Unlocking the potential of **connected healthcare** in India

Saving INR 2,150+ Cr for public healthcare by upgrading every bed to a **connected bed**



An initiative by



Impact assessment study conducted by



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Foreword



Srikrishna Sridhar Murthy CEO and Co-Founder, Sattva Consulting

The healthcare sector is one of the largest sectors in India in terms of both employment and revenue. With an aim to increase health expenditure to 2.5% of GDP by 2025 and the launch of important health schemes such as Ayushman Bharat Digital Mission, Government of India aims to prioritise improving health outcomes of the country.

However, the reality of the sector remains that healthcare infrastructure in India falls short of the demands of its large population. Total number of government hospital beds per thousand vary widely across states, with most government hospitals reporting understaffing, leading to increased stress on their limited resources. The COVID-19 pandemic further accentuated the existing challenges, thus straining the limited infrastructure available. Given the constraints faced by the sector, technology and innovations in healthcare will need to play a significant role if India is to achieve its SDG 3 targets by 2030. At Sattva Consulting, we resonate with the need of integrating technology in our public healthcare delivery systems and also recognize the importance of public-private partnerships in doing so. We are very excited to have partnered with Dozee, one such innovation that we believe can play a catalytic role in solving some of the oft-talked about challenges in public healthcare; to monitor, measure and evaluate the impact that Dozee has had in public hospitals. Over the course of this study, we interviewed 14 doctors, 60 nurses and 5 Hospital administrations across six public hospitals in India and have triangulated our insights basis these conversations.

We hope that the study methodology and insights have helped the Dozee team to align their impact framework to their business objectives as well as revisit their internal processes to better measure and govern their impact. We also hope that this report enables greater adoption of the Dozee device in public healthcare facilities and that these learnings can pave the way forward for increased adoption of more such healthcare innovations in public healthcare delivery systems.



Mudit Dandwate CEO and Co-Founder, Dozee

The last two years have been very significant for the Indian healthcare ecosystem. The COVID-19 pandemic really highlighted the acute challenges faced by our healthcare infrastructure, with problems like unavailability of secondary and tertiary care beds, lack of trained medical staff and over-stressed hospital staff coming to the fore. However, this also catalysed a wave of innovation aimed to solve these challenges with solutions like Telemedicine, Lowcost oxygenation, Remote patient monitoring, use of Al in diagnosis and triaging of high-risk patients being widely adopted in both private and public healthcare facilities.

At Dozee, we're extremely proud that we were able to step up as a company to launch our MillionICU Initiative at this time of need and partner with multiple stakeholders across the ecosystem to integrate our solution in both public and private healthcare facilities and thus deeply impact the lives of thousands of patients. Our unique remote monitoring solution has seen acceptance by hospital administration and nurses alike and has been successful in reducing the patient burden and improving the quality of patient care provided. As of March 2022, we have deployed 6600+ Dozee beds in 323 hospitals across 14 states.

As part of our MillionICU initiative, we partnered with Sattva Consulting to help us measure, monitor and track the impact that we've created thus far and also provide recommendations on pathways to improve our impact footprint. We are also immensely grateful to all the doctors and nurses who took time out of their busy schedules to participate in this study. We remain committed to our vision of transforming public healthcare systems and shall continue to release annual impact reports of our work going forward.

India's public healthcare infrastructure has huge challenges in terms of service accessibility and quality of patient care. According to the Global Health Security Index 2021, which measures a country's preparedness for epidemics and pandemics, India ranks 66th out of all 195 countries and 9th out of 13 countries that have a population size of >100 million. There are challenges across the spectrum of availability, accessibility and affordability of healthcare infrastructure and services in India that were further accentuated and highlighted by the COVID-19 pandemic. Adopting innovative technology solutions in healthcare can help mitigate some of these challenges, while improving the overall quality of patient care in India - especially within public healthcare delivery. Government policies like the Ayushman Bharat Digital Mission (ABDM) and regulations which allow 100% Foreign Direct Investment in the medical technology sector are a step in the right direction. However, there is also a need for targeted public-private interventions which can help tackle these challenges.

