tools eradicate human error, making its data analyses and, consequently, hyper-personal strategy deployment near flawless.

In addition to social listening and hyper-specific KOL mapping, AI tools can also do game-changing marketing copy auto-generation. This essentially lets you publish pharma content which could triple engagement metrics among physicians and patients, as reported by PM360. What's more is that this success is scalable and repeatable, so it's a good idea to invest in good AI tools for your company as soon as you possibly can.

Pharma marketing is an omnichannel and very interconnected process, so it may actually benefit you to try a combination of these trends to make sure that your pharmaceutical products can gain a bigger market share.

**Artificial intelligence (AI) allows pharma companies to have access to real-time data and insights due to the AI's machine learning capabilities.**

**Irene Trivett** is a writer who focuses on health technology, digitalization, AI and informatics.



# What is Estonia doing with Block chain in providing healthcare to its citizens?

■ Dr. Sunita, Simran Malhotra, Shradha Chandak



**E**stonia, officially known as the Republic of Estonia is a country in the Baltic region, to the north of Europe. The Gulf of Finland borders this country to the north and Latvia from the south.

Estonia enjoys incredible progressions, high monetary pay and among the quickest developing economies in the European Union. The Estonian residents are all around furnished with widespread medical care, free education and one of the longest paid maternity leave in the OECD. Estonia is the first country in the world to launch an EHR system

registering all the patients' data from birth till death. Estonia's quality of healthcare is very good.

Estonia is one of the most digitally progressive countries in the world. Estonia's medical services information is 99% digitized. It is the first country which uses the blockchain in healthcare. Since 2008, 'hash-linked time-stamping' has been used in the public and private sector.

In 2011, the Estonia experts in association with Guardtime, a cyber-security enterprise based in Estonia in 2007, used the Keyless Signature Infrastructure (KSI)

blockchain science to make the health records impenetrable. The essential reason for KSI is the exclusive use of hash-function cryptography which gives records validation rather than dependence on other centralized trust authorities. In 2016, Estonian e-health foundation launched a blockchain technology to secure the health records of the patients.

Residents of Estonia carry smart cards through which they can access over 1000 online government portals to check their health records. With conventional network protection like firewalls, attacks can go undetected for quite a long time, and it is also difficult to find the amount of the information that has been stolen or destroyed. Blockchain secures online health records by making information immutable. Hackers will not be able to make any changes in the data.

**In 2016, Estonian e-health foundation launched a blockchain technology to secure the health records of the patients.**

All the Digital transactions made with Blockchain technology are recorded irreversibly. The records are difficult to change since they are shared across many computers in real time through a distributed ledger, globally.

The blockchain technology utilized in Estonia is unique from standard block chains because of its adaptability. Blockchain technology can offer individual citizens a transparent and clear view of their clinical data for the first time ever.

To keep up health data totally immune and time available to people, the electronic ID-card gadget used by the Estonian e-Health record utilizes blockchain technology for ensuring information integrity and protecting the data from the internal threats. In this manner, the forgery is easily detectable and damages to a person's health can be avoided.

The Estonian Government is joining hands with a company Guardtime to implement Blockchain. The company has been working with the government since 2011 to secure records. Ten main pharmaceutical agencies – initiated by way of Roche and co-ordinated by the Swedish Association of the Pharmaceutical Industry (LIF) – have partnered with Guardtime to enable the visibility of “real world data” in healthcare with the ultimate intention of realizing outcomes-based contracting. EY, Sensyne Health and Guardtime to use AI and blockchain to link health care reimbursement and actual patient outcomes.

Estonia makes use of blockchain technological know-how to put into effect the integrity of the government data and systems. Estonian Information Systems Authority (RIA) is a crucial provider company for the Government, they guarantee the admission to the blockchain network for the State Agencies via existing digital public service software known as X-Road to create the EHR network.



Selected State Registries backed by using the blockchain technologies are: Healthcare Registry, Property Registry, Business Registry, Succession Registry, Digital Court System, Surveillance/ Tracking Information System, Official State Announcements, and State Gazette.

Estonia is leading the way in the blockchain revolution. Implementation of blockchain has secured certain records, facilitates better healthcare, more environment friendly transactions and empowers the patients.

**Application of Blockchain technology in Estonian Healthcare**

1. Medical practitioners have unlimited access to the patient’s information and allocate the required time for each of their patients.
2. The information is immutable and hackers cannot make any changes to information. Hence, the information cannot be tempered.
3. A huge volume of records can be put under a secured ledger.

**Challenges of Blockchain technology in Estonian Healthcare**

1. Blockchain technology suffers a security issue due to the past bitcoin breaches. As healthcare data has to be kept very confidential and safety is the primary concern. Break Level index reported 554 million lost or stolen records in the first half of 2016. Security is the major challenge.
2. Management and transferring of the data from the existing system to a new system also poses a major problem in the implementation of blockchain. A lot of technology is required in rebuilding the existing data which is very expensive.
3. Also, the mindset of people is hard to change for adapting a new technology. Few people were reluctant to get accustomed with the new technology.

**Dr. Sunita, Simran Malhotra, Shradha Chandak** are the students of International institute of health management Research, Delhi (IIHMR). They are currently pursuing PGDHM in hospital and healthcare management.

**Residents of Estonia carry smart cards through which they can access over 1000 online government portals to check their health records.**

# ► RESEARCH

## How can blockchain help in immunization certificate: An International Travel Passport

■ Varsha Prasad



It is more than a year since the onset of the global pandemic COVID-19. After months of lockdown and restricted outdoor activities, things are now getting back towards normal, globally. Despite all the precautions such as social distancing, sanitization, wearing masks along with other guidelines that are issued by WHO and health organizations of respective countries regarding COVID-19, there is a significant probability of an individual to get infected by the virus. In order to reduce the possibility of the spread of the infection to the community, vaccination is key and to know who is vaccinated and who is not there is a trend of adoption of

immunization certificates among certain nations.

