

Role of High Technology Medical Devices and Its Uses in Patient Care

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Abstract

The healthcare sector has a vision of providing the best medical facilities to their patients leading to better health care and minimum of medical errors. The healthcare sector tries to provide the patients access to high quality medical devices, safe and security, effective technology and safe products for their health. Increasing complexity of medical technology and consequences for training and outcome of care. The healthcare sector has created a safe sense of services with enhanced and swift technology which is patient reported outcomes to help the patients rate the quality and working of the hospitals to get a clearer picture. This is possible only with the help of technology and this research paper is a primary data based exploration where techlogy is in the centre.

Key Words: Health care, Technology, Safe services and outcomes.

Introduction

In the era of technology all industries are opting for technology for development and innovation in their field. Technology in today's World is being adopted by every industry and is playing an important role in industries and in our lives¹. Like all the industries we can see that technology is taking over the healthcare sector focusing on saving lives. In the field of medical sciences, technological innovations in medical devices are taking place all around the World². Medical technology has a vast field of innovation that is innovation in sustaining lives. The technology innovation can be seen in the areas like biotechnology, Information technology, pharmaceuticals and development of medical devices and equipment's³. The growth in innovations in healthcare sector can be seen from small innovation of bandages and ankle braces to complex innovations like MRI machines, artificial organs, etc. The innovation in the medical devices has focused on integrating innovations into medicines. The innovation in medical devices with integration of telehealth has also lead to robotic surgeries which focuses on helping doctors to do surgeries with the help of robotics sometimes even without their physical presence⁴. Thus technology is trying to work

easy and save more and more life. Medical technology is innovating with intensive growth and research in the area the technology has introduced new equipment's to hospitals making their work easy and complex surgeries successful, not only this technology in healthcare sector has connected thousands of patients and doctors from all around the world. Increasing complexity of medical technology and consequences for training and outcome of care⁵.

Study conducted by Yan Wei, Hao Yu, Zude Guo, on the topic "Hospital efficiency and utilization of high-end technology medical equipment". In this paper the researcher focused on the relationship between the hospital environmental characteristics and their utilization of high-tech medical equipment⁶. The research focused on the cost and quality of the medical devices used and efficiency of the hospitals in adopting the devices. The researcher found that the use of Computed Tomography(CT) and Magnetic resonance imaging(MRI) in hospitals have increased with hospital cost inefficiency⁷. The researcher aimed to understand the adoption of new medical devices by hospitals and their cost controlling activities in hospitals. The study found out that the relationship between quality improvement of

devices and cost control is very complex due to high cost of technology adoption⁸. The research found out that the hospitals do a comparison to check the benefits with the cost of using high end devices. The main reason of using these devices are quality improvement and increase in income.

Study conducted by Bupe. G. Mwana , Charles Mbohwa on the topic “An assessment of the effectiveness of equipment maintenance practices in public hospitals”. In the research the researcher has found that the use of medical devices is increasing around the World and so are the complexities with the use of the devices⁹. The aim of the study was to analyze the practices adopted in hospitals to maintain the medical devices to reduce the errors happening due to mishandling of the devices. The study conducted found out the maintenance strategies and challenges faced in the maintenance. The study by the researchers found out that devices failure and unavailability of the devices was high due to faulty schedules for devices, high breakdown in the devices was seen due to shortage of skilled manpower¹⁰. The shortage of skilled manpower affected the service provided to the patients and lead to poor maintenance of the medical devices, not only the shortage of employees the improper training of the employees leads to mishandling of the devices and causes injuries to the patients. The error usually occurs due to lack of staff training and due to non-maintenance of a proper team to look after the maintenance and repairing of the medical devices¹¹. The researcher says that the staffs are

not trained about the complexities of the devices that are updated timely.

Research Methodology

The data is collected with the help of structured questionnaire. The data is analyzed with help of the statistical software known as SPSS which has used various statistical methods for the analyzing of the data which will be represented with the help of graphs, charts etc. The analysis of the questionnaire on the topic “Role of high technology medical devices and its uses in patient care: Study in reference to Delhi &NCR Hospitals” where sample size was 201.

Hypothesis Testing for the Study

Hypothesis has been formulated on the basis of objectives framed for the study. Since study is moving around the uses of technology in health care industry. Formulated hypothesis is being testing with the help of t-test analysis has been used, data is normally distributed which indicating that, t-test could be applied.

H0 – There is no significance relation between, carelessness of nurses causing medical errors and untrained professionals using high end technology causes medical error.