Dozee is one such example of technology innovation which could help solve some of the critical availability and accessibility challenges faced by public healthcare institutions. An easy-to-use contactless remote patient monitoring and AI-powered early warning system, Dozee upgrades hospital ward beds into connected step-down ICUs, enabling remote real-time monitoring of patients' vitals such as heart-rate, respiration rate, blood pressure, cardiac performance, oxygen saturation, ECG and temperature. It also provides early-warning alerts for critical patients, inturn allowing healthcare staff to make data-backed clinical decisions, thus easing the patient burden on hospital staff. Dozee saw widespread adoption of their solution across public healthcare systems because of their role in helping hospital administrations manage the COVID-19 pandemic. This led to the launch of MillionICU, an ambitious publicprivate initiative which aims to convert 1 million hospital ward beds into connected step-down ICU beds with the installation of the Dozee devices.

As an assessment partner to Dozee, **Sattva Consulting carried out an independent retrospective assessment study** to measure the impact of Dozee and estimate its potential on the public healthcare delivery system in India. The assessment aimed to study the adoption and acceptance of the device; its impact on workload of the medical staff; its impact on quality of patient care and on operational cost at hospitals; and the impact of digitisation of patient vitals. Highlighted in the next page are some of the key findings and insights from the assessment study.



Figure 1: Benefits of connected hospital beds

Please refer to the next four pages for a summary of the key findings and insights from the study

IMPACT OF DOZEE

ON-GROUND Adoption of Dozee











Nurses found Dozee's continuous monitoring useful

REDUCTION OF WORKLOAD For Medical Staff



2.5 HOURS Time saved everyday/ nurse

3

IMPROVED QUALITY OF PATIENT CARE

Nurses felt more in control of a patient's health Total life-saving alerts triggered¹



DIGITISATION OF PATIENT VITALS

97%

Nurses support automation & digitisation of patient vitals



OPTIMISED HOSPITAL BED UTILISATION



Reduction in patient stay on ICU bed



Reduction in patient stay in hospital ward

3,700 PATIENTS

Additional patients that can be provided critical care annually/ 100 Dozee beds



COST SAVING POTENTIAL

₽26%

reduction in cost of ICU operations



reduction in cost of hospital ward operations

₹2.3 CR Annual direct savings/ 100 Dozee beds

₹0.4CR Annual indirect savings/ 100 Dozee beds



INTRODUCTION

A Healthcare System Desperate for Relief





India ranks 66th out of 195 countries and 9th out of 13 countries (with populations over 100 million) on the Global Health Security Index 2021, which measures the capacity of a country to prepare for endemics and pandemics.²

This signifies the need for increased investments in India's healthcare infrastructure and focused public-private policy interventions, some of which the NITI Aayog and MoHFW has already begun. Even though public investment in healthcare has seen an upward trend in the past few years, it still falls short of the target of 2.5% of the GDP.

India only has 5 hospital beds/ 10,000 population, ranking 155th out of 167 countries across bed availability as per the Human Development Index.³ Shortage of relevant healthcare equipment along the continuum of healthcare delivery have also been highlighted due to the COVID-19 pandemic. India recently achieved the WHO recommended desired doctor-population ratio of 1:1000⁴. However, the nurse-population ratio stands at 1:588⁵, which is much lower than WHO's recommended benchmark of 1:333. The challenge of availability of resources is further exacerbated by the accessibility challenge, given the skewed nature of distribution of healthcare resources across rural and urban areas. **Over 75% of India's healthcare infrastructure is concentrated in metropolitan regions,** where only 27% of the population lives. Furthermore, 74% of doctors in India work in urban areas, which indicates that 73% of the population in rural areas lacks access to even **basic healthcare**⁶ with medical practitioners in rural areas under immense pressure and workload.

It is precisely in this scenario that the private healthcare market has attempted to bridge the gap, as evidenced by the fact that private healthcare delivery is responsible for the treatment of >70% cases in both urban and rural areas. However, affordability continues to be a significant barrier with quality private healthcare, with out-of-pocket healthcare expenditure reportedly driving **50-60 million people into poverty on an annual basis**.⁷

² Global Health Security Index 2021. ³ Human Development Index, 2021. ⁴ Lok Sabha Address 2022, Minister of State for Health and Family Welfare. ⁵ Indian Nursing Council Data, 2020. ⁶ KPMG - OPPI report on healthcare access initiatives, 2020. ⁷ Public Health Foundation India Study.

