

# The hospital is sick, who will heal it?

BY HARSH VARDHAN

**R**eports of shortages of hospital beds, ventilators, medical equipment and doctors and nurses to cope with growing cases of Covid-19 infection have thrown into sharp focus the need to accelerate digital transformation of healthcare infrastructure worldwide.

Modern medicine has been enriched by genomics, tele-medicine, virtual reality for surgery and many bio-pharmaceutical advances. The human bladder has been reproduced via 3D printing and other print-on-demand organs may soon follow. New cures and better equipment mean that most of us will live longer and healthier than our parents.

But behind the many medical advancements, true digital transformation of health infrastructure — hospitals, blood and vaccine banks, centres for dialysis, ambulatory surgery, imaging and radiology — is slow. It has lagged other sectors such as e-commerce, transport and logistics and that of large corporations.

Unlike for other sectors, digital transformation to enable Internet of Things (IoT), 5G connectivity, artificial intelligence and machine learning (AI/ML) is much more complex for healthcare.

Healthcare infrastructure innovation has been and remains curtailed by three main issues:

- Compliance with regulatory standards

- Multiple forms of medical data, from patient records to X-rays, CT scans and other analogue or digital data; and
- Reluctance to change, which prevents a clear digital dashboard to allow administrators to respond, plan and predict in real-time.

Until now, many hospitals with sophisticated equipment have yet to fully capture and update medical records to enable clinical decision support and real-time hospital workflow, let alone combine them seamlessly with long-term care and disease management.

This means that hospitals often operate below true capacity and are unable to respond optimally during a crisis. Indeed, even in developed countries, there is a growing shortage of staff and equipment amid rising Covid-19 infections.

How can planners and administrators improve IT infrastructure to prepare for a true digital transformation for the healthcare sector? Several key steps can kick-start or accelerate the process.

The first is to build or enable real-time data capture at every touchpoint of healthcare hardware. This means installing sensors, embedding IoT and high-speed communication throughout each facility down to the last piece of equipment.

As with a full health check, identification and measurement of performance of each piece of equipment is the first step to achieving transformation.

The second is to break down information silos once and for all. Data passing through the hospital systems and databases must be digitised and harmonised and shared, from patient records, X-rays and HCT (high-resolution computed tomography) scans to data on the functioning of each piece of equipment and machinery within the infrastructure.

This roadblock has eluded decades of effort by IT consultants and systems

integrators. A protocol of “golden data” in a common format will enable visibility of the entire healthcare enterprise — from ambulance to operating theatre — on a single platform.

Ventilators need to be serviced regularly, so how many are operational at any time? And how do we know whether the vaccine has arrived and is stored in appropriate conditions before being administered?

Third, the same visibility can facilitate interoperability of different healthcare systems — electronic patient health records can be analysed alongside Covid-19 infection trends and the demand for vaccines and the cold-chain infrastructure needed to store or deliver them.

During pandemics such as Covid-19 and

the SARS epidemic that struck many Asian countries in 2003, data may have to be shared beyond a single hospital group to include other private or public healthcare facilities, ambulance operators and even military field hospitals. Without this, decision-making during a crisis will be delayed.

Fourth, healthcare assets, be it CT scanners, operating rooms or ventilators, have to be tracked on usage levels and even location. This can help predict breakdowns, plan for maintenance and help the next shift of medical staff locate them.

Several other asset-heavy sectors such as aviation maintenance, repair and overhaul (MRO) have migrated management of inventory, checks on component reliability, engineering data and supporting financials to the cloud for easy access through smartphones.

Fifth, such tracking will support more vital C-suite decisions such as scenario planning, which can calibrate potential equipment shortage, availability of spares and service-level agreements with suppliers with hospital manpower planning.

By standardising protocols for maintenance — helped by such cloud-enabled real-time data — productivity will improve. As with other sectors such as MRO for the aviation and resources sectors, new and more efficient business models can also emerge among healthcare equipment suppliers and third-party service providers.

Sixth, there are lessons to be drawn from a concept known as Inventory Technical Management already practised by MRO service providers. Those who are more digitally enabled have upscaled to the next level — flexible pooling of inventory to prevent duplication and to share hardware more intelligently.

Such practices can be extended to healthcare asset management. Spare CT scanners or components for medical equipment can be “pooled” through cloud-based management by a healthcare MRO operator who can guarantee service levels.

Finally, the guardians of healthcare hardware can take tentative steps in AI/ML without sacrificing medical outcomes. These include sensors that can monitor the health data of each patient more frequently than checks by nurses; and the use of chatbots to allow nurses or junior doctors to ask questions when certain patient symptoms occur or to check when an equipment needs to be sent for servicing.

Through AI/ML, healthcare hardware can be “trained” to self-correct. It can learn prescriptive maintenance through protocols that can predict failures and recommend actions to take. Over time, each major piece of equipment can instruct itself when to prepare for maintenance, possible risks and the pre-emptive measures it should take.

Covid-19 has triggered a once-in-decades shift in the thinking behind healthcare administration. It is time for the hospital itself to get out of the sickbed and embrace the true promise of digital transformation. ■

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