**Immunization certificate** refers to the certification from an authorized doctor or representative of the state or health department of any particular country, which states that the person has received immunization towards infectious diseases under this regulation, together with the types of immunizations administered and date of administration as proof of immunity. In the present scenario, when the movement of people is getting back to normal, it is very important to have these immunization certifications. In case

of international movement of people, the significance of these immunization certificates is even more. Some of the European countries and U. S. have already been considering similar proposals for other infectious diseases like yellow fever. In context to COVID-19, these immunization certifications are useful for both domestic as well as international travellers while travelling from high-risk areas or towards high-risk areas.

Currently- Seychelles, Thailand and Georgia are some of the countries which are allowing international passengers to enter in their county if they are vaccinated



with doses of vaccinations which are permitted in those countries. In addition to these, there are certain more countries which are in process of allowing the immunized travellers to visit them.

In India, there is no provision of standardized immunization certificate for COVID-19 as of now but there is a written copy provided to patients which mentions the vaccination details of the patient. Though some of the countries are following the concept of paper-based

immunization certificate for COVID-19 immunization.

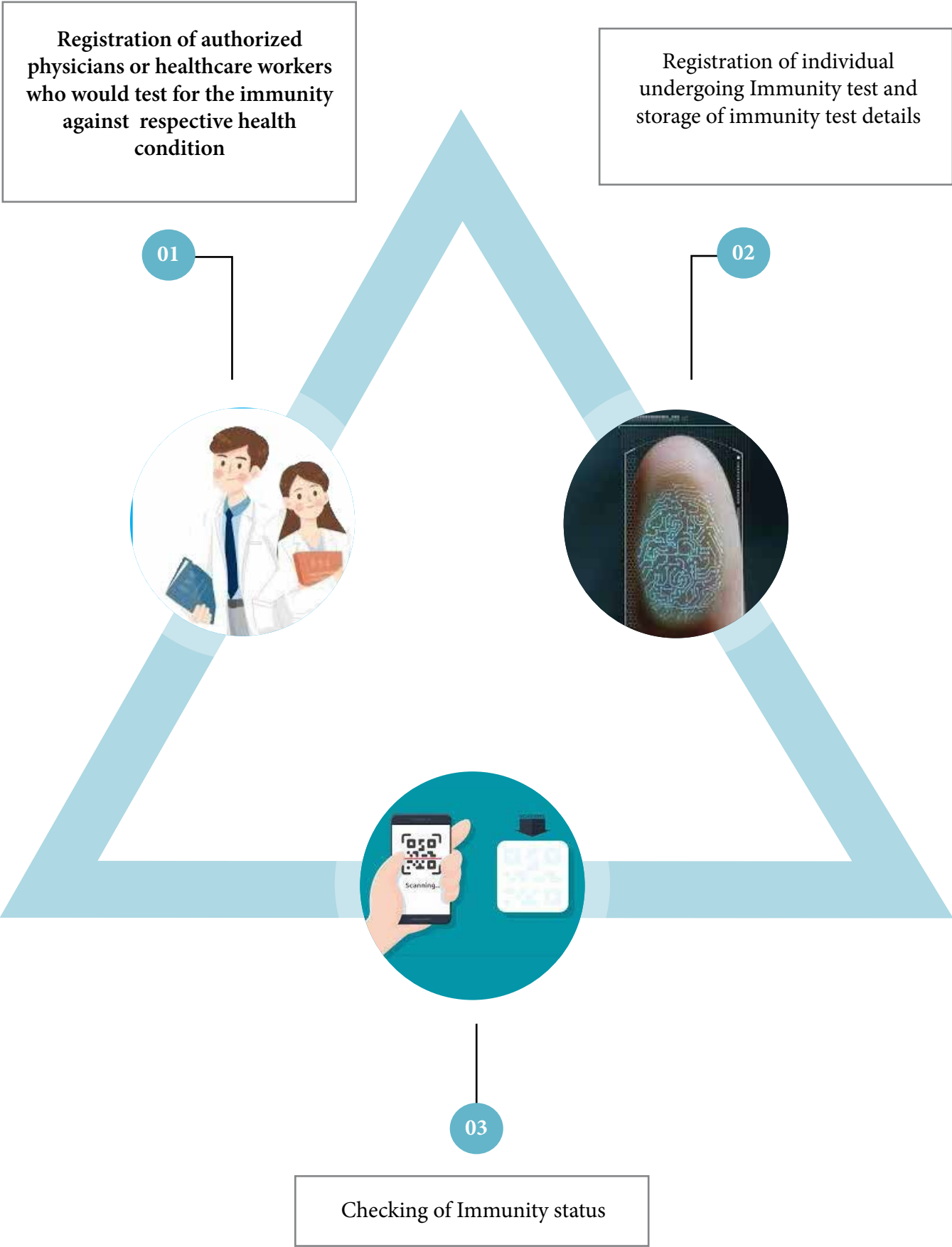
But there are some of the **challenges that are associated with the use of these paper based immunized certificates.** The primary challenge that arises with the current paper-based immunization certificate is that for these there should be a government body that needs to be appointed which can take care of the certificate related activities, even once the certificates are issued to certain

individuals, it becomes almost impossible to track the statistics of the associated data. In addition to this, there is a need for a proper infrastructure to be implemented on such a large scale, which also questions the availability of both financial as well as human resources (certifiers). Also, there is a possibility of some ethical issues related to the incidence of fake certificates. Technology can certainly be useful in order to overcome the various challenges that are associated with the paper-based immunization certificates. **Blockchain** could be used as a supportive as well as efficient option to replace these traditional methods of certification.

