The Future Evolution of Hospitals

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Modern healthcare systems face developing existential challenges. This is due to demographic and epidemiological changes (e.g., the growing aging population and an accompanying co-morbidity burden) as well as to the global need for a healthcare market with inherent incentives that maximize value to health consumers while reducing costs under a growing economic burden. More specifically, despite the scientific and technical advances of modern healthcare, it is insufficiently patient centered or value driven, may offer sub-par quality and, consequently, may be unsafe [1]. At the same time, it is all too commonly fragmented and unsustainably expensive. Within healthcare systems, hospitals today live with the effects of these challenges: they are the major cost factor in delivery, accounting for about 40% of total healthcare spending, they face questions regarding the quality of care and patient safety, and are not fully integrated in the care continuum for most patients.

Overcoming these challenges will require transformative efforts by hospitals. This journey of change began almost 20 years ago, with the U.S. Institute of Medicine report "Crossing the Quality Chasm" published in 2001, which stated: "The current care systems cannot do the job. Trying harder will not work. Changing systems of care will" [2]. With most of that change still ahead of us, a set of questions remain: How will hospitals change? How will hospitals make the transformation? What will this mean for the role of the hospital in evolving patient care?

It is clear the redesigned hospital will need to be much more patient centered, in terms of experience but even more in terms of providing measurable significant value. Quality and safety will need to further improve as we continuously drive for zero patient harm. Genomics and other personalized data will need to direct precision medicine that will improve outcomes and reduce costs. Process-improvement methodologies would further improve value while increasing efficiency and reducing the cost of care. Finally, new payment models would require hospitals to be much more integrated into the continuum of care, mandating them to build new partnerships and work closely with community services and primary care.

One of the major enablers of any transformational change will be digital health [3]. Specifically, digital transformation will include tele-health and mobile health solutions, artificial intelligence (AI) and robotics, bioinformatics enabling precision medicine, and virtual reality. These will bring about new opportunities to tackle the challenges we have listed here.

In terms of functions, hospitals in the future will continue to treat acutely ill patients, as well as provide ambulatory procedures. Yet, we believe that much of acute care will need to remain outside of hospitals, together with the transition to walk-in clinics and to the home where technology will enable healthcare providers to provide high quality, safe and patient-centered care at a lower cost. One critical solution would be "hospital at home," a solution that is already generating encouraging evidence [4]. With time, as more and more acute care is being provided through solutions in the community, crowding in hospitals will become less of an issue. This will allow countries confronted with a shortage of hospital beds (such as Israel) to not depend on financing more beds in order to bridge the gap. In countries with a high bed-per-population ratio (like the United States) we would even see hospitals reduce bed capacity, while intensive care unit beds will comprise a growing ratio of the total number of hospital beds. Regarding ambulatory procedures, these would move to ambulatory centers, yet more complex procedures will always remain in the future hospital. Thus, hospitals will become more specialized and professional, with cutting edge technology and innovation applied to treat the most complex patients. Regarding current successful models of "hospital at home," it is likely that hospitals will play a significant role in management of care in the home, supported by improvement in tele-health technologies, and through partnerships with community services.

Furthermore, application of tele-health technology will facilitate neutralizing geographic barriers and enable highly specialized services to be provided away from the hospital – to patients' homes, community clinics, and rural hospitals. These will include provider-patient and provider-provider consulting services, tele-rehabilitation, and also tele-surgery using robotic technology. Tele-services have the potential to provide more patient-centered care, as well as improve equity since leading urban hospitals can extend services to rural communities.

It is our opinion that hospitals will always provide high-end medicine to the most complex patients. In the future, this will rely mostly on AI decision support, as well as on robotic technology that will enable higher quality and safety, and more personalized and more efficient care [5]. AI solutions are no longer science fiction as initial applications are entering routine use. AI algorithms, particularly deep learning, have demonstrated remarkable progress in image-recognition tasks. Such is the case with radiology, where professional radiology associations are now embracing this new technology [6]. AI may contribute significantly to clinical quality and efficiency while freeing clinicians to focus on engaging with patients and delivering empathic care. Furthermore, AI-driven analytics will optimize operations, save providers time, enhance efficiency, and improve the patient experience. Future hospital operations, such as managing patient flow and more efficient control of resources, will be controlled through "control towers" or "care traffic control" which will act as a focal point for AI-driven solutions.

We believe academic hospitals (i.e., academic medical centers) will continue to play a major role in the training of healthcare professionals. Technology such as virtual reality and augmented reality, coupled with simulation, will enable competency-based training and will allow for highly specialized care training to be more widely available. Training in the future will be much more multi-disciplinary as different disciplines will work together from an early stage. Training will become more personalized and competency based across health professions, where the curriculum is adjusted to individual needs. Here as well, technology such as AI, virtual reality and even tele-education, will play a central role. Finally, we believe the curriculum will need to change, emphasizing interpersonal and communication skills on the one hand and the studies of bioinformatics, data analysis and AI, on the other. Academic hospitals will also continue to play a central role in research. However, we believe a shift from more basic science to clinical and translational science and research will occur. This is due to the fact that expert and highly specialized clinicians in leading hospitals will continue to lead in cutting edge research and innovation, pulling in the industry to sponsor. Leading hospitals will establish innovation hubs, providing space for clinicians, researchers, industry and, with investment funds, will work together to accelerate innovation. With data being the fuel for future digital health innovations, leading hospitals will create an ecosystem that will share data as a key driver for innovation.

Finally, and perhaps most importantly, hospitals of the future will be far more integrated into the community and population they serve. Value-based and population-based payment systems will require hospitals to work hand-in-hand with community health organizations (either as a single entity system or through partnerships). This accountability over a population's health status will be possible through technology enablers such as: a) enhanced communication between providers and data sharing, b) tele-health such as monitoring through wearable technology, c) precision medicine that will make it possible to predict and prevent disease, and d) mobile health enabling increased patient engagement and empowerment. Enhancing continuity of care and aligning hospitals' goals so that an effort is made to prevent illness and disease exacerbations will be vital for the future ability of healthcare to overcome the challenges at hand.

In conclusion, as long as hospitals will need to treat the most acutely ill patients and perform the most advanced and complex procedures, they will employ the most professional and specialized providers and continue to be a main platform for education, research and innovation. Coupled with digital transformation processes, and much needed payment reforms aligning incentives so that the patient's benefit are at the center, hospitals will need to play a growing role in prevention, health maintenance and rehabilitation. At Sheba Medical Center, Israel's largest and most comprehensive hospital, similar to other leading hospitals around the world, we have recently launched a strategic initiative that aims to pave the road towards future needs. At Sheba we call this the "City of Health," an initiative that would include much of the abovementioned redesign needs. Furthermore, since the challenges we face are global, we have established an international task force that includes leaders from leading hospitals around the world with the express aim of building a clear agenda and blueprint for the future.

We believe healthcare is on the brink of major transformation. There is no question regarding the need; the only question is that of timing and scope. We also believe that hospitals have a critical role within this transformation and in any future healthcare system. This is surely a challenge for all healthcare professionals, but one we are more than eager to confront.

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