

Chapter 2

Robotic Augmentation in Healthcare: Transforming Patient Care and Medical Precision in the Era of Transhumanism

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ABSTRACT

In the age of transhumanism, healthcare is being changed with robotic augmentation which improves patient care and medical accuracy. The chapter explores the use of robotics in medicine that range from surgical robots, which offer incomparable levels of precision to rehabilitation robots that enable patients' recovery. It also looks at the ethical concerns that have been raised, technological developments including robot systems that have made it possible for them to be used by health professionals as well as examining the impact they have had on both patients and healthcare providers themselves. Finally, the chapter points out how robotic enhancement could transcend human abilities while enhancing quality of life, and demonstrates how these advances are paving way for a future where people interact seamlessly with technology in order to achieve the best health outcomes.

INTRODUCTION

Medical practice robotics or in general, the robotic incorporation in the healthcare sector is the utilization of robot technology, systems or facilities in the rendering of medical services. As a concept this idea involves the use of newly developed and

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more advanced robots, artificial intelligence as well as machine learning and other complex algorithms to assist different health care practitioners in diagnosing, treating, as well as managing all manner of health complications. Assistance is possible at a range running from surgical robots that make mini-invasive interventions possible up to specialized exoskeletons for exercising patients. When applied within the field of medicine, robotic assistance is aimed at elevating the abilities of humans, at reducing the probability of errors on the part of humans, and at raising the levels of precision and efficiency of actions taken (Brunete et al., 2021).

Robotics in the context of medical settings: the stages of taking, making and communicating decisions

Robot utilization in health care systems has therefore introduced change in methods of health, care provision. Surgical robotic systems especially the telerobotic surgical systems such as the da Vinci Surgical System have become apparent in operating theaters around the world. With the help of these robots, a surgeon acquires an opportunity to perform complicated operations, several times more effectively, easily and quickly, compared to the existing approaches and technologies. For example, the da Vinci system will translate the motion of surgeon's hand into mini-motions of instruments in the form of micro-miniatures inside the body of the patient (Fosch-Villaronga & Drukarch, 2021). This specifically reduces rubbing of the internal organs hence fast healing, minimal pains and minimal prospects of complications. Moreover diagnostic as well as imaging processes are also enhanced with robotic means out of the operating theatres. Robotic aided endoscope for instance is used to enhance the visibility of the part of the gastrointestinal canal making it easier to detect early signs. In the same way, the radiology robots that are using algorithms of artificial intelligence are effectively incorporated in investigation of medical images to detect diseases such as cancer, fractures or neurological disorders with significant accuracy to assist the radiologists (De Togni et al., 2024).

Robotic technologies are also implemented in the rehabilitation and various types of physiotherapy. The mobility impaired are able to get basic movement with the help of mobile assistive robots and robotic exoskeletons and have an abundance of quality of life. These devices may be operated accurately and have a perfect repetitive motion that is required for the rehabilitation program. It is also possible to make ASRs patient specific as the need may be and this makes effective therapeutic sessions possible (Hu et al., 2011). Robotic augmentation in health care of the patients is promising in term of bringing in better, improved and accurate patient care. Compared to human resources, robots can also perform repetitive tasks, and also they are very precise in their operations. This precision is also useful in those surgeries which entail some delicate procedures because even a slight error can result

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