This **blockchain based network** would work as a decentralized platform which function as follows -

First of all, a representative of the healthcare authority who is appointed for testing purposes needs to be registered in the blockchain and is provided with the testing id which can be useful for

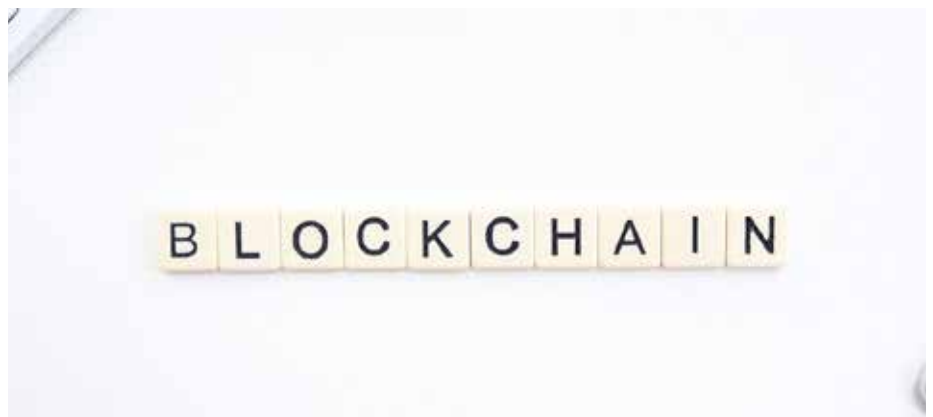
**Despite all the precautions such as social distancing, sanitization, wearing masks along with other guidelines that are issued by WHO and health organizations of respective countries regarding COVID-19, there is a significant probability of an individual to get infected by the virus.**





identification purposes. After the establishment of testers at different nodes of the blockchain, individuals of the respective nation needed to be registered and provided with a unique immunization identifier inked with their biometrics. These individuals are then tested and their results are stored in a digital format in the blockchain by the corresponding testers along with their validity. These individuals must be provided with a password or QR code that can be used to review the information stored by the testers, so that they can use the information as per their convenience. At last, there must be an option for the individual to share her immunity certificate with any third person with their consent.

This sort of technology set up eliminates the need of any trusted third parties. With the help of such a blockchain based immunization certificate system, it would be very convenient to keep track about the status of vaccination of a particular health



system. These blockchain based certificates would work as international passports to visit foreign countries by eliminating the paperwork and eliminating the risk of infection because of the use of fake certifications. There would no threat to the security of the individual as well as they are tamper proof which ultimately make them ideal for being reliable for considering as entry pass for domestic as well as international travels.

Though there are some challenges in implementation of blockchain based technology as there is resistance by the healthcare workers for the adoption of digital technologies but this can be overcome by proper training and assistance, also the **benefits obtained from this technology outweighs the financial investment.**

Currently, **WHO partners with Estonia in order to support the blockchain based immunization certificates.** There are certain countries trying to figure out vaccine passports for prevention and surveillance mechanisms, interestingly blockchain fits in providing an effective as well as efficient infrastructure for the same.

**Technology can certainly be useful in order to overcome the various challenges that are associated with the paper-based immunization certificates. Blockchain could be used as a supportive as well as efficient option to replace these traditional methods of certification.**

**Varsha Prasad** is currently pursuing PGDHM (Post Graduate Diploma in Health and Hospital Administration) from IIHMR, Delhi. She is a trainee with Akhil Systems Pvt. Ltd (ASPL). Her areas of interest lie in Healthcare IT and emerging Digital Health technologies.

# How can Blockchain help in the Pharma Sector?

■ Kritika Arora, Col Niteesh Kumar, Sneha Khurana, Dr. Reshu Mathur and Dr. Priyanka Gupta



**B**lockchain is a buzzword and this new technology is maturing day by day. It is amply clear from banking to supply chain; it is ready for disruption. Blockchain technology can revolutionise various fields particularly in the healthcare sector to bring the change and lead a digital transformation, from medical records to pharmaceutical supply chains to smart contracts for payment distribution, there are plenty of opportunities to leverage this technology.

Blockchain technology can change the healthcare in three ways: -

## 1. Health Records

Electronic Medical Records (EMRs) are the backbone of every modern healthcare system. But as the medical record grows longer and becomes more complex

with each visit to the doctor, it is not always easy for healthcare providers to obtain them. Companies like Patientory, Medibloc or Medical chain aim to solve this problem with a goal to give patients the authority over their entire medical history and provide a one stop access for patients and physicians as well. Blockchain would not only simplify and make access more efficient, but inherently bring data security to this field as well.

## 2. Supply chains

The pharmaceutical industry has one of the highest standards for product safety, security and stability vulnerable to disruption. For example: supply chain management with the help of blockchain technology can be monitored securely and transparently, reducing time delay and human error. It can also be used to

monitor costs, labour and even waste emissions at every point in the supply chain. It can also be used to verify the authenticity of products by tracking them from their origin source, combating the counterfeit drug market that costs 200 billion dollars in losses to the market annually. Companies like Chroniced, Block pharma and Modem are already working towards more efficient Blockchain logic solutions.

## 3. Genomic Market

Companies like Encrypgen and Nebular Genomics are building Blockchain platforms to enable people to share genomic data safely and securely in a new emerging market. They claim that in future, opportunities around personal genome sequencing will create a data market with billions of dollars and will be the best technology to solve data security issues and to ensure that data gets from the source to its end-user without any middlemen.

**The pharmaceutical industry has one of the highest standards for product safety, security and stability vulnerable to disruption.**

**Underlying Problems in Pharma Industry**

As per WHO reports,

a) One in ten products circulating in low and middle-income countries are either substandard or falsified and in western markets about 1% of all drugs in circulation are believed to be fake.

b) The global market for fake drugs is blooming, counterfeit pharmaceuticals are a lucrative sector with roughly 200 billion euros in circulation.

c) The rising complexity of supply chains in a globalized world as well as the growing number of online pharmacies leveraging the anonymity advantage of the internet surely contribute to these developments

**d) Developing new medications that can treat (or prevent) the incurable illnesses of today**  
 The most visible obstacle remains the greatest one. There are some new treatments for already incurable diseases that Big Pharma has to come up with. Alzheimer's Disease and multiple cancers continue to be among the list of people that need to make real progress.

