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Impact of Technology in Human Error in Health Care

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ABSTRACT:
It is not uncommon for patient safety problems to be unconnected with attention to human factors and technology as well as the deployment of new technologies, workflows, roles, and teams. Several studies have shown that human aspects are crucial in any situation, yet mistakes usually occur when systems and technology are not well matched to human activity. Numerous patient safety mishaps can be traced back to a misunderstanding of the latest technological developments.
Patients' safety, operating personnel performance, and well-being can all be improved by studying human factors, which examine the interactions between persons and the technology they use. If a small mistake is made, it will have an impact on all the other elements, including patient safety and the reputation of the organization. After reading a lot of scholarly articles and other important materials, the author will try to figure out how technology affects human error.
Key Words: Human Error, Technology, Health care, Patients and Safety

I. INTRODUCTION :

To err is human, says a 1999 Indian Institute of Medicine paper. To reduce medical errors, new technologies must be developed and tested. Additionally, "Crossing the Standard Chiasm" claims that new data technology is required as a key first step in networking to achieve better patient care.

The development and implementation of health data technology has increased, and evidence of the influence of health technology on patient safety has ranged from weak to strong. Thanks to the digital revolution, pharmacists now have more opportunities than ever before; can place direct orders for pharmaceuticals and treatments. Patients have benefited from the 'Computerized Provider Order Entry" Program, which has been upgraded and is extremely useful. Computed Provider Order Entry is used by the vast majority of hospitals. Currently, fashionable systems allow for tests, procedures, and consultations to be ordered using these new methods. Clinicians and patients have both benefited from the widespread use of "Computerized Provider Order Entry," which also shows the basics of health care.

Patient injuries due to medication errors can be reduced thanks to the Health Information Technology for Economic and Clinical Health (HITECH) Act, which subsidises their implementation by hospitals. To evaluate the efficiency of CPOD in hospital settings and to analyse precisely the reasons for the varied impacts on medication errors, 'Preventable Adverse Drug Events' (PADE) have been systematically measured and effects on medication errors are provided.

Institute of Drugs (IOD) is a big supporter of electronic health records. They made a link between the "Human Epidermal Growth Factor Receptor" and possible equipment in terms of both quality and safety.

In their vision statement, medical aid providers should offer services that are both affordable and high quality, and they should also be able to provide complete treatment. This is what they should do.

The researchers are also assessing the impact of 'Electronic Health Record' on medication safety, with a focus on CPOE systems incorporating clinical call support (CDS) alerts.

According to a 1999 Indian Institute of Medicine report, making mistakes is part of being human. The development and testing of new technology is essential for reducing medical errors. According to "Crossing the Standard Chiasm," new data technology is also required in order to network better and provide better patient care.

Everything from basic charting through medical technology integration is included in this system.

By learning about a variety of strategies, we will discover how to improve clinical outcomes and care coordination while minimising human error. Increasing efforts have been made in the development and deployment of health data technology, and evidence of health technology's impact on patient safety has ranged from negligible to significant. Thanks to the digital revolution, pharmacists may now obtain medications and therapies directly from manufacturers. Computerized Provider Order Entry, a program that

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has been improved and is incredibly useful for patients, has helped them. The great majority of hospitals make use of CPOE (Computerized Provider Order Entry). These new methods can be ordered through stylish systems currently in use for many types of testing, treatments, and consultations. The widespread use of "Computerized Provider Order Entry" has helped both clinicians and patients because it shows the most important health technique.

The Health Information Technology for Economic and Clinical Health (HITECH) Act, which subsidises hospitals' deployment of drug error detection systems, can reduce patient injuries as a result of these systems. 'Preventable Adverse Drug Events' (PADE) have been carefully evaluated and effects on medication errors are provided to evaluate the efficiency of CPOD in hospital settings and to investigate precisely the reasons for various impacts on medication errors.

For a long time, the IOD has been a strong supporter of electronic health records. They made a connection between the use of "the Human Epidermal Growth Factor Receptor" and the best and safest equipment that is available today.

According to their goal statement, the 'National Alliance for Medical Aid Suppliers' should provide services that are both affordable and of good quality, and they should also be able to provide comprehensive care as well.