Rise in Technology Solutions to support Public Healthcare systems

It is in this context that the need for technology and digitisation in public healthcare delivery becomes all the more important so that existing healthcare resources can be better leveraged to provide more accessible and affordable quality healthcare. Technology can be leveraged to streamline the operational and clinical processes for healthcare facilities in order to manage efficient patient flow, promote virtual care protocols, and telehealth services. In turn, these can be leveraged to reduce the patient-load burden to a large extent.

In this light, the launch and expected promotion of **Ayushman Bharat Digital Mission (ABDM) in 2022-23 is a welcome move by the Government of India.** Under ABDM, each patient will have an individual and interoperable digital Personal Health Records (PHR). The PHRs will allow patients to access and share all their health records as well as provide wider discovery to healthcare resources like doctors, labs and pharmacies. There has also been an increased focus on the utilisation of technology within public hospitals across hospital management systems, medtech products and artificial intelligence solutions, for digitising hospital workflows, delivering real-time diagnosis and improving overall quality of patient care. For instance, **Artificial Intelligence (AI) was of immense help to hospital administrations in managing the COVID-19 pandemic.** AI was leveraged for multiple purposes in the healthcare industry, from early-COVID-19 detection to assisting patients and drug repurposing.

The ongoing pandemic has also increased the demand for tech solutions that are designed for the Indian healthcare system, especially in public health centres where the need is the highest. The medtech industry in India (both public and private) has been dominated by international players, whose solutions are typically expensive and originally designed for Western markets. Most of these devices have infrastructure requirements that are just not available in an Indian public health setting such as specially trained operators, high-speed internet and continuous electricity requirements. There is a need for intelligent indigenous solutions that provide high quality, affordable medical devices that are designed for the Indian system, are accessible and improve patient outcomes. The Indian government has actively sought to plug this gap with favourable regulations, allowing 100% Foreign Direct Investment to drive an 'Atmanirbhar' MedTech sector.



Figure 3: Policy Impact on the Medical Technology Market in India

MillionICU INITIATIVE

Dozee's attempt to re-imagine public healthcare



Dozee - Creating Connected Wards and Enabling Tele-ICUs

Dozee is an easy-to-use contactless remote patient monitoring and AI powered early warning system that has seen widespread adoption in various hospitals across the country. It is a thin sensor sheet that goes under the mattress and without direct contact with a patient, tracks heart rate, respiration, cardiac performance, blood pressure, sleep and heart rate variability. It also comes with additional components to monitor oxygen saturation, ECG and temperature. Dozee has especially been an asset to public hospitals, given that they have a patient load that is almost double of that of private hospitals. With its ease of use and minimal training requirements, Dozee has been able to strengthen secondary and tertiary health infrastructure in district and sub-district hospitals in India, especially during the COVID-19 pandemic. Dozee is also easily integrated for domestic use in homes where patients require constant care and monitoring.

The installation of Dozee devices sets up the provision for risk scoring through the Dozee Early Warning Score (DEWS). Based on this score, daily triage reports are created and shared with the doctors and nurses enabling them to prioritise high risk patients and improve clinical outcomes, while being constantly alerted of deteriorating patient condition through smart alert triggers. Each patient's risk status can easily be accessed from the centralised web dashboard through a mobile app or on TVs installed in the hospital premises. The remote monitoring enabled by the device increases patientnurse safety by lowering human exposure and the risk of infections, reduces risk of manual error and saves time for both nurses and doctors alike.



Figure 4: About the Dozee Solution

Dozee Solution for Hospitals



Central patient monitoring dashboard and Doctor/ Nurse app

Dozee allows contactless real-time monitoring of patients' vitals such as heart-rate, respiration rate, cardiac performance, blood pressure, temperature and oxygen saturation. Coupled with hospital dashboards for centralised monitoring and doctor/ nurse apps for immediate alerts, Dozee provides a holistic monitoring solution for hospitals

NcBP: Non-Contact Blood Pressure | AHI: Apnea Hypopnea Index | IBP: Non-Invasive Blood Pressure



Centralised monitoring of patients vitals



Current adoption of Dozee in India





Given the success of Dozee devices in helping government hospitals manage the COVID-19 pandemic, Dozee further aims to be an integral part of the transformation of secondary and tertiary healthcare services across India. Co-opting the Government's vision of ensuring universal healthcare which is accessible to all, Dozee launched the 'MillionICU Initiative', an ambitious initiative to address the massive shortage of ICU beds in public hospitals with the aim to alleviate the immense load on both healthcare infrastructure and staff.