H1- There is significance relation between, carelessness of nurses causing medical errors and untrained professionals using high end technology causes medical error.

Table -1 Paired Sample correlation

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Carelessness of nurses	2.3698	201	.241	.013
Medical error	1.3652	201	1.987	.021

Table-2: Correlation matrix

	N	Correlation	Sig.
Pair 1 Carelessness of nurses	201		
Medical error		.321	.342

Table-3: Paired Differences

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Carelessness of nurses Medical error	1.0046	1.23410	8.92314	232.123	56.942	-7.000	200	.000

After analyzing data with SPSS, calculated value of $p = .000$, since standard value is 0.05. Thus calculated value is less than the standard value. So the researcher fails to accept the null hypothesis i.e. there is significance relation between, carelessness of nurses causing medical errors and untrained professionals using high end technology causes medical error. Which means that carelessness of are due to untrained staff or nurses that uses high technological medical devices and these untrained staff due to carelessness causing medical errors.

H0 – There is no significance relation between, the use of clinical information to improve patient safety and technological devices that increases patient safety.

H1- There is significance relation between, the use of clinical information to improve patient safety and technological devices that increases patient safety.

Table -4 Paired Sample correlation

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 The root cause of medical error is careless of Nurses.	1.16	201	.367	.026
Untrained professionals using high technological medical devices causing medical errors.	3.32	201	1.249	.088

Table-5, Correlation matrix

	N	Correlation	Sig.
Pair 1 The root cause of medical error is careless of Nurses. Untrained professionals using High technological medical devices causing medical errors.	201	.510	.258

Table-6, Paired Differences

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95%Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	The root cause of medical error is careless of Nurses. Untrained professionals using high technological medical devices causing medical errors.	-1.1250	25.00000	12.50000	-152.28058	-72.71942	-9.000	399	.003

After analyzing data with SPSS, calculated value of $p = .006$, since standard value is 0.05. Thus calculated value is less than the standard value. So the researcher fails to accept the null hypothesis i.e. there is significance relation between, the use of clinical information to improve patient safety and technological devices that increases patient safety. Which means that clinical information system is used for improvement of patient safety and this device increases patient safety in hospitals. Thus clinical information system proves to be a technology that is successful in patient safety thus reducing medical errors.

With the increase in technological devices in healthcare sector it is very important for the staff to understand the complexities and working of the devices. The technology in healthcare sector is innovating every year which has made training a very crucial part of proper implementation of the devices as these devices are not only using high tech mechanisms they are also becoming more and more complex which requires timely training for better safety and quality which will reduce medical errors. The implementing cost of high end technological medical devices are very high as agreed by the respondents on the question, that, whether cost of implementing high technological medical devices are high. The dependence of healthcare sector in technology is increasing with time and this has led to new innovations of devices and has focused for on

saving lives by providing better diagnosis, better surgical procedures and improvement in the health of patients.

The devices focus on saving lives and making healthcare a safe sector.

The respondents believe that high technological medical devices increase patient safety as 86.1 percent of respondents agree that devices has turned out to be safer and has particular standards that maintain patient safety at each level. The devices though complex help the healthcare sector in better quality and safety. Medical devices also help in reducing medical errors as agreed by the respondents as 86.6 percent agree that high end technological medical devices are successful in reducing medical errors. Though successful implementation of the devices depends on the staff i.e. then trained staff as agreed by 80.1 percent that is 161 respondents out of 201 agree that if staff is trained the implementation of the devices would be done rightly reducing medical errors.

Suggestions for the study

- Timely training should be given to the staff in healthcare regarding working of the devices
- The implementation of the devices should be on the basis of environment
- Regular maintenance and repairing of the devices to be done to reduce medical errors

- Safety standards should be followed by all the hospitals and a standard format for all should be used
- Internal and external audits should be conducted in the sector to keep a check on the machines
- Devices should be up to dated according to international standards
- Only technical staff should be allowed to use the high technological medical devices
- The training should be done in a specified framework with goals set prior to the training of the staff so that the staff is accountable for themselves.

Authors Declaration

Conflict of interest – This is to declare that all of us are authors of the following manuscript titled “**Role of high technology medical devices and its uses in patient care**” and we hereby agree to the following:

1. All of us the authors have read the manuscript and take responsibility for its contents.
2. We have taken special care towards the language and grammar of the article and certify it is correct to the best of our knowledge.
3. We have no conflict of interest.
4. Similarity index is less than 10 percent.

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Ethical Clearance – NIL

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