As part of this study, researchers are also looking at how 'Electronic Health Records' affect medication safety, with a particular focus on CPOE systems that incorporate clinical call support (CDS) warnings.

II. OBJECTIVES:

The aim of this paper is to discover and evaluate healthcare technology's effectiveness in reducing human errors while also evaluating its impact on service quality. It's possible to define Healthcare Data Technology as "the application of data processes including each element and comprising the storage of health care data, retrieval, sharing, use, and communication." It uses a lot of different kinds of technology, from simple charting to medical technology integration.

We will be able to learn about the numerous ways to improve clinical outcomes and care coordination while also reducing human error.

III. REVIEW OF LITERATURE:

During the course of this study, the influence of human factors and technology on health care and patient safety procedures was examined in detail. Five main categories of results were found, which are as follows: I. Medical errors or patient safety; II. Healthcare professional quality of life; and III. (for example, decreased fatigue, discomfort, workload, pain, and injury).III. The performance of the user, followed by the potency or correctness of the intervention, and IV. The attitudes of health care providers concerning interventions (e.g., satisfaction and preference). 5) Economic assessments are also included.The data revealed that the treatments had a statistically significant influence on the outcomes of healthcare professionals. The relevance of scientific and consistent recommendations on how HFE should be applied in health care is emphasised in this review[1].

As stated in the research title, this project's purpose was to conduct an in-depth examination of the scientific evidence presently available about the effects of various kinds of health information on patient safety. Electronic physician orders, computerised provider order entry, clinical decision support tools, electronic sign-out and hand-off tools, bar code medication administration (including the use of smart pumps and automated medication dispensing cabinets), the electronic medication administration record (EMAR), and patient data management systems were all included in the research. Patient safety and security have been deemed the most likely health information technologies to increase patient safety and security. The safety of critical care patients may be improved by the use of ADC systems and PDMS (patient monitoring systems)[2].

The Patient Safety Primer published three articles on "Computerized Provider Order Entry," one of which was written by myself. The goal was to raise the level of knowledge among healthcare practitioners about current technologies. The study employed a secondary data gathering strategy in order to get its findings. Finally, it pushes for CPOE to be included as one of 30 "Safe Practices for Better Healthcare" by the National Quality Forum, for it to be included as one of the first three suggested "leaps" for increasing patient safety by The Leapfrog Group, and for healthcare providers to adopt it[3].

According to the four authors who contributed to this work, "The efficacy of computerised order entry in minimising adverse drug events and prescription mistakes in hospital settings: a systematic review and meta-analysis," is the conclusion of this work. Eryl K Nuckols and Crystal Smith-Spangler are two of the authors who contributed to this research. Their goal was to assess the efficacy of CPOE in reducing PADEs in hospital-related settings, as well as the processes

underlying the various impacts on pharmaceutical errors that have been observed. The following was the study's methodology: Medline, the Cochrane Library, and Econlit, as well as web-based databases and bibliographies, were used in this investigation. After everything is said and done, they were utilised in hospital-related duties; implementing CPOE is linked with a more than 50% reduction in PADEs, despite the study's weak design4.

The impact of prescription errors on a hospital group practice's experience with computerised order entry: The purpose of the study was to determine whether an ambulatory CPOE system had an impact on prescription problems and adverse drug occurrences (ADEs). For both the pre- and post-testing phases, a community-based, multispecialty health system that was not affiliated with an academic medical centre was chosen as the setting. It was decided to undertake the inquiry in a quasi-experimental method. According to the findings, even the most basic form of the CPOE system, which does not need CDS warnings, has the potential to have a major impact on medicine safety if it is put into place.[5]".

Medical care quality, efficiency, and cost were all factors in the author's systematic review. The study's primary goal was to examine health information technology's impact on health care quality, efficiency, and cost. The study's technique was a meta-analysis, which involved looking at a variety of articles about healthcare-related human technological errors. According to the researchers, health information technology has been found to increase the quality of health services and reduce prescription errors. Primary and secondary preventive care has a lot of evidence to do with quality improvement[6].

