Digital Twin: An Emerging Tool in Healthcare

Q **Dr. Deepak Agrawal, you pioneered medical digitalization and Digital Twins (DTs). What made you start this segment and how has it helped you?**

Answer: The name "digital twins" is new, but the notion is not. My colleagues and I tried this to improve emergency care at AIIMS in New Delhi a decade ago. We created a digital twin project by monitoring medical staff stress levels with smart watches. This increased medical consistency and decreased luck. We were creating a digital twin without knowing the word. I'd think a digital twin improves healthcare delivery consistently. Since then, we've advanced. Precision medicine, preventive maintenance, and remote monitoring have been integrated to improve healthcare.

Q **Doctors' main goal is to improve patient care. What are DT's main advantages?**

Answer: Technology has helped in many ways, especially for major organisations like AIIMS, which sees over 10,000 patients daily. Digital twins streamlined AIIMS OPD services. The team constructed a digital model to anticipate patient load for each doctor based on past trends with 90% accuracy. Notwithstanding patient fluctuations, we kept our clinics running at full capacity. Thus, we implemented digital twin technologies to improve healthcare delivery with great success.

Q **Why are digital twins being adopted in healthcare across the nation?**

Answer: Good question! Hospital administrations demand high turnover, whether private or public. To optimise the patient's hospital stay, the bed should not be empty and the turnover should be higher even if it's full. Studies show that patients overstay, which may not benefit the hospital in long run. Due to a lack of equipment, surgical slots, or auxiliary services like lab and radiology examinations, patient care can be delayed. The AIIMS team is saving resources, improving efficiency and productivity, and better serving patients with digital twin technologies. This technology offers real-time inventory management, which improves patient services,

quality, and price.

Q **India has become a digital economy faster than any other nation in the past eight years. How do you feel about healthcare's Digital Twin implementation challenges?**

Answer: Any technological implementation has hurdles. I find data security and privacy are major hurdles for digital healtcare. Hospitals need trained people to maintain technology and equipment. Safeguarding patent data is also important. Importantly, standardisation is necessary in terms of what various solutions providers are offering. We need a common dashboard irrespective of what brand we are using. Patients need lower equipment maintenance costs to keep healthcare affordable. We need an interface to communicate with technology suppliers and doctors, who speak different languages.

Q **When educational institutions of higher learning and industry come together in a working symbiotic relationship, both try to find a common ground to meet each other's needs and create a win-win situation for all. What better can we do when making a headway with this initiative and shape current innovation and commercialisation systems?**

Answer: I think there is a huge scope when it comes to collaboration. I can offer you a few examples. I've worked on developing ventilators with numerous other startups, and what I've observed is that there is a lot of synergy when it comes to healthcare. When we work alone, we are constrained by our knowledge; however, when we collaborate, things suddenly become possible. For instance, I've observed that many startups from the engineering and IoT sides have a disconnect unless they have a collaborator from the healthcare domain invested in the product. In light of the fact that we have so many requests, I would say that our wish list for the digital twin concept includes things like patient care, facility maintenance, equipment upkeep, and remote patient monitoring. What we lack, in my opinion, are sensors, sensor integration, software development, and the usage of AI and ML at the back end to eventually get that product ready. IITI DRISHTI CPS Foundation will then be able to team together collaborators who have a particular area of expertise. So, these are merely turns to toss; the data that is already there can become big data through analysis, a digital twin through patient use, and so on.