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An Idea About Utilization of Medical Technologies and Devices in Therapeutics and Diagnostic

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Abstract

The study showcases the beneficial aspect of medical technology along with medical device that ensure the progression of therapeutics and diagnosis. Secondary data collection procedure has been chosen in this study to collect data from peer reviewed journals that made the study more reliable and validated with informative justification. Thematic data analysis procedure has been used in this study to interpret the significant data to meet the goal of the study. Concept of medical technology and medical devices along with its implication in medical field has been discussed over here. Health technology assessment also has been considered in this study focusing on social, ethical, medical and economic impact of medical technology. Implication of policies and strategies of medical technology also have been focused over here. Beneficial aspects of new medical devices also have been depicted in this study. Negative consequences have been evaluated here to measure the strength of medical technology. Overall justification of the study has been highlighted in this study to signify the subject of the study.

Index Terms

Medical technology, medical device, health technology.

INTRODUCTION

Medical technologies are the key factors that create a revolutionary change in the medical field. Treating disease with healing medical technologies implication in the medical field has a significant impact on therapeutics and diagnostics. AI and multimedia technology are the most utilized technology in the medical field to detect and prevent critical disease. Improving clinical outcomes and reducing human errors can be enhanced with the implication of developing artificial intelligence. Diagnosis of numerous diseases has been emphasized with the application of AI technology. Most beneficial impact of technological devices in the healthcare industry is to prevent, diagnose, treat and rehabilitate sickness with a safe and effective approach [1]. Vaccination, anaesthesia, epidemiology, germ theory, gene therapy, insulin and 3D printing can be considered as effective progression of the medical field highlighting application of advanced medical technologies. Cost effective approach of medical technologies has focused on the easy accessibility of the patient medical records.

Greater patient care service can be provided with the advanced medical technologies implication. Accuracy of diagnostic results has been prioritized in the medical treatment reducing medical errors that can be an influential perspective of medical technology. Automated IV pumps are an effective example of a medical technological device that helps to control the dosage and drips given to patients [2].
create an effective impact on medical progression. Tele-health communication and application make virtual interaction between doctors and patients possible that enhances the probability of availability of advanced medical services in remote places. Centralized command centres encourage the detection along with prevention of health disease, prioritizing the implication of advanced medical technological devices.

Digitized diagnosis system is another smart application of advanced medical technologies that ensure a short term detection of diseases such as MRI, USG, PET and scanner. In the surgical segment medical advanced technological impact determines progressive creativity in the medical field. Combination of medical science and medical technology is quite an impressive revolutionary enactment in the medical industry. Widespread use of advanced medical technology in the healthcare industry enhances adoption of electronic health records [3]. Care services have been influenced by medical advanced technology including various devices that also determine the quality care provided to the patients. Fast and more accurate diagnosis widens the scope of cure diseases with effective treatments.

METHODS AND MATERIALS

Selection of appropriate methods and materials in a study plays a vital role to reach the goal of the study. This particular study has been followed by qualitative research design. In every study research design helps to design a framework for conducting a research with particular methods and techniques. Qualitative research design approaches authentication of study with the implication of realistic observation into the study to meet the objective of the study with informative justification. Inductive research approach has been chosen by the writer to draw a conclusion depending on the specific observation to general overview [4]. Secondary data collection procedure has been chosen by the writer in this study to justify the study. Peer reviewed journals are used in this study as a data source to collect secondary data.

Already existing information is considered in peer

reviewed journals that ensure authenticity and reliability of the study. Validity and reliability plays an important role to make the study more trustworthy for the readers as validity confirms consistency of the study whereas reliability assures accuracy of the study. Secondary data collection procedure depending on the peer reviewed journals has been helped to enhance quality of the study [5]. On the basis of secondary collected data thematic interpretation of data has been used in this study. Themes are developed with the implication of realistic observation of the writer relevant to the subject of the study along with help of peer reviewed journals.

Thematic data analysis of data has the scope to interpret justification of the study with an independent and flexible manner. Cost effectiveness and time saving approach of secondary data collection procedure and thematic data analysis has an influential significance on the study [6]. Ethical consideration also has been maintained by the writer of the study considering the inclusion and exclusion criterion of the study. Secondary data collection procedure has been included in this study whereas primary data collection procedure has been excluded from this study. Peer reviewed journals are used in this study and survey or interview procedure has been avoided in this study. Depending on the consistency of the subject that focuses on impact of utilization of medical technologies along with devices in medical therapies and diagnosis, the writer of the study considered these methods and techniques to justify the study with evident information considering general overview.