**e) Customer standards are constantly increasing**  
 The market climate is only becoming tougher and more ruthless. Payers of healthcare continue to impose further rate controls on the providers. Around the same time, they are actively scrutinizing the dollar value provided by individual drugs to their members even more closely than ever before. They expect better medications and therapies that deliver higher benefits at more cost-effective rates than the existing ones. In order to reinforce all arguments made about the supremacy of one medication versus rivals in the region, they often insist on seeing evidence for real world clinical outcomes.

**The market climate is only becoming tougher and more ruthless. Payers of healthcare continue to impose further rate controls on the providers.**

**f) Issues of management culture slow much needed changes**

Another ingrained aspect, which is difficult to reform in a rush, is management culture. The prevailing management culture, industry-wide strategies, and mental models on which the sector has become dependent are more or less identical to what it has always relied upon. Despite this fact that newer methods of doing business today and for tomorrow have disrupted them. Through the design of their pharmaceutical website, pharma seo, and the development of integrated content experiences, management would need to concentrate on developing better digital experiences for their consumers.

Therefore, it is a top concern for the pharma industry and health regulators to fight the shady world of the largest fraud market.

**How can the problem be solved?**

Several countries have been working on a medicine tracking system for years, but tracing and authenticating drugs moving through the distribution network requires an appropriate electronic system. Until now, serial numbers and barcodes or radio frequency identification are the basic steps to verify drugs with the pose-pedigrees being another tracking option. However, these supply chain solutions are not interoperable and won't have a significant impact on preventing counterfeits and in the end protecting patients.

Blockchain Technology can be used to track all transactions of an asset in a distributed ledger of cryptographically secured time-stamped records, thus enabling the digital transfer of values -directly and without middlemen. Blockchain is a decentralized and transparent system that does not need trusted third parties such as banks but



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establishes trust via secure and traceable transactions with an immutable IT infrastructure. Also, everybody can participate in a peer-to-peer network ecosystem making faster and cost -saving dealings possible.

In order to address the counterfeit drug problem caused by insecure supply chains, blockchain could work as a drug supply platform with manufacturers as well as end customers for its unique ability to track pharmaceutical products throughout the whole supply chain by ensuring drug identification, tracing and verification, thereby benefits such as trust and transparency can be achieved.

E.g. -Cryptotec ensures the authenticity of drugs from production house to delivery of the pharmaceutical product, thus preventing introduction of counterfeit products into the market.

**Blockchain Technology can be used to track all transactions of an asset in a distributed ledger of cryptographically secured time -stamped records, thus enabling the digital transfer of values -directly and without middlemen.**

### Pharmaceutical Supply Chain

The capacity to create an auditable trail and establish drug provenance throughout the entire supply chain is one of the greatest advantages of blockchain technology. A survey conducted by the Pistoia Alliance revealed that nearly 70% of pharmaceutical and life science leaders believe that blockchain will have the greatest impact in this area. Both manufacturers and their customers would be able to independently verify the quality and point of origin of drugs quickly and securely with a decentralized blockchain solution.

For members of the pharmaceutical supply chain, transparency and security are two other key benefits of blockchain technology. All stakeholders involved in the supply chain must be able to share and update information while also ensuring

that the information is timely and accurate. The entire supply chain can be managed with blockchain technology with one piece of software shared between authorized stakeholders. In addition to drug manufacturers and their suppliers, the data can be accessed by payers, suppliers, pharmacies, and patients to see when it is updated in near real-time.

### Blockchain and Serialization

Blockchain technology will play a key role in the willingness of the industry to comply with various regulations on serialization around the world, including the U.S. 2013 Protection Act of the Drug Supply Chain (DSCSA) and EU Falsified Medicines Directive 2011/62/EU (FMD). Serialization includes the specific identification, at the level of individual units as well as in aggregated packaging units, of and drug product. It is important to exchange information on the product, its development (location, date, batch number, etc.), the logistics path, etc., with all supply chain partners involved in the distribution of the medication to the patient.

The aim is to make it possible to track goods back to their point of origin across



the supply chain. Blockchain technology's transparency and protection are ideally suited to allowing serialization, not just because it allows data exchange, but also because the records are unchangeable, which makes regulatory auditing simpler.

**Impacts of Manufacturing**

The development of next-generation, individualized treatments may also be enabled by blockchain technology. The logistics involved in the development of autologous cell therapies are highly complex and require a chain of identification assurance. The sample taken from a patient must be returned to that patient until transformed into cell therapy. Blockchain technology can help the manufacture of this type of customized product.

In a doctor's office or hospital, it can also allow 3D printing of personalized drugs.<sup>13</sup> One such drug has already been approved by the FDA: Spritam®, as approved in 2015, for the treatment of epilepsy. Better structures are required for handling manufacturing and

patient data to make this approach to drug manufacturing more practical. For the determination of the optimal dose and formulation for a given patient, AI and ML could be used to analyze this safe data and input it into a 3D printer for the development of a customized drug.

**IP and Tech Transfer**

This issue could be resolved by blockchain-based platforms to manage early-stage technology details. The technology is an excellent match for monitoring the work carried out in a network that is decentralized and convoluted. Investors will use the platform to identify the owners of a given technology and create permanent records of any deals they execute. Smart contracts allowed by blockchain technology, once the underlying binding contract has been coded, allow the execution of a contract without human intervention.

These smart contracts will allow pharmaceutical companies, for the protection of intellectual property, to develop and enforce IP agreements, such

as license agreements, and even to make payments in real time in response to the recording of milestone achievements. Blockchain security and accountability could also provide a digital way of protecting documentation of the roots of innovation and ensuring the safety of trade secrets, such as the specifics of the development process.