Dozee intends to convert 1 million hospital ward beds into connected step-down ICU beds with the installation of Dozee remote sensing devices through this initiative. In the immediate time frame, this initiative shall upgrade a certain number of regular beds in public hospitals (equivalent to the number of ICU beds in the hospital) across India into connected step-down ICUs using Dozee's non-contact sensors providing an intermediary level of care for at-risk patients, and thus enabling remote and central monitoring of patients at the ward level. Over time, the initiative shall aim to upgrade every non-ICU bed in hospitals. Coupled with nurse and doctor training on the use of devices and its features, this initiative enables the setting up of a 24x7 central patient monitoring cell that aims to monitor critical patients at district, state and country-level also if required.

The MillionICU Initiative has been a success story so far, already impacting 54,273 lives in 323 hospitals across 14 states.

ASSESSING DOZEE'S IMPACT ON PUBLIC HEALTHCARE DELIVERY

About the Impact Assessment Study

As an independent assessment partner, Sattva Consulting conducted a retrospective impact assessment study on the impact and potential of Dozee devices across the public healthcare system in India.

Objectives

The assessment aimed to study the adoption and acceptance of the device; its impact on workload and stress levels of the medical staff, primarily nurses; its impact on quality of patient care and on operational cost at hospitals; and the impact of digitisation of patient vitals for the medical staff.

Sampling

Sattva conducted this study across 6 hospitals in India to understand the adoption, effectiveness and impact of Dozee devices in providing medical care assistance to public hospitals in India. This was achieved by interviewing 14 doctors and 25 nurses, 5 admin heads at hospitals and 8 Dozee field team members. The opinions of an additional 35 nurses were captured through a survey shared with them to allow for convenient sampling keeping in mind the feasibility of their mobilisation during the COVID-19 pandemic.





Figure 7: The Reach of the Impact Study

RESEARCH FINDINGS AND INSIGHTS

More than 90% nurses found Dozee's continuous monitoring useful and believed that Dozee improved quality of patient care

Under this initiative, especially during the second wave of the COVID-19 pandemic, wards across various public hospitals in the country were upgraded into connected step-down ICUs in just 15 minutes. Nurses and doctors across public hospitals were successfully trained on the usage of the devices in less than 1 day, which has been one of the key drivers behind the widespread acceptance and adoption of the Dozee solution.

Given the ease and convenience of upgrading ward beds into connected beds, the MillionICU initiative has the capacity to upgrade 700,000+ hospital ward beds across the existing 8,000+⁸ secondary and tertiary care hospitals.

The immediate acceptance of Dozee seen across the hospitals is primarily because of its multifaceted ability to take over repetitive work of doctors and nurses in wards. The product is capable of efficiently remotely monitoring a patient's vitals, providing automated triaging and aid in quick and appropriate treatment protocols. The Dozee continuous vital monitoring and alert system has been helpful and effective as we manage a huge patient load in our hospital. The data is accurate and helps doctors to decide the treatment for the patient. – Ward Incharge Nurse, Indira Gandhi Government Medical

College, Nagpur

The product allows for digitisation of patient records across multiple devices, saving valuable working hours of medical and administrative staff, who no longer need to feed this information manually into hospital administrative systems. Doctors and nurses find this Dozee report to be comprehensive and reliable, providing crucial patient monitoring data that was not being captured through manual monitoring. This allows doctors to better evaluate each patient's condition and plan accordingly. The added fact that the report provides historical as well as present vitals trends makes it useful for academic research as well.

Through the study, it was also established that 94% of nurses find Dozee's continuous monitoring useful and 90% of the nursing staff believed that patients would benefit if the device is scaled to cover all patients in the hospital.



Figure 8: Adoption of Dozee across hospitals and hospital staff

97% of the nurses surveyed believed that patient health care should be digitised, 88% leverage Dozee's reports

The use of Dozee devices enables remote monitoring of patients' vitals and digitises their data to create daily triaging reports which can be accessed by hospitals, doctors and nurses digitally.