RESULTS

Theme 1: Assessment of health technology

Health technology has a significant impact on the medical industry and assessment of the implicated medical technologies also enact as a vital tool for further execution of the medical technology. Health technology assessment is also considered as the detection tool for evaluating the critical success factors. Considering the efficient properties of HTA, biomedical sector management has been improvised day by day. HTA helps to make decisions in favour of reimbursement of pharmaceuticals and recommendations that can be overcome various challenges in the medical industry [7]. The main objective of HTA is to evaluate the functions, characteristics and effects along with impacts of medical advancement technological implication in the health care sector. Social, medical, ethical and economical dimensions have also been considered in the HTA to determine the decision making ability of the medical industry.

The systematic evaluation procedure of health technology assessment confirms further improvisation or modification in medical technology including devices to better the health care services. Identification of the loopholes considering primary research in the medical aspect, HTA helps to analyze the systematic review of medical issue relevant knowledge [8]. Innovation in the biomedical field also has been driven by HTA as synthesizing and evaluating the medical treatment based evidence has been framed with formal application of HTA. The basic pillars of HTA are the comparative effectiveness, cost effectiveness and organizational impact that ensures the medical development on the basis of advanced medical technology. Procurement of diseases has better scope by enhancing diagnosis and therapeutic invention in medical consequences following the HTA.

Figure 1: HTA and its impacts

This assessment procedure helps to summarize the medical, ethical, social and economic conception of utilization of health technologies that includes medicinal products, medical equipment for diagnostics and treatment along with therapeutic measures. Basic components of HTA are the policy analysis, evidence based medicine, social science with a human ground, economy of health evaluation [9]. These four perceptions are focused on HTA to assess the impact of the heath technologies applied in the medical industry. Relative effectiveness and cost effectiveness of new medicine following HTA, payers can make decisions in favour of medical technology improvisation.

HTA process has developed by following some steps that involves establishment of medical requirements, market review, and procurement of the medical devices. After the selection of the medical devices, planning the testing segment is the most crucial stage of HTA. Evaluation of tests also has been considered in the assessment process and then analysis of results wider the scope of adoption of the medical technology in the health care aspect. Secondary assessment also has been done in HTA to determine the positive output of the result [10]. Finally, the selection process of medical devices has been completed with economic effectiveness. Therefore implications of medical technology along with medical devices go through in a challenging perspective to develop the medical version in the healthcare industry.

Theme 2: Policies and strategies of medical technology

Sustainable policies and strategies enhance the probability of implication of advanced technology in the healthcare

industry on a large scale. Most effective objective of medical technologies to develop policies in favour of health care is to increase the accessibility, affordability, safety and quality that enforces innovation and sustainable implication of medical technologies in the medical industry. There are different kinds of policies that have been adopted by the medical advance technologies such as the national medical device policies, draft medical device policy, MDR regulating act and many more. In Europe the MDR regulations made an impressive impact in the medical industry that focuses on the legal security and more certainty of the assessment, manufacture and distribution of the medical products [11]. On the other hand, National medical device policy ensures the growth of the medical device sectors considering the safety and quality following the objectives and principles of HTA.

FDA is the approval authority of new medical devices that determine the implication of new medical devices in the healthcare aspect to better the medical services including effective significance along with safety and quality. Advanced medical technologies also play a significant role to promote health awareness. Enabling, mediating and advocacy have been followed by medical technology to enforce the development of the healthcare industry [12]. Implications of biomedical technologies determine the faster approach of detection of physiological dysfunctions that increase the probability of advanced treatment aspects in the healthcare industry. ECG, EEG, fEEG are the most influential medical devices that to some extent prevent the unpleasant uncertainties such as stroke, cardiac arrest. Initial identification of the physiological dysfunctions has been driven by the biomedical technological involvement in the healthcare industry.