Blockchain and partnerships with payers Through monitoring forms, negotiating discounts and rebates, and processing and billing prescription drug claims, usually through electronic channels, pharmacy benefit managers (PBMs) act as intermediaries between pharmacies, drug suppliers and payers. A much more effective and transparent solution could be provided by Blockchain technology that could minimize duplication, alleviate price variations and provide a better customer experience. Blockchain technology and intelligent contracts, for example, could accelerate the process of insurance authorization on the front end and pace claims processed on the back end.

**Infrastructure Building**

One of the key limiting factors for the introduction of blockchain technology in the pharmaceutical industry and other industries is the construction of the

**The technology is an excellent match for monitoring the work carried out in a network that is decentralized and convoluted.**

infrastructure to enable data exchange and transaction monitoring through the pharmaceutical production supply chain and the broader healthcare system.

The development of applications that can exploit blockchain technology is the priority of all major application software companies and many new start-ups. Acceptance of data exchange must be realized in addition to the implementation of these physical networks, which will involve cooperation and demonstration of the protection and privacy features of blockchain solutions.

- Novartis is using blockchain technology and the IoT to identify counterfeit medicines and track temperature with real-time visibility for all participants in the supply chain.
- Merck recently garnered a blockchain patent on its own covering technology for preventing counterfeit drugs by increasing supply chain security.
- In a combined effort, Pfizer, Amgen and Sanofi are investigating the use of blockchain technology to safely store patient health data to speed clinical trials and lower drug development costs.
- Blockchain startup Exochain offers a way to securely store and manage clinical trial patient data that also allows patients to control how researchers may interact with their medical data.
- Boehringer Ingelheim (Canada) has partnered with IBM to test the ability of the latter's blockchain platform to "improve trust, transparency, patient safety and patient empowerment in clinical trials" by improving the management of clinical trial processes and records.
- Recently, IBM announced that it is working with KPMG, Merck and Walmart to develop a pharmaceutical blockchain platform that can track drugs as they move through the global supply chain.
- MediLedger, which has over 20 members, including Pfizer, Amgen and Gilead. The goal is to leverage blockchain's capabilities to create an interoperable system in which multiple parties, including manufacturers, wholesale distributors, hospitals and pharmacies can register, verify and transfer pharmaceutical products with absolute trust in their authenticity and provenance.

- With blockchain technology, the entire supply chain can be managed with one piece of software that is shared among authorized stakeholders.

The benefits of incorporating blockchain technologies to enhance the protection of the supply chain, promote clinical trials, and improve patient data management effectiveness are obvious. Of course, some degree of danger comes with the introduction of every new technology. While blockchain technology is attractive because it guarantees confidentiality, it is not possible to completely remove or ignore the risk of data breaches or system failures. Scalability is also a concern which has yet to be tackled.

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# Are our sportspersons over exhausted? The increasing case of Hypertrophic cardiomyopathy

■ Dr. Debleena Bhattacharya



**T**he lethal cardiovascular disease that is now omnipresent in young athletes poses a complex dilemma regarding sportsperson safety, patient autonomy, team or institutional risk tolerance and medical decision-making.

The goodness of regular exercise on cardiovascular health and all-cause mortality are well established. However, the recent studies have demonstrated that nearly threefold increased risk of sudden cardiac death (SCD) is found in young athletes with underlying cardiovascular conditions when compared to sedentary individuals.

Hypertrophic cardiomyopathy (HCM) is the most common cause of SCD in athletes younger than 35 years of age.

The people associated with any sports usually perform intensive and regular exercise to maintain their fitness and they thereby develop a variety of electrical and structural cardiac adaptations that

eventually manifest them to improve the stroke volume, reflexes that invariably enhance their performance.

Greater left ventricular (LV) wall thickness is seen more compared to sedentary controls in nearly one-fifth of young athletes (aged between 14–35 years).

**The people associated with any sports usually perform intensive and regular exercise to maintain their fitness and they thereby develop a variety of electrical and structural cardiac adaptations.**



The usual cause for tiredness are iron deficiency, viral infections, asthma-like conditions, medication, mood disturbance and endocrine conditions such as PCOS or RED-S and the non-medical causes of tiredness in the athlete are an inappropriate training plan, poor sleep, lifestyle stressors, inadequate macronutrient intake and suboptimal hydration.

Apart from this, nutrition plays an important part in the life of a sports person. As these patients are considered to be at high risk of sudden cardiac death (SCD) during exercise hence it is kind of reserved for them and hence sedentary lifestyle is advisable to them.

In India the need for contemporary public and physician awareness towards the broad spectrum of HCM should be developed through the training and educational mode.

The healthcare system should be upgraded and an expert technical team pertaining to developing advanced HCM-specific cardiac imaging, interpretative echocardiography and cardiovascular magnetic resonance need to be made. Another important initiatives involve access to adequate numbers of trained medical and paramedical personnel to support expanding defibrillator implant programmes, as well as the identification of surgeons experienced in septal myectomy. With the increase in impact of advanced heart failure and the option of transplant now we have greater relevance to the multidisciplinary approach for HCM.

In terms of priority the standard imaging and clinical evaluation has more importance than laboratory-based genetic testing for HCM management.

Proposed hierarchical model as an approach to developing dedicated hypertrophic cardiomyopathy (HCM) programmes, with components and treatment options arranged with respect to initial priority. AF, atrial fibrillation; ASA, alcohol septal ablation; CMR, cardiovascular magnetic resonance; ICD, implantable cardioverter defibrillator; SD, sudden death.

Though slowly but steadily the HCM is causing a lot of havoc in the present healthcare system. The latest data showed a steep increase in the number of deaths of sportspeople and in certain cases they are restricted to sedentary lifestyles.

According to a new research from the University of British Columbia, Canada, gives us the study that even the fittest among the sports person are not immune to cardiovascular disease — and they often don't have any symptoms. Another study published recently in British medical journal Open Sport and Exercise Medicine, highlights the importance for middle-aged athletes to have their doctor check their cardiovascular risk factors, when high blood pressure, high cholesterol or diabetes are prevalent in their family history of cardiovascular disease.