These triaging reports are often shared with doctors by the nurses on their devices, allowing for paperless monitoring which helps doctors prioritise their rounds around critical patients. The usefulness of Dozee Early Warning Score (DEWS), shared digitally with the doctors, has been repeatedly emphasised by the medical staff at hospitals making use of the device. 97% nurses and doctors think that patient health care data should be digitised going forward and 88% nurses already leverage the daily triaging reports for efficient decision making.

It is a boon because manual errors can be avoided and also continuous monitoring is more efficient than manual periodic monitoring.

– Doctor, ESI Hospital, Bangalore, Karnataka

Hospital staff root for digitisation of healthcare data



1 leverage the daily triaging report to aid their decisions

Figure 12: Response of hospital staff on digitisation of patients' vitals



~2.5 hours saved every day for nurses, resulting in significant reduction in daily nurse workload

Prior to the installation of Dozee, nursing staff manually monitored vitals at specified time slots, recording them into physical files for the doctors to refer to. This was a time, effort and resource intensive model. Post adoption of Dozee, most vitals are continuously recorded on the device and presented to doctors through electronically generated reports, saving crucial man hours for both doctors and nurses.

On an average day, a nurse reported recording a patient's vitals 5 times a day, spending ~50 mins per patient on the activity. Through the assessment study, the nurses reported that with the regular use of the Dozee device, they were able to monitor and record a single patient's vitals in just 10 mins. There has been an 80% overall decrease in the time spent by nurses to monitor a patient's vitals. Assuming the ideal nurse-patient ratio of 1:4, as prescribed by the WHO, this would result in ~2.5 hours saved by a single nurse everyday.

This has further implications in the form of reduction in workload and stress of the nurses. 70% nurses reported a

decrease in their workload post installation of Dozee devices, leading to lowered stress levels through digitisation.

Nurses and doctors do not have to visit patients very frequently as the Dozee devices provide continuous monitoring of patients' vitals, so the workload is reduced and our stress levels have also decreased. - Staff Nurse, Beed District Hospital, Beed, Maharashtra

Given the low nurse-patient ratio in the country and the resource constraints in the public healthcare system, Dozee increases the potential of a nurse to monitor **16 additional patients per day.**

As a result, the overall shortage of ~4.3 mn nurses in India can be reduced by ~1 Mn nurses through the adoption of automated patient monitoring systems across secondary and tertiary public hospitals.



Figure 9: Impact of Dozee on healthcare delivery

~144 estimated lives saved annually for every 100 Dozee beds due to timely escalations and improved quality of care

Dozee works to eliminate the lag in constant monitoring due to the limitations imposed by the need to manually check the vitals. It tracks the patient's vitals continuously, providing constant updates on the health of the patient, allowing for timely decision making and improved quality of patient care.

On average, a Dozee device provides ~ 0.12 life saving alerts in a month and as of December 2021, Dozee devices have already enabled 1,874 timely escalations through automated alerts. This means, for every 100 Dozee-powered beds, an estimated ~144 lives are saved annually⁹. Dozee's early warning system has resulted in the medical staff building deep-trust in Dozee's ability to improve quality of patient care. These are clearly highlighted through the study as 83% of nurses believed that automated monitoring helped them in providing accurate, time sensitive and correct critical care to the patients and 77% nurses feel more confident of a patient's health if their vitals are being continuously monitored through the Dozee devices.

110,000+ lives can be potentially saved annually if the MillionICU initiative is scaled across public healthcare in India.



~3,700 additional patients can be provided critical care for every 100 Dozee beds due to more efficient hospital bed utilisation

The use of Dozee devices not only has the potential to reduce stress on the overburdened medical staff across the country and save lives through timely escalations, but also optimise the use of hospital resources and cost to patients. Automated vitals monitoring and real-time alerts in case of deteriorating patient vitals allow ICU beds to be used for the most critical patients and enable an earlier discharge of patients in both hospital wards and ICUs. The assessment study reported a **decrease of 0.7 days in the average stay of a patient in a hospital ward and a decrease of 1.3 days in the average stay in an ICU bed.** This is a result of the Dozee device helping medical professionals make more informed and efficient treatment decisions - resulting in timely escalations to HDU/ ICU wards or early discharge of patients, as reiterated by 77% of all nurses surveyed.