Pre analysis and post analysis properties of bioengineering in medical aspects develop the treatment segment in the medical industry. Primordial prevention, primary prevention, secondary and tertiary along with quaternary prevention of disease also has been influenced by the advanced medical technologies including medical devices that ensures reduction of risk along with lower the complications of manifested disease [13]. Non curable disease also can be cured with the implication of advanced medical technologies in the pharmaceutical industry considering medical invention. Robotic surgery is a revolutionary innovation of medical technology that enhances the probability of success rate of the operations.

Figure 2: New medical devices

Installation of the artificial intelligence in medical technological application introduces the complex programmable pacemaker, artificial pancreas system and simple tongue depressor including Vitro diagnostics. Encompassing the advanced medical technology in the healthcare industry highlights the effective virtual interaction of patients and doctors that increase the accessibility of the treatment in remote places [14]. Improvisation of the single use of device, implantable and imaging devices also has been prioritized by the implication of the advanced medical technological effort. Considering the consecutive aligns of advanced medical technology has been implicating the significant progression of the healthcare industry.

Theme 3: Implication of new medical devices in healthcare industry

Medical devices can be considered as the fundamental component of advanced medical technology that increases the potential of preventing, diagnosing, treating and rehabilitating illness and disorders with a safe and effective approach. The total revenue collection in the med-tech industry worldwide is expected to reach 600 billion dollars within 2024 focusing on the new medical devices implication in the healthcare industry [15]. The economic strengthening has determined the progression of the medical field all over the world. Diagnostic diseases, treating the disorders and monitoring health status become easier with the implication of new medical devices.

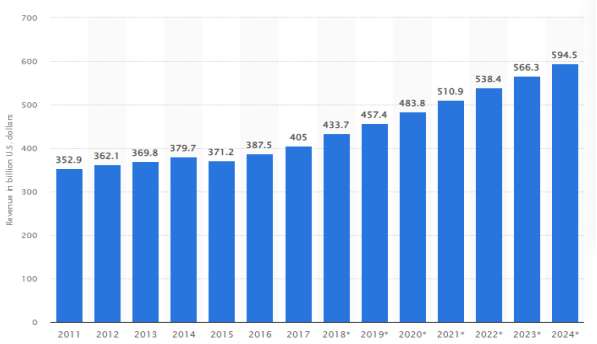

Figure 3: Total revenue collection of the healthcare industry with the application of medical technology in worldwide

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After the Covid 19 pandemic, the healthcare industry also has been suffering from the critical issues to provide medical facilities according to the demand due to the norms and regulations implicated by the health government of different countries. However, implication of the new medical devices has an effective solution towards healthcare services. Most appreciable new medical device can be considered the tele-health and app that reduces the virtual distance between the patients and healthcare service. Telemedicine services under the new medical device technology have enhanced the probability of pharmaceutical support to remote places. Diagnostics of disease become easier and faster with the involvement of new medical devices.

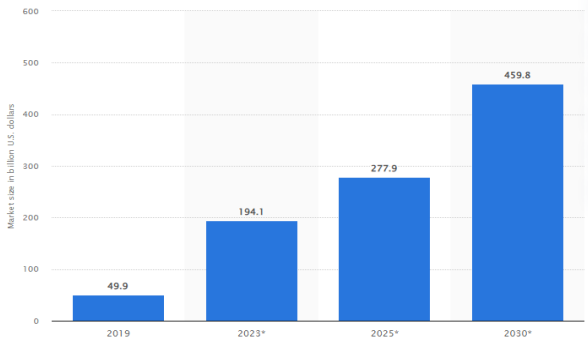

Figure 4: Impact of telemedicine on healthcare industry after Covid 19

Following the principles of HTA, tele-health along with telemedicine has produced a beneficial enactment towards the healthcare industry. Covid 19 can be considered as the driver factor of the increasing telemedicine market size which is expected to grow up to 460 billion dollars within 2030 [16]. Cost effective approach and increased demand of the digitized medical device have prioritized the tele-healthcare and telemedicine procedure in the healthcare industry. Detection of the severity degree of the chronic disease along with certain illness can be evaluated with the implication of new medical devices. On the other hand, Biotricity, shockwave medical, Eko, clean space technology, Ambu, Hologic surgical are the most impacting examples of new medical devices.