**The latest data showed a steep increase in the number of deaths of sportspeople and in certain cases they are restricted to sedentary lifestyles.**



The inherited condition of familial hypercholesterolemia is a condition that is characterised by very high levels of cholesterol present in the blood.

Cholesterol, a waxy, fat-like substance created within the body and obtained from foods that return from animals (particularly egg yolks, meat, poultry, fish and farm products), is needed by the body to form cell membranes, bound hormones and compounds that aid in fat digestion. In individuals with monogenic disorder, the body is unable to induce additional sterol, and it builds up within the blood. The surplus sterol is deposited on the inner walls of blood vessels, notably the arteries that offer blood to the guts (coronary arteries), forming clumps (plaques) that slender and harden artery walls. because the plaques get larger, they will clog the arteries and prohibit flow of blood to the guts. The build-up of plaques in coronary arteries causes a style of pain referred to as angina and greatly will increase a person's risk of getting a coronary failure.

Familial hypercholesterolemia is sometimes caused by mutations in 3 genes — LDLR, APOB or PCSK9. Changes within the LDLR sequence is the measure for the foremost common reason behind this condition. The LDLR sequence provides directions for creating a macromolecule known as LDL receptor. This kind of receptor binds to particles known as low-

density lipoproteins (LDLs, legendary ordinarily as unhealthy cholesterol), that square measure the first carriers of sterol within the blood. By removing LDLs from the blood, these receptors play an essential role in controlling sterol levels. Some LDLR sequence mutations scale back the quantity of LDL receptors made inside cells.

Less ordinarily, hypercholesterolemia is caused by mutations within the APOB or PCSK9 sequence. Proteins made from these genes square measure essential for the traditional performance of LDL receptors. Mutations in any of those genes forestall cells from creating useful receptors or alter the receptors performance. Hypercholesterolemia results once beta-lipoprotein receptors falters to measure and are unable to get rid of sterol from the blood effectively. High LDLs within the blood creates risk of heart diseases at a younger age. As of now only statins are given to control the situation and if genetic default is there then only the beta- blocker injections are of temporary remedy. There are presently no medical interventions that alter the natural course of HCM, however myosin inhibitors have shown potential promise. Gene-silencing with CRISPR/Cas9 gene-editing technology might sometimes play a job within the hindrance of malady development before the intervention of clinical manifestations. Till then the shared

deciding in areas of exercise prescription, play a pivotal measure and therefore are essential to boost the standard of life and survival of patients with HCM.



**Dr. Debleena Bhattacharya** is the Associate Editor of InnoHEALTH magazine and working as an Assistant Professor in Marwadi University, Gujarat. Her area of interest lies in Environmental Biotechnology focusing on wastewater treatment.

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## LATEST NEWS IN HEALTHCARE

### BHARAT BIOTECH'S INTRANASAL VACCINE PHASE 1 TRIALS COMMENCE

*After being one of the few worthy vaccine candidates, Hyderabad based Bharat Biotech has made its next big move by entering as intranasal vaccine into the Phase 1 of human clinical trials. Though it would be quicker and also easier to administer, we will have to wait and weigh if it poses any adverse reactions to the administered person. If not, it would be a great way to quickly tackle the increasing numbers.*



**B**harat Biotech has codenamed its intranasal vaccine as BBV154, and have commenced its human clinical trials at some of the selected sites that include Hyderabad and Nagpur.

The trials of the chimpanzee adenovirus vectored vaccine candidate, being developed in collaboration with the Washington University School of Medicine at St Louis (WashU), are to be conducted on 175 healthy volunteers aged between 18-60 years at four sites – Hyderabad, Nagpur, Patna and Chennai.

Apart from the Hyderabad hospital, the Gillurkar Multispeciality hospital at Nagpur, All India Institute of Medical Sciences (AIIMS) at Patna and the

Apollo Specialty Hospital at Chennai will be conducting the vaccine trials, as per the CTRI (Clinical Trials Registry-India) website. While the institutional ethics committees of the Hyderabad, Nagpur and Patna hospitals have already approved the trials, the Chennai hospital is still awaiting the ethics committee nod.

As part of the randomised, double-blinded trial to evaluate the reactogenicity, safety and immunogenicity of the vaccine candidate, the volunteers will be divided into three groups. In the first group, 70 volunteers will be administered a single dose of the vaccine followed by a placebo after 28 days. In the second group 70 volunteers will be given two doses of the vaccine 28 days apart and in the third

group 35 volunteers will get two doses of the placebo (a substance that has no therapeutic value).

The company will conduct an interim analysis on day 42 after the administration of the first dose to ascertain the vaccine's immunogenicity and safety before submitting the data to the CDSCO (Central Drugs Standard Control Organisation).

Bharat Biotech plans to produce 1 billion doses of the non-invasive, vaccine, which is being touted as a game changer as it will not only be quicker but also easier to administer.

**SOURCE:** [www.health.economictimes.indiatimes.com/news](http://www.health.economictimes.indiatimes.com/news)

## A HIGH-LEVEL CENTRAL TEAM LED BY NATIONAL CENTRE FOR DISEASE CONTROL TO REVIEW MEDICAL CARE AND PUBLIC HEALTH ARRANGEMENTS FOR KUMBH MELA

*Kumbh Mela being the biggest pilgrimage destination in Hinduism registers thousand of devotees from around the country. All the people attending the Kumbh Mela this year will have to follow the guidelines issued by the government and any violation of which would be liable for legal actions. Owing to the ongoing pandemic, social distancing and proper sanitation would be a huge concern for such a mass scale gathering. But as it's said, crisis leads to opportunities, this on the other hand, poses a huge opportunity for the startups who are developing or have developed solutions for coping with sanitisation, tracking etc.*



In view of the large crowd that gathered on the first shahi snan on Maha Shivaratri (March 11), the central government has now deployed a high-level team led by National Centre for Disease Control director Dr SK Singh to review the Covid-19 situation in Haridwar.

