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Editorial

Marching into Metaverse

**“To follow knowledge like a sinking star,
Beyond the utmost bound of human thought”**

— *Ulysses* by Alfred, Lord Tennyson

The above lines from a famous poetry from the Victorian era wrap in a capsule how man foresees future. Rather than allowing time to take its own course, Man resolves to be the equestrian, leaping upon the saddle of galloping time and taming and maneuvering it according to his own wish. Medical science, the indispensable weapon of survival to mankind, also follows the trend inching towards omnipotence and omnipresence. But how? Let us discuss.

Rapid technological advancements have allowed for new and improved devices within the medical field. Specifically, the development of robotic-assisted surgical devices has helped create a push for improved patient care and outcomes. Most robotic technology seeks to assist the human operator in reducing variability and improving accuracy of surgical maneuvers¹.

Fields such as complex gastro intestinal surgery, surgical oncology, urology, and gynecology/oncology have led the way in developing robotic assistance. In these settings, surgical robots have allowed improved optical visualization and improved surgical maneuvering for retraction, exposure, and resection of tissue. Although in its infancy robotics in spine surgery is also opening new frontiers. Remote surgery again widens the horizon of medical treatment. Remote surgery is essentially advanced telecommuting for surgeons, where the physical distance between the surgeon and the patient is less relevant. It promises to allow the expertise of specialized surgeons to be available to patients worldwide, without the need for patients to travel beyond their local hospital. This definitely points towards brighter future since futuristic biotechnology is in the constant process of evolution¹.

Another emerging field is human augmentation surgery. The essence of human augmentation is adding or expanding functions to the human body. Categories

are: replacing limbs or body parts (using prostheses), supporting the body (using for example exoskeletons) or improving physical or cognitive functions. Relying on the trend of advancement a huge improvement in Oncosurgery is also predicted. Less invasive image-guided treatments are under investigation, such as magnetic resonance-guided radiotherapy (MR Linac) and tumour ablation procedures. These techniques allow accurate detection of small peripheral lung lesions that are often difficult to find during surgery, and hence may offer strong competition to the current standard of care. Surgery will also continue to advance and become more technology-driven. Image guidance and surgical navigation are already common practice in neurosurgery and orthopaedics, and will definitely find their way into surgical oncology². In addition, smart surgical tools and probes are being developed with tissue-sensing properties able to detect the difference between tumor and healthy tissue. All these technologies will enable far more precise surgery, even in less experienced hands. The developments in image guidance and tissue sensing will go alongside advancements in surgical robotic systems. Artificial intelligence and machine learning tools have the potential to analyze large datasets and extract meaningful insights to enhance patient outcomes, an ability that is proving helpful in all fields of medicine more so in radiology and pathology. Images obtained by MRI machines, CT scanners, and x-rays, as well as biopsy samples, allow clinicians to see the inner workings of the human body. However, these images often contain large amounts of complex data that can be difficult and time consuming for human providers to evaluate. In future AI tools can augment the workflow of radiologists and pathologists, acting as clinical decision support and enhancing care delivery. In a 2017 study from Case Western Reserve University, researchers found that a deep learning network identified the presence of invasive forms of breast cancer in pathology images with 100 percent accuracy. Researchers at Colorado State University are using machine learning to develop a virtual biopsy tool that will make early detection of melanoma faster and cheaper.

In future AI will impact primary care and its key stakeholders. We define AI broadly as any technology designed to mimic human cognitive functions—including techniques such as classic machine learning, modern deep learning, natural language processing, and robotics. Many companies such as Babylon Health, Health Tap, Ada, Buoy, and Your MD have developed “AI doctors” that provide health advice directly to patients with common symptoms, freeing up primary care access for more complex care. Babylon reported diagnostic accuracy comparable to human doctors. By 2025, the market for these services (using the current telemedicine market and retail clinics market as comparison) is projected to be \$27 billion a year. AI-powered algorithms for diagnosing disease is now outperforming physicians in detecting skin cancer, breast cancer, colorectal cancer, brain cancer, and cardiac arrhythmias. In regions with lack of access to specialty care, these tools in the hands of primary care doctors can provide significant benefit to patients. University of Iowa Health Care is using IDx-DR, an AI capable of detecting diabetic retinopathy to improve care. Aysa, an app from VisualDx, allows patients to take photos of their skin conditions: the AI will generate possible diagnoses and suggest self-care versus a visit to their physician. Google can accurately predict cardiovascular risk using retinal scans, and Tencent’s AI can spot Parkinson’s using smartphone videos—promising tools that can expand access to care and empower primary care physicians to broaden the services they can provide to patients. This could reduce the need for unnecessary referrals, increase continuity with patients, and enhance mastery for primary care physicians³.

Radio Frequency Identification (RFID) is a fast developing technology that utilizes radio waves for data collection and transfer. The use of RFID offers many benefits to the healthcare industry related to patient safety, tracking, efficiencies in patient care, and provider satisfaction. Research shows that RFID can help to improve patient safety. RFID tags provide the ability to reduce misidentification issues in healthcare. Accurate patient tracking using RFID technology can improve patient safety in many instances like errors

in medicine administration. With the volume of population increasing the number of patients seeking medical attention is also increasing manifold. Keeping accurate records of all patients to help follow up treatments is a continuous challenge to the health care sector. Online access to computerized medical records has the potential to improve convenience, satisfaction, and care for patients, and to facilitate more efficient organization and delivery of care. The pandemics of major infectious diseases often cause public health, economic, and social problems. Virtual Reality (VR) and Augmented Reality (AR), as two novel technologies, have been used in many fields for emergency management of disasters⁴. The experience thus gathered can be used in wider fields in the future to reduce patient doctor physical communications at all times during emergencies especially in the remote areas which as a dearth of medical professionals.

The list of future possibilities in the field of medical science can extend indefinitely and is beyond the scope of this limited article. However all said and done the implementation of such technologies and research and development in these sectors requires a hefty sum which is only possible by Government intervention. If not the cumulative cost of technological development added to the usual medical cost can boost the cost of treatment to such astronomical heights that it would be beyond the scope of common man to avail right treatment at the right time. Another question might prop up in the mind. Can automation of medical treatment lead to alienation of the doctors from their patients? Can this become a hindrance to holistic medical treatment where a doctor physically interacts

with his patient and develops a bonding with him? Pandemic has proven that no individual can survive alone. Universal healthcare thus should be the priority of the future medical science. And target of advancement must be focused towards achievement of equal and accessible universal health .

“The old order changeth, yielding place to new
“and it is time for me to pass over the baton of legacy to my capable successor. Team JIMA worked hard and together for betterment. My journey through these last few months as an Honorary Editor has been memorable. In each and every of my editorials I have discussed about issues that are very pertinent to the time which challenges even the existence of humans on this earth. At the least, if these articles have evoked contemplation among the readers I will consider that my efforts have not fallen upon deaf ears. Allow me, the august readers, to sign off with a famous line from the same poetry with which I have started my editorial – ***“To strive, to seek, to find, and not to yield.” Let the quest for onward progress be relentless.***

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