Figure 13: Impact of Dozee on hospital bed utilisation

- **11** The Dozee devices have impacted positively in the ICU/HDU patient discharge rate. It has helped in early discharge from ICU and better usage of ICU beds as well in monitoring patients shifted from ICU.
 - Administrative Staff, Indira Gandhi Government Medical College, Nagpur, Maharashtra

Assuming peak capacity at public hospitals, **1200 more patients can be treated in wards and 2500 more patients can be treated in ICUs** for every 100 Dozee beds every year. As a result, 3700 more patients can be provided critical medical care per 100 Dozee beds annually due to increased ICU/ward bed utilisation.¹¹

The adoption of Dozee devices across public healthcare facilities could potentially unlock the treatment of almost an additional 3 million patients annually (assuming peak capacity at these facilities) across India.

Direct Annual savings of ~INR 2.3 Crores can potentially be unlocked for every 100 Dozee beds due to improved bed utilisation

As a result of the reduced ICU and ward bed utilisation, there has also been a 26% decrease in per patient treatment cost in the ICU, and a 14% per patient treatment cost in hospital wards for public hospitals. This would lead to direct annual savings of ~INR 2.3 Crores for every 100 Dozee beds for public healthcare delivery, assuming that healthcare facilities are running at standard occupancy rates in ward and ICU beds. In addition to these direct savings, there are also indirect annual cost savings of ~INR 0.4 Crores as a result of 27,000+ nursing hours saved per 100 Dozee beds annualy.¹²

If scaled across the public healthcare system, the MillionICU initiative could result in total potential savings of INR 2,150+ Cr for the public healthcare system in India.



Figure 14: Impact of Dozee on treatment costs

CASE STUDY

Indira Gandhi Government Medical College, Nagpur, Maharashtra

Al Ban For



Supporting Indira Gandhi Government Medical College in its fight against COVID-19

Indira Gandhi Government Medical College and Hospital (IGGMC) is one of three Government Medical Colleges in Nagpur, Maharashtra. Equipped with 822 beds, it admits 90-120 patients per day, at the charge of INR 30 per day for general ward, and INR 400 per day for ICU stay.

When the COVID-19 pandemic first broke out in India in March 2020, IGGMC was quick to upgrade itself to fight against the virus. An ICU ward with 172 beds capacity and an HDU ward with 394 beds were prepared in the surgical complex of the hospital to manage the COVID-19 pandemic. However, the hospital staff were still overwhelmed with the onslaught of COVID-19 cases. The need for constant manual monitoring of patient vitals coupled with a lack of vaccines led to an increased risk of infection among the staff and the hospital was struggling to optimise time utilisation of its medical staff. At this critical juncture, IGGMC sought the help of Dozee to shift to a remote vitals monitoring approach in order to reduce the burden on the healthcare staff and limit their risk of infection. The deployment of Dozee devices saw an immediate impact on the quality of healthcare provided to patients at this critical time, positively affecting thousands of lives.

150 HDU beds were upgraded by Dozee devices due to which doctors and nurses were able to **continuously monitor heartrate, respiration-rate and SPO2 of more than 1800 patients** through a central patient monitoring platform. Dozee's advanced health intelligence algorithms tracked patient's vitals continuously and converted them into risk scores. Based on **timely early warning alerts generated** with these risk scores, **200+ patients** were transferred to ICU and provided with life-saving medical support.

The hospital had ~350 nurses and ~150 non-nurse ward staff, who were trained on the go for adoption of new technology on a day-to-day basis by Dozee's on-ground team. Additionally, the central monitoring platform **enabled a single nurse monitor up to 150 beds** at any given time. This allowed for remote, contactless patient monitoring, the records of which could easily be accessed by the doctors in the form of a dashboard on their digital devices.





Dr. Vaishali Shelgaonkar 28 years of experience Associate Professor and Head of Department of Anaesthesiology, IGGMC, Nagpur

Recognizing the potential of the Dozee device, Dr. Vaishali believes that

11 It helped reduce exposure with the patients, especially during COVID-19 situation. Time and energy were saved, as other productive work could be done now. It also added to patient safety. Dozee also helped identify the critical patient adequately. Digital monitoring helped to identify high-mid-low risk patients with timely insights which helped to prioritize critical patients.