A study titled "Using information technology to enhance medication mistake rates in hospitals" was conducted in order to investigate the usefulness of technology in reducing medication mistakes in the healthcare industry. The investigation was carried out using a meta-analytic approach. Although the research's conclusion calls for the employment of robots to fill prescriptions, bar-coding, automated dispensing devices, and computerization of the medication administration record, the report also notes that as mistake rates fall, fewer studies will be undertaken in the future[7].

In this article, we will look at the link between "Bar Code Technology and Medication Administration Error:" Specifically, the goal of this systematic review was to assess whether or not the installation of the Bar Code Medication Administration System (BCMA) resulted in a decrease in the risk of major adverse events. The findings of this systematic review are studies that looked at the relationships between and among the five rights of medication administration (appropriate drug, appropriate time, appropriate patient, appropriate dose, and appropriate route) in general, as well as the relationships between and among the five rights of medication administration in particular.

The prospect of analyzing new MAE categories recognized by the BCMA has ramifications for patient safety, and this is likely the most significant contribution made by the review8, according to the authors[8].

In an English hospital, qualitative research was conducted on the effect of an inpatient computerized prescribing system on the causes of prescribing errors. The results were published. One of the objectives of this study was to get insight into prescribing professionals' perspectives on the causes of electronic prescription system failures in order to develop recommendations on how to maximize benefits while minimizing risks. Semi-structured interviews with sampled prescribers who had committed a prescription error were conducted as part of the approach. As a result, the outcomes – and their causes – were multifaceted; the electronic prescription system influenced environmental, personal, and group error-producing conditions, task-producing conditions, and technological error-producing conditions[9].

Healthcare Malnutrition: The Use of Technology in its Detection Researchers in this study sought to provide a conceptual framework for the numerous types of technology utilized to alleviate malnutrition in hospitalized patients by determining (1) the breadth of accessible literature; (2) the relevant results; and (3) the outcomes. The author searched three databases (PubMed, Scopus, and CINAHL) and generated a numerical summary of the study before doing an analysis. The use of malnutrition technologies was shown to be beneficial due to the shorter stay and lower costs associated with missed diagnoses of malnutrition. As previously indicated, electronic technologies and software can also be used to reduce the workload and time required by health care practitioners assessing patients for malnutrition10, as previously indicated[10].

A tertiary hospital in the United Kingdom conducted research to determine "factors influencing healthcare personnel's adoption of mobile electronic medical records (EMR)." An online questionnaire survey and log file analysis were conducted to determine the factors that

influence healthcare personnel's willingness to use mobile electronic medical records (EMR). The findings of previous research were compared.

In order to determine user approval of the system, an offline survey was conducted utilizing the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Tech Acceptance Scale, which were both included in the approach. Consequently, it was discovered that both physicians and nurses regularly used the menus to see inpatient lists, alarms, and clinical data about patients. Doctors frequently used the menu to obtain laboratory results, whereas nurses frequently used it to retrieve nursing notes and estimate nursing task duties[11].

The National Institute of Medicine (IOM) brought attention to the issue in 1999 by focusing on government reports from the igniting toward activity to advance patient safety at a time when it was estimated that preventable medical errors kill between 44,000 and 98,000 patients each year in the United States hospitals (National Institute of Medicine, 1999). Aside from this, it is widely acknowledged that medical errors cause more deaths each year than road accidents or cancer combined. The emergency room protocol must be changed in order to prevent shift mistakes; in addition, the performance of the emergency room staff must be enhanced. As previously mentioned, management strategies must also be established[12].

Medical mistakes are on the rise, and the Institute of Medicine (IOM) of the National Academies of Sciences, Engineering, and Medicine (NASM) produced "To Err Is Human" studies that focused on reducing medical errors in a thorough attempt to enhance patient safety[13].

The Institute for Healthcare Improvement educates healthcare professionals on the inherent flaws in care systems and procedures in order to reduce the number of medical errors caused by carelessness or neglect rather than system faults. Among the most serious threats to patient safety, medical mistakes such as transition errors are listed as the most common[14].

The threat posed by medical error has been incorporated into patient safety in a significant way. JCAHO has compiled a list of risky events that occur as a result of medical error[15].

Additionally, several public and private entities participating in health care benefits recognised the necessity of recognising issues and providing suitable remedies that would advance the process of patient care as well as the necessary hospital systems[16].