The team will focus on the status of implementation of Covid-related SOPs for the Kumbh Mela. The health authorities, while speaking to media persons on Monday, said that the team will inspect whether the recommendations given to the state are being implemented or not. According to the health staff, there is still uncertainty as to whether the devotees will

need to carry negative RT-PCR Covid-19 test reports or not.

Meanwhile on Monday, 60 fresh Covid-19 cases were recorded in Uttarakhand. The cumulative Covid-19 cases tally now stands at 97,866 in the state. Also, the death of a 58-year-old man at Shri Mahant Indresh Hospital pushed the toll of the virus to 1,704. Among the new cases, the maximum of 35 were recorded in Dehradun, followed by 10 in Haridwar, seven in Nainital, four in Udham Singh Nagar, and two each in Tehri and Pauri districts.

On Monday, 86 patients recovered from Covid-19 infection, taking the recovery

rate to 96.22% in Uttarakhand. Till Monday, the state had 581 active cases.

According to the official data, the state, till Monday, had managed to fully vaccinate 95,093 people for Covid-19 and more than 1.11 lakh elderly people have been given the first dose of vaccination. On Monday, Bishan Singh Chuphal, newly-appointed cabinet minister from Pithoragarh, also took the first dose of Covid-19 vaccination at Government Doon Medical College and Hospital.

**SOURCE:** [www.timesofindia.indiatimes.com](http://www.timesofindia.indiatimes.com)



## COVID-19: FELUDA TEST KIT TWEAKED TO DETECT MUTATED VARIANTS QUICKLY

*With the rise in the covid positive cases across the world, it has become an utmost concern to detect and test the masses for any of the three new variants. As this new test will make detecting the new variants simpler, would this eliminate the need for complete genetic sequencing for diagnosis, which raises the cost manifold and takes about three days. Can it be tweaked even further for any possible mutation or new variant that might be on its way? If so, this could be the boon for the medical industry in the fight against covid.*



Researchers from the Institute of Genomics and Integrative Biology, New Delhi, have modified their gene-editing technology-based Feluda paper-strip diagnostic kit in such a manner that a simple polymerase chain reaction (PCR) test can be used to detect mutated variants of the Sars-CoV-2 virus that causes coronavirus disease (Covid-19), said the institute.

After naming their first kit after the famous fictional Bengali detective, the researchers have named the second one Ray (Rapid variant AssaY) after the author of the detective series, Satyajit Ray.

At present, to detect the UK, South Africa, or Brazilian variants, the entire virus genome has to be sequenced to look for specific mutations. This, however, adds cost and time to the process -- three days in comparison to a few hours it takes to do a PCR.

“We have developed the Feluda platform to come up with a test that can tell us in a few hours whether an infected person has any of the three new variants of concern. This will make detecting the

new variants simpler and eliminate the need for complete genetic sequencing for diagnosis, which raises the cost manifold and takes about three days,” said Dr Debojyoti Chakraborty, senior scientist at IGIB and part of the team that developed both the tests.

He added, “This does not mean we can stop sequencing the viral genome. We will still have to sequence a proportion of our positive samples to detect whether new mutations are arising or any imported mutations are in circulation. Used along with the Feluda strip, this test will just help in diagnosing whether a particular person has the mutated variant or not.”

“This does not mean we can stop sequencing the viral genome. We will still have to sequence a proportion of our positive samples to detect whether new mutations are arising or any imported mutations are in circulation. Used along with the Feluda strip, this test will just help in diagnosing whether a particular person has the mutated variant or not.”

Once a swab sample from the patient is collected, the viral RNA is extracted from it and amplified using a thermo-cycler

machine. The Feluda (FnCas9 Editor Linked Uniform Detection Assay) test then uses a paper strip barcoded with the Cas9 protein to recognise specific portions of the genetic material of the Sars-CoV-2 virus to give a positive result.

For Ray, the scientists have encoded the Cas9 protein to recognise the N501Y mutation, which is present in all the three new variants of concern. “In theory, the Cas9 protein can be encoded to recognise any number of mutations as and when they arise. The high specificity of the Cas9 can be utilised to detect any point mismatch in the viral genome,” said Dr Chakraborty.

The lab is currently in talks with the industry to market the product. Tata Sons had manufactured and marketed the initial Feluda test kits. The cost of the Ray test is likely to be the same as Feluda. The scientists had earlier said that the lab cost of the test came up to ₹500 per sample, but the final cost decision depends on the company marketing it.

SOURCE: [www.hindustantimes.com](http://www.hindustantimes.com)

# FDA AUTHORISES FIRST ML-BASED COVID-19 NON-DIAGNOSTIC SCREENING DEVICE – UK TO DEVELOP FAST TEST FOR COVID-19 VARIANTS

*With the increasing application of emerging technologies like AI in healthcare, better care outcomes can be achieved in more efficient and timely fashion. This displays a great example of how this pandemic has fast forwarded the behaviour change and that the world is now even more ready and committed to support innovative ways to fight this deadly pandemic.*

The US Food and Drug Administration (FDA) has granted emergency use authorization (EUA) to the first machine learning-based Covid-19 non-diagnostic screening device. The Tiger Tech COVID Plus Monitor is an armband with embedded light sensors and a small computer processor which identifies biomarkers that are typical to conditions like hypercoagulation or blood clotting. It will be used by trained personnel to prevent exposure and spread of the virus. The device identifies the SARS-CoV-2 virus, along with other conditions and allergies in

asymptomatic individuals over the age of 5.

Stimdia Medical, a company that specialises in the development of lung pacing devices, has received FDA's approval for its pdSTIM system. The Breakthrough Device designation allows the device to be used to treat difficult conditions and gain regular access and priority to the FDA. The system can be used in treating high risk Covid patients, to recondition the diaphragm and strengthen the primary muscle used in respiration. The device is expected to reduce weaning time for patients on mechanical ventilation.