Dr. Vaishali also applauded the effectiveness of Dozee in reducing stress of the medical staff by facilitating efficient identification of critical cases, "The stress of going to each and every patient and missing out the critical patient is not there. Same is for the junior doctors. If they need any opinion, I am able to suggest & ask the junior doctors to change certain treatment accordingly with the help of the dozee monitoring data and reports."

She and other doctors feel more confident of a patient's health if their vitals are being continuously monitored through the Dozee devices even when they are not in the ICU/HDU. According to Dr. Vaishali,

It is easier now to exchange medical information/opinion **JJ** across medical staff/departments due to digitisation as the data is accessible as and when required.



Rekha Janega 16 years of experience Staff nurse

Similar sentiments have been expressed by the nursing staff at IGGMC, Nagpur. Rekha Janega, a staff nurse at the hospital recounts an experience where Dozee played a crucial part in saving a patient's life during the peak of the pandemic.

1 I remember one case in ward no. 37 during the pandemic. We received an alert from the Dozee device for that patient. As soon as we received it, we immediately transferred him to the ICU ward and started giving the best treatment before time. Hence, we were able to save the patient's life and he survived.

Rekha also feels that "the overall workflow has been fast now since patient's data is already available to the doctors directly. Using non-Dozee ICU machines is time consuming, as manpower is less we are not able to attend to more patients at a time. Cases like COVID-19 positive patients, patients in ICU, HDU, and surgical patients need continuous patient monitoring and it helps us to know before time which patient needs to be treated first."

Stressing the need for scaling the use of the device due to its potential impact on medical staff, Rekha mentioned that, "Yes, it will be beneficial to medical staff as well. Their workload is reduced and time is saved from such tasks. This time can now be utilised for giving other proper services to the patient."



Mohammed Sharib Haidry 15 years of experience Staff nurse

Similar thoughts are shared by Mohammed Sharib Haidry, a staff nurse, who believes that

• Patients will be benefited if this device is scaled to cover all patients in the hospital as they will receive good nursing care and timely treatment.

The COVID-19 pandemic has fast tracked the shift to a digital first model in all spheres of life. Minakshi Ramtekkar,

a pediatrics in-charge sister nurse, and Sunita Shende, a ward in-charge sister nurse also felt the need for a separate central monitoring system and high-speed internet connectivity in each ward to enable efficient remote monitoring. "A separate ipad or central monitoring system should be provided for each ward. Secondly, internet connectivity should also be provided separately, reducing the dependence on the hospital's internet."

WAY FORWARD

Maximizing the potential of Dozee solution

Vishwas

The insights from this impact assessment study have been very promising. While the sample size was limited, the strong adoption and recommendations received for Dozee thus far, reinforce the fact that Dozee helps mitigate several critical healthcare infrastructural challenges and has the potential to create deep systemic impact for public healthcare delivery systems. Going forward, Dozee could further deepen its impact through two key pathways-

Product Innovations for public healthcare delivery

There is potential for further product innovation to create greater systemic impact for public healthcare institutions. Product features like real-time connected hospital bed networks displaying availability of hospital beds at the ward, hospital, district and state level health facilities through multilevel dashboards could enhance accountability and health outcome visibility for governments and health policy makers across all levels. These decision makers would also have access to anonymised data on bed utilisation, discharge rates, patient comorbidity profiles and demographic analysis for more informed hyper-local policy and public interventions.

In addition to this, Dozee can also aim to include other affordable wearable technologies to enable round-the-clock monitoring of patients' vitals. These would also support complete digitisation of patient records and visibility into patients' health for clinicians. Such innovations could easily dovetail with the ABDM (Ayushman Bharat Digital Mission) and would help hospitals adopt ABDM protocols and integrate digital health records more easily.

Operational Model of MillionICU

While the Dozee innovation stands to be a gamechanger for hospital operations, Dozee team needs to ensure regular training of nursing staff, doctors and other supporting staff on not only the vitals monitoring technology, but also other related accessories such as desktop or mobile app, which would also lead to digital upskilling of clinicians. Given the operational constraints, there is also high potential for Dozee to partner with local implementation organisations and non-profit organisations that have active relations with local healthcare administrations and contextualised experience of geography-specific implementation/training.

With technologies like Dozee coming to the forefront, we are excited about what the future holds. These Made-in-India technologies have the potential to truly help India's healthcare infrastructure leapfrog into the best-in-class at a global level.