3D printing technology and Gene editing technology along with severe paralysis curing implantation are the result of new advanced medical devices that determine revolutionary changes in the healthcare industry. Hypertrophic Cardiomyopathy Medication is an effective implication of advanced medical technology that helps to maintain the cardiovascular activities in a sustainable way [17]. Virtual reality aspects of medical ground become possible with the evident action of new medical devices. Faster detection ability of new medical devices has enhanced the reduction capability of potential risk factors of chronic diseases considering cardiac dysfunctions. Mortality rate also can be controlled with the progression of the medical industry following the contribution of new medical devices.

Theme 4: Challenges associated with advanced medical technologies

Critical evaluation of the medical technologies has highlighted the challenges that took place in the implication of medical technologies in the healthcare industry. Most crucial factor that affects medical technology is the long periodical gestation. Data management and maintaining the security of the data information can hamper the sustainability of advanced medical technologies [18]. Coping up with the new medical technologies is also a critical issue for implicating new advanced technologies in medical consequences. Lack of knowledge about the new technologies along with difficulties in accessibility can slow the diagnostics and treatment procedure of health hazards. Frequent modification of the legislation also creates a crucial challenge for the medical technology implication. Improper infrastructure of tele-health also fails to meet the objective of health improvement considering the medical aspects. Equitable access to the medical devices increases the risk of data loss that can create obstacles for treating a disease. False alarms regarding detection of physiological disorders and altered data adversely lead to the incorrect decision making regarding healthcare.

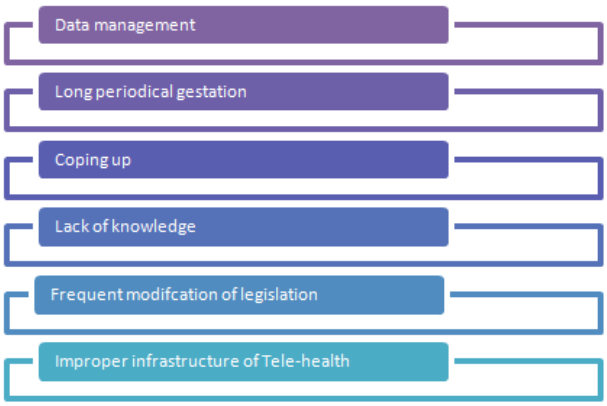

Figure 5: Challenges of medical technology

Data breaches risk can create severe consequences in medical treatment considering medical technologies. Sudden technical fault or machinery disturbance can affect the operational function of medical treatment of crucial health hazards. Difficulties in regulatory compliance also have been negatively impacting the healthcare industry that causes lack of safety and traceability. Initial high installation cost of the advanced medical technology has created barriers for the healthcare industry to adopt the technology in the medical field. Interoperability including medical errors and retrieving medical records highlighting the medical technology also have negative consequences in the healthcare industry [19]. However, all the challenges can be mitigated with some effective strategies such as increasing the security perception of the medical data with back up data in many devices along with ensuring private accessibility of the data. Reconsideration of diagnostics results can reduce the risk of medical errors. Focusing all consequences of advanced

medical technology it has been evaluated that advanced medical technology along with medical devices has a significant impact on therapies and diagnostics in medical aspects.

DISCUSSION

Evaluation of the impact of utilization of medical technologies and medical devices in therapies and diagnostics of physiological disorders has been highlighted as a beneficial aspect of the medical field. Assessment of the health technology is considered in the result interpretation of the medical technology impact on medical terminology. HTA has prioritized ethical, social, medical and economical dimensions that have accelerated the positive consequences in the medical field. Innovation criterion in HTA also has been to maintain the safety and quality of the medical technology. Comparative effectiveness along with a cost saving approach considering the organizational impact have been focused in HTA that determine the implication of high quality medical technology in curing diseases. Different kinds of policies and strategies are used in the medical technology to lead the medical science to the progression and strictly maintain the sustainability of the medical technological efficiency without any misuse.

MDR regulations in Europe create a symbolic contribution in medical technology considering the HTA or health technology assessment. Therapeutics and diagnostics both medical terminology have met the objectives of the medical field with the involvement of medical technology along with medical devices. ECG, EEG, fEEG are the most influential medical devices that encourage faster detection of the presumption of uncertain events. Various kinds of prevention measurements have been considered in this subject of the study that ensure the reduction of risk factors such as chronic disease effects including cardiac, neuro and musculoskeletal dysfunction. Robotic surgery is one of the best examples of therapeutic medical implantation in curing diseases. Installation of artificial intelligence enhances the efficiency of medical treatment along with pre diagnosis diseases. Graphical interpretation has highlighted the increasing demand of medical technology in medical progression.