Patient safety and quality of care problems that occurred as a result of health care delivery changes were addressed via the National Database of Nursing Quality Indicators (NDNQI)[17].

The Error Trajectory Model is a fantastic representation of the multiple contributing reasons and failed levels of defences, barriers, and safeguards that contribute to accidents and their consequences. [18].

HE (human error) is described as "a word that refers to occasions in which a planned sequence of mental or physical acts does not result in the expected result[19]."

When the Robert Wood Johnson Foundation started a new program in 2003, it was intended to relieve strain on overcrowded emergency rooms while also raising awareness of the overworked healthcare safety net in the communities it served. [20].

The action "not planned by the actor; not desired by a range of rules and regulations or an external viewer or that piloted the job or system beyond of its allowed confines[21]" is considered another definition of a human mistake.

IV. DISCUSSIONS:

Concerning the discussion, a meta-analysis was conducted to determine the effect of technology on human error in healthcare. A review of the literature was done to come up with a way to describe the parts of implementing health information technology and the different types of health information technology systems.

The modification of a framework takes into account initial costs, ongoing operational and maintenance costs, a percentage of health information technology penetration, and hospital productivity. Typically, humans make errors and commit common errors in their work, reducing the productivity of services. Human error in hospitals can result in patient dissatisfaction, medication administration errors, surgical errors, and so on. Conducting a systematic study with related articles ensures a thorough analysis, and incorporating new technology invariably reduces errors.

A qualitative descriptive study was conducted following a review of the articles. Broadly, a few independently selected review articles that addressed human errors in the administration of drugs were included.

We are all prone to making errors, and human error accounts for at least 80% of failures and losses. The root cause of human error is a lack of a well-defined workflow system coupled with insufficient technology. However, with the advancement of technology, it is entirely possible

to reduce the incidence of workplace human error. Of course, we cannot change human behavior, but we can certainly provide an employee with a set of procedures for delivering patient care and monitoring its quality. Therefore, let us consider how this utilization of information systems can benefit the hospital. It is a healthy way to increase employee efficiency and thus the organization's overall effectiveness.

'Employees become more productive and have accurate data with which to evaluate the problem. The painless modification of an organization's is an operational procedure. The total expenditure on workforce training should be lower than the target, which is necessary to meet the target.

The study found that when technology is not updated or staff is not trained to use it properly, there are numerous errors and productivity is reduced. In hospitals, the use of advanced technology has reduced human error. By using the right hospital information system, a lot of mistakes in how medicines are given out have been cut down.

The result of a focus on quality:

The key influence of HIT on care quality was its contribution to the overall quality of care provided by the hospital. Traditionally, decision support features have been implemented into electronic health records or computerized provider systems to aid in the decision-making process. According to the survey, electronic health record systems were more regularly utilized in outpatient settings, whereas physician order entry systems were most frequently used in inpatient settings, according to the survey.

The research looked at the influence of health information technology on the delivery of preventive health care and the quality of such care. A number of studies looked at primary preventive care measures, while others looked at secondary preventive care measures, and a few looked at screening measures.

It was discovered that three studies looked into the impact of health information technology on secondary preventive care for hospital-acquired complications. One randomized controlled experiment made use of automated surveillance and identification of high-risk patients, as well as physician notifications, in order to improve patient outcomes. According to the findings of this study, the percentage of deep venous thrombosis and pulmonary embolism dropped dramatically in high-risk hospitalised patients (from 8.2 percent to 4.9 percent). Other studies have revealed a substantial decrease in the incidence of pressure ulcers among individuals who are admitted to a medical facility for treatment. According to the findings of another study, there has been a considerable drop in postoperative infections at hospitals across the country.

Research on health information technology and quality improvement, which was made possible by an emphasis on prevention, looked at a number of different types of care, like hypertension therapy, inpatient lab tests, and advanced directives in hospitals, among other things.