The UK government is currently developing a test genotype assay test, which will be able to detect Covid-19 variants of concerns from coronavirus test samples. According to the UK government's health ministry, the test is expected to halve the time required to detect Covid-19 variants and will be used alongside standard testing to identify cases more rapidly, thereby curbing the virus spread and easing restrictions.

SOURCE: [www.medicaldevice-network.com](http://www.medicaldevice-network.com)

## DOORDASH, VAULT HEALTH AND EVERLYWELL COLLABORATE FOR ON-DEMAND DELIVERY OF COVID-19 PCR TEST COLLECTION KITS – TATAMD AND ANDERSON DIAGNOSTIC LABS PARTNER TO DETECT COVID-19 VARIANTS

*The US has probably been the most affected nations in this pandemic. And probably the fastest one to adopt the innovations around the fight against the pandemic. Owing to the situation, new partnerships are paving way for the consumers in the USA to get the same-day delivery of FDA Authorized COVID-19 test collection kits. This should help rectify the situation a bit since the early and easy detection could lead to faster tackling and in turn lesser affected individuals. But only time will tell how much the adoption and penetration rate is.*

DoorDash has collaborated with Vault Health and Everlywell to deliver same-day Covid-19 PCR test collection kits to consumers across the US. The collaboration facilitates consumers' access to two FDA-approved Covid-19 home collection kits through on-demand delivery from DoorDash's DashMart locations.

The test kit has been approved by the Indian Council of Medical Research (ICMR), and has already conducted more than 10,000 tests. It is being looked at as an alternative to RT-PCR tests.

Monoclonal antibodies have been making headlines since Eli Lilly's Bamlanivimab and Regeneron's Casirivimab/Imdevimab received EUA to treat mild-moderate COVID-19 in November 2020. The DripAssist Supplemental Infusion Rate Monitor, a test developed by Hometa, provides a middle ground between the simplicity of gravity infusion, and the

certainty of a pump to deliver these treatments. The device secures to the drip chamber of an IV set and counts drops with 99% accuracy using an infrared sensor. It operates continuously for 270 hours on a single AA battery, viable for emergency use such as a power outage or pump shortage, and in austere/pop-up medical clinics.

SOURCE: [www.medicaldevice-network.com](http://www.medicaldevice-network.com)

**Compiled by:**

Parthvee Jain, Editor, InnoHEALTH Magazine

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# ▶ BOOK REVIEW

Reviewed by Sachin Gaur  
Executive Editor  
InnoHEALTH Magazine

**W**hen I saw the campaign about the upcoming book of Mr Bill Gates about Climate Change, I could not resist pre-ordering it. When the book arrived at my home on 17 Feb (it was launched on 16 Feb), I took to it like the sponge absorbs the water. The book is easy to read and could be finished by a seasoned reader in a day or two. Mr Bill Gates has made it very palatable, a topic which is otherwise not so accessible. The key number from the book is fifty one billion tonnes of carbon dioxide that we produce in a year and the approach by which we can reverse and minimize this carbon footprint.

If you are someone looking for a hard problem to solve in your career, this book is a good starting point. As humanity, climate disaster is the next big thing we are staring at. While this book raises difficult questions it does not provide much answers. Maybe, we do not have the answers and still need to be discovered. I bought the book with an expectation that I will find some interesting innovative solutions addressing the climate change problem but I was left wanting! Having said that the book still empowers me to understand the problem a bit better and orients me to build a meaningful conversation and hopefully search for answers that can make a difference. The debate for climate change, green energy is everywhere, if you don't want to be carried away in such discussions but rather shape the debate and be part of the solution then this book is for you!

**BILL GATES**

**HOW TO**

**AVOID A**

**CLIMATE**

**DISASTER**

**THE SOLUTIONS WE HAVE AND THE  
BREAKTHROUGHS WE NEED**

Allen Lane

I wish if Mr Gates can convert this book to a community where readers can come and not just discuss the problem but also catalogue their experiences and share solutions.

# IC InnovatorCLUB

A not-for-profit initiative

## About

The IC InnovatorCLUB is created for innovators and its mission is to support the growth of its members in their roles as a innovators, mainly through education, local and global networking, and strategic alliances and partnerships.

## Membership details

The membership for the IC InnovatorCLUB is open for individuals, organisations and institutions in both **physical** and **virtual formats**. Enthusiasts can fill the form available at [www.bit.ly/ic-club-membership](http://www.bit.ly/ic-club-membership)

## Benefits

To encourage the knowledge dissemination within the healthcare community, we are providing the following benefits to the members of the club.

- *Free access to theme based bimonthly club meetings*
- *Upto 50% discount on conference/ master class tickets prices*
- *Complimentary InnoHEALTH magazine digital format yearly subscription*
- *Free access to embassy meeting and foreign delegation visits*
- *Exclusive perks with respect to B2B and B2G meetings*

## Associated institutional members



# InnovatioCuris

*Finding methods, tools and techniques to deliver qualitative healthcare at optimum cost at all levels*

## Our activities include

**InnoHEALTH  
Quarterly magazine**

[innohealthmagazine.com](http://innohealthmagazine.com)

**Market access**

[innovatiocuris.com/market-access](http://innovatiocuris.com/market-access)

**Training  
& Consulting**

[innovatiocuris.com/training-and-consulting](http://innovatiocuris.com/training-and-consulting)

**VIRTUAL EVENT  
as a SERVICE**

[innovatiocuris.com/veaas](http://innovatiocuris.com/veaas)

## Our activities include

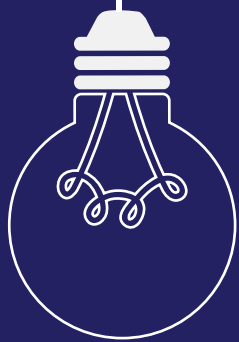
**InnoHEALTH Annual international  
healthcare conference**  
[innohealth.in](http://innohealth.in)

**IC InnovatorCLUB  
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**InnovatioCuris  
Foundation of  
Healthcare  
& Excellence  
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