Single uses of device, implantable and imaging devices also have been focused on the result interpretation for the justification of the study. Implication of new medical devices in medical technology considering the medical aspect has been discussed over here to analyze the strength of the advanced medical technology. Special impact of medical technology along with medical devices has been overviewed in the Covid 19 pandemic situation worldwide. Implication of Tele-health and telemedicine establish a connection bridge between doctors and patients prioritizing the scope of health treatment in virtual aspects. Remote places can be reached out with the medical benefits considering the medical technological devices. 3D printings, Biotricity, shockwave medical are also can be considered as the fruitful result of advanced medical technology. “Hypertrophic Cardiomyopathy Medication” is an effective initiative of medical technology that ensures the sustainable rhythmic rate of the heart.

Accuracy and consistency of diagnosis results have been driven by medical technology including monitoring devices. Automation functions of medical technology also ensure the IV pumps operating system and Portable monitors, smart beds, wearable devices and electronic health records which are associated with the medical technology and medical devices implication in improving clinical outcomes. Mortality rate of human beings can be reduced with the direct enactment of medical technology. Genetics technology is also a progressive output of medical technology. Pharmaceutical enhancement also has been led by advanced medical technology that reflects on curing critical diseases with a cost effective approach. Faster initial detection of the diseases can be avoided by certain unpleasant events such as stroke, cardiac arrest and many more dangerous illnesses.

Complexity of medical technology also creates challenges for medical use such as data loss is one of the crucial drawbacks of medical technology. Security and confidentiality of medical data can be hampered with the improper projection of medical technology. False alarms and errors in reports can create a dangerous health hazard considering the therapies and treatment. Acceptance of new medical technology can be difficult for health organizations including health workers. Frequent changes in the infrastructure of legislation in medical technology can produce adverse effects on medical aspects. Data breaches have negatively impacted the decision making capability of medical science regarding health hazards cure. Lack of information relevant to medical technology can slow the procedure of diagnosis of diseases along with implantation treatment according to the needs of the disease. Considering pros and cons of the study it can be concluded that advanced medical technology has a revolutionary significance on medical science.

CONCLUSION

The study has depicted the significance of the subject of the study that highlighted the impact of advanced technology on therapeutics and diagnostics in medical aspects. Secondary data collection procedure has been used in this study to justify the subject of the study. Peer-reviewed journals are selected as data sources to collect authenticated and reliable information that helps to meet the goal of the study. Themes with realistic observation have been focused on this study to create a significance of the subject of the study. Conception of the HTA and importance of it in evaluation of medical technology has been briefly discussed over here. Various policies and strategies used by medical technology along with medical devices have been highlighted in this study to interpret the evidence of medical progression considering the technology. Social, ethical, medical and economical benefits have been prioritized in the HTA to evaluate the impact of advanced medical technology

including medical devices.

Bioengineering is a progressive initiative of advanced technology that enforces a successful medical sustainability. Various medical instruments and its characteristics in detecting physiological dysfunctions have been highlighted in this study. EEG,ECG, fEEG can be considered as the most influential medical devices that have been used in daily life to detect initial signs of physiological disorders and accelerate the treatment procedure in an efficient manner. Pacemaker is one of the best examples of advanced medical devices that ensure cardiac sustainability. Tele-health and telemedicine has brought a revolutionary progression in the virtual medical aspect that helps to reduce distance between doctors and patients. In the situation of Covid 19 pandemic Tele-health and apps made possible virtual treatments that increase the availability and accessibility of medical benefits for people.

Different kinds of challenges also have been highlighted in this study that helps to enhance the quality of the study. Data loss considering data security and confidentiality is one of the major crises in medical technology. On the other hand, wrong medical data can create an adverse effect on health treatment. Technical error can lead to the delay of diagnosis of physiological disorders that affect the medical treatment aspect. Coping up with new technology with insufficient knowledge is another drawback of medical technology. Errors in medical reports can mislead the therapeutics and create a dangerous health impact. Considering safety and quality manageable implications of medical technology is a progressive approach towards medical science.

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