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Potential for AI and robotics in healthcare is vast

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Medical robotics is a fast growing and rapidly innovating space, majorly fuelled by enhancement of automation technologies, rising incidence of disabilities in human beings and increased incidence of age related physical ailments in the baby boomer population. According to the Global Medical Robotics Report, Asia Pacific medical robotic systems market is also expected to grow at the fastest rate ever during the forecast period (2016-2022), due to untapped market/opportunities. Recently, a Singapore-based data analytics company Biofourmis raised US$5 million (S$6.8 million) in a Series A round of funding from venture capital firm NSI Ventures and Aviva Ventures. Biofourmis has created a health analytics platform known as biovitals, which leverages artificial intelligence to analyse physiology data from clinical grade wearables. The data gleaned from this allows medical professionals to intervene before a critical medical event takes place, which can potentially improve health outcomes and lower healthcare costs. In an interaction with BioSpectrum Asia Magazine, **founder and CEO, Biofourmis Pte Ltd., Mr Kuldeep Singh Rajput** shared how AI and robotics are increasingly becoming an integral part of the healthcare ecosystem, and what are the investment opportunities created as a result.

Q. How is robotics technology affecting the healthcare space? How is it effective in filling care gaps?

Mr Kuldeep: Robots are everywhere from science fiction to the local hospitals, where they are changing healthcare. Robots in medicine help by relieving medical personnel from routine tasks that take their time away from more pressing responsibilities, and by making the medical procedures safer and less costly for patients. Surgery is an unpleasant experience at best. The waiting lists can be long depending on available manpower and resources. Surgical Robots help to alleviate this problem. They are capable of performing accurate surgery in tiny places. Robots are used in assisting a surgery, allowing doctors to conduct surgery through tiny incision instead of an inches long incision. The surgeon is in complete control of the system always, however as the machine has greater reach and flexibility, smaller incisions made with more precision are enough to access the problem areas.

There is incredible opportunity for the robotics technology to help fill care gaps and aid healthcare workers. Robots can

provide both physical and cognitive task support for both DRUs and clinicians/ caregivers, and may be effective and helping reduce cognitive load. Task assistance is particularly critical as the demand for healthcare services is far outpacing available resources, which places great strain on clinicians and caregivers. They can be used to disinfect patient's rooms and operating suites, reducing risk for patients and medical personnel.

Q. How difficult is the commercialization of robotics technology in healthcare, and what are the investment opportunities created as a result?

Mr Kuldeep: The healthcare industry struggles from the combined pressure of skyrocketing costs, aging populations in industrialized countries, and a shortage of qualified workers, as well as the need to continuously improve the quality of services and results. For every challenge faced by the healthcare community, however, there are multiple opportunities for businesses professionals, academicians and investors that provide innovative solutions. Robotics and automation technology — healthcare robotics — are one class of solution. Despite the monumental potential of the technology and obvious need, commercial development of healthcare robotic products has been relatively slow and market penetration has been minimal.

I also see virtual robots, e.g. chat-bots and virtual nurses emerging for remote patient monitoring and management. At Biofourmis, we are using AI and virtual nurses to assist patients to manage their complex chronic conditions. Health analytics has been one of the hottest category of investment since 2016.

Q. **How safe is the use of robotics in the operation theatre? Are they cost-effective? Will they replace surgeons in future?**

Mr Kuldeep: A study has revealed that robotic surgery was involved in 144 deaths and 1,391 injuries in the US during a 14-year period. While this may seem a cause for concern, considering there were 1.7M operations carried out during the same period, this is very few indeed. Robots designed for surgery have three main advantages over humans. They have greater three-dimensional spatial accuracy, are more reliable, and can achieve much greater precision. Safety is a key concern. A robotic device can be designed in an intrinsically safe way by restricting its range of movement to an area where it can do no damage. Furthermore, safety can be increased by making it passive, guided always by a surgeon.

The market leading device is the Da Vinci, manufactured by Intuitive Surgical, sales of which have rapidly risen despite the latest model's £1.7m price tag and annual maintenance costs of £150,000. Between 2007 and 2011, the number of Da Vinci robots in use in the US increased from 800 to 1,400, while the number worldwide reached 2,300 in 2011. There are around 50 in the UK.

I do not think that human surgeons will be replaced by robots in the near future. Surgeons are at the top of the medical food chain. Robots do not have the responsibility. A human will always control the process because of possibility of potential complications. Surgery is not like a production line, where a machine can follow the same set of instructions and come up with the same outcome every time. Every human body is different, and even with the most advanced imaging technology we have available there are still things that you only see once the body has been opened. You need someone who can think, make decisions and weigh options, and the kind of AI that could do that at the level of a human surgeon is a long way away.

Q. **AI and robotics are increasingly a part of our healthcare eco-system. How is this transformation currently underway?**

Mr Kuldeep: The emergence and increasing use of artificial intelligence (AI) and robotics will have a significant impact on healthcare systems around the world. AI is getting increasingly sophisticated at doing what humans do, but more efficiently, more quickly and at a lower cost. The potential for both AI and robotics in healthcare is vast. Just like in our every-day lives, AI and robotics are increasingly becoming a part of our healthcare eco-system. One of the AI's biggest potential benefits is to help people to stay healthy so that they don't need a doctor, or at least not so often. AI increases the ability for healthcare professionals to better understand the day to day patterns and needs of the people they care for, and with that understanding they are able to provide better feedback, guidance and support for staying healthy. AI is already being used to detect diseases like cancer, more accurately and in their early stages.