

Significant impacts on healthcare through Biomedical Engineering in the next five to 15 years

The invention of medical devices has a historical root that extends long back in 7000 BC, the evidence shows that of a dentist in Baluchistan who used flint tipped drills and bowstrings.

A few articles claim that there were many types of accessories used (1). Although medical devices were invented a long time ago, the term biomedical engineering started to be used in the modern human era. However, the terminology is somewhat confusing as bioengineering, biomedical engineering and clinical engineering are repeatedly used interchangeably.

Regardless of the term, this article appreciates that those terminologies overlap, and biomedical engineering is an intercept of technology, engineering, maths, and medicine. It involves bridging the gap between medicine and engineering, using the engineering principles for the purpose of healthcare.

Biomedical engineers are the heart of any health service, they are the ones that design, develop, check, install and implement any medical device out there. This amazing profession is powering up humans when they need medical support. Though, for the public it is hard to completely understand the impact of biomedical engineering has had on the lives of many people. Nevertheless, seeing medical equipment in all sizes and shapes could give an idea as to how significant its impact would be.

It is well known that the COVID-19 pandemic has put the healthcare industry under pressure, but it is worth highlighting that how biomedical engineers have utilised their skills and knowledge to tackle the biggest health crisis that human beings have ever encountered. Biomedical engineers played an important part in tackling this deadly corona virus; not only by assisting to deploy countless medical devices across the world, saving millions of lives, but also promptly assisting to develop ventilators within a matter of days (2).

Biomedical engineering's positive impact on patient management is often overlooked, however the pandemic has raised the profile of the profession and the professionals working within it. Like other industries, the biomedical engineering industry is rapidly progressing with technical advancement. The world of biomedical engineering opened up incredible possibilities someone never thought about it in the early days. Tremendous improvement in technology gave way to many more important developments of the medical devices.

Biomedical engineering has been used in developing everything from gloves, syringes, to the biggest X-ray equipment and software's. Breakthroughs in biomedical engineering research have opened new frontiers for healthcare. Robotic, Artificial Intelligence, 3D printing, Wearable technology, Neurotechnology, have all expanded the biomedical engineering industry on a larger scale. Transformation of these technology advancement into clinical practice started and there would be huge impact in next decade.

Although biomedical engineering is thriving day by day, the pandemic geared up and brought up many innovations into reality, new generation wearable technics are integrated with vital physiological signs in real time (3). Along with this new generation wearable technology, is the centralised digital patient data which lead to a virtual health service where a clinician could oversee a number of patients while in their home (4).

Robots and the internet of thing are integral to this trend, and smart technology will alert professionals when sensors detect that intervention is needed or cameras spot that an elderly person has had a fall in their home. Application of robotics in health service is tremendous and will have a huge impact in the future. In addition to highly accurate virtual

surgery, we started to see a robot in action to assist infection control (5), these all give promise for a better future where biomedical engineering would achieve many of our current impossibilities.

It is very conventional for every field, certainly it's not an exception for biomedical engineering, that tackling current significant challenges in health industry using biomedical engineering skills and knowledge now, becomes the foundational premises for the next generation of biomedical engineering.

The current generation are growing up with computers of all sizes and shapes as an everyday part of life, but that will create huge impact on next generation biomedical engineering applications. It was not, and still is not, uncommon to see clinicians walking with bundles of clinical notes during their ward rounds. This is being replaced with handheld digital patient's history taker, going paperless and digitising patient data. This offers the potential to be accessible from anywhere in the country or world, which would have an amazing impact not only for patient care but also from an environmental perspective.

Thinking about global health outlook, many talk about improving quality of life among all groups of people where they have access to all infrastructures, whilst people in other parts of world are dying without having access to health service (6). More access to health services results in society improving lives. Biomedical engineering would be the best way to make health services more accessible, so that a patient living in any poor village has the same access to the health service as all of us.

The next generation of biomedical engineering has the potential to bring the benefits of health services to all. Telemedicine has the potential to improve access to health services, what could be more significant and exciting than this. Practice makes perfect and developing more confident surgeons, biomedical engineering technology may make it possible that the next generation medical schools will no longer have room for cadavers with virtual reality making it possible to practice in hologram so future clinicians could be able to practice until they feel confident which cannot be possible in the cadaver.

Everyone knows that 'care is better than cure' and biomedical engineering could have a huge impact in this area in the next decade. A combination of technology and computing can be used as a preventive measure by monitoring, screening, and alerting a patient or clinicians to forecast the disease progression. Biomedical engineering holds hope for the future. It creates a positive, significant impact on providing new solutions not only to life threatening diseases, but to also increase efficiency in everything from equal access to healthcare to climate change.

Reference 1. <http://news.bbc.co.uk/1/hi/sci/tech/4882968.stm>

2. Wittenberg, M., Fabes, J., Strange, D., Griffin, M., Lock, D. and Spiro, M., 2020. Rapid development of a ventilator for use during the COVID-19 pandemic: Clinical, human factor & engineering considerations. Journal of the Intensive Care Society, p.17511437211007773.

3. Soon, S., Svavarsdottir, H., Downey, C. and Jayne, D.G., 2020. Wearable devices for remote vital signs monitoring in the outpatient setting: an overview of the field. BMJ Innovations, 6(2).

4. <https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality>

5. <https://www.newscientist.com/article/2236777-coronavirus-hospital-ward-staffed-entirely-by-robots-opens-in-china/>

6. <https://www.who.int/about/accountability/results/who-results-report-2020-mtr/outcome/2020/1.1-improved-access-to-quality-essential-health-services-results-report-achievements>

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