Clinical monitoring, which is based on large-scale screening and data collection, helps to enhance the overall quality of treatment provided to patients. The analysis of another study report makes it evident that health information technology can enable unique ways of care delivery that are not conceivable with traditional paper-based information management. Approximately 90,000 hospital admissions were reviewed by one researcher to evaluate the incidence of adverse medication events. The researcher discovered that the rate was 2.4 occurrences per 100 admissions. In addition, the drug's unfavourable impact was related to a 2.45 percentage point increase in crude mortality, which was mostly owing to an increase in the length of stay in the hospital. An electronic health record was used in two studies to detect adverse medication occurrences, examine their causes, and design strategies to minimize their incidence. The results of both studies were published in JAMA Internal Medicine.

According to the findings of the first study, using electronic health record surveillance, researchers were able to develop interventions that increased absolute adverse drug event detection by 2.36 percentage points while simultaneously decreasing absolute rates of drug side effects by 5.4 percentage points. There was no discussion in this study of how the treatments are utilized to reduce the occurrence of adverse medication events. An electronic health record monitoring system was used in the second trial to monitor approximately 61 000 patient admissions in order to establish which adverse medication events constitute a substantial cause of prolonged hospitalizations.

Two investigations indicated that, while automated quality measurement was found to be less labor-intensive than manual quality assessment, the validity of automated quality measurement was shown to be compromised due to a number of constraints. One study revealed that when automated quality measurement was used, the greatest proportion of negative outcomes was

observed, showing that such systems may create biassed results.

There's an extra bonus to this: The second study found that when quality of care processes are done, automated mistakes from computerised illness registries are overestimated.

Three-fold, health information technology adds to the development of quality while also lowering the incidence of prescription mistakes. Two trials of computerised hospital providers found an increase in adverse drug events, while a third study found a non-statistically significant trend toward drug event reduction and an increase in prescription errors.

In one study, Bates and colleagues looked at pharmacological side effects and identified a non-statistically significant trend toward a decrease of 17 percent. The evaluation did not only look at pharmacological side effects, even though this result did not reach statistical significance in this study.

Immediately following publication of the first study, the research team looked into the long-term consequences of adverse medication occurrences that were not averted by automated provider order input. The hospital information system has increased the hospital's assistance for decision-making.

The second study, which used a time series methodology, discovered an 86 percent reduction in the frequency of major drug mistakes that were detected and prevented.

Additionally, by speeding drug delivery, health information technology systems have helped to decrease pharmaceutical mistakes and save lives. The fact that this result shows that the overall quality of treatment has gone up is unquestionable.

This is the ultimate consequence in terms of efficiency in the long run:

The research found two key forms of technology that have an impact on efficiency: the usage of care and the time spent by providers. Other research examines the influence of health information technology systems on the usage of health-care services. Despite the fact that only a few studies have shown a reduction in health-care use rates, computerised provider order-entry systems assist clinicians in making treatment decisions in a timely and efficient manner.The use of a variety of decision support tools, such as automated calculation of diagnostic test pretesting likelihood, notification of prior test results, notification of laboratory test costs, and computerized reminders, all resulted in an absolute drop in use rates. The most severely affected services were those involving laboratory and radiological tests. Instead of reporting on the influence of HIT on service use levels, the majority of studies did not analyze the appropriateness of service utilization decreases, but rather reported on the effect of HIT on service utilization levels. The bulk of the research did not explicitly calculate the savings in terms of money. Instead, the researchers used the average cost of the service at the institution to make estimates about how much the service would cost if it were cut.

Two investigations carried out at the registered institution assessed inpatient order entry and discovered that the use of computers enhanced the amount of time spent by physicians on their patients. The use of computers will boost time utilization while simultaneously reducing mistakes, resulting in a rise in the overall efficiency of the task.

There was either a lack of evidence on costs or evidence that was less persuasive than the evidence on quality and efficiency. Cost information can be found in one of the studies, but it is not available at this time. In addition to the cost data from system installation and system maintenance that were collected from institutional leaders and utilised in the analysis, the study also incorporated cost data from the study's participants on the basis of system implementation and maintenance. In their defence, they highlighted the high expense of computer storage, despite the fact that virtually all of the institutions were more than twenty years old. System maintenance costs were high in several categories of the research, and the fact that these systems had been built, deployed, and assessed was cited as an explanation. However, it isn't likely that the total costs of developing and putting it into use can be accurately estimated in this way, as previously stated.

V. CONCLUSION:

The widespread use of information technology (IT) in health care has the potential to provide a number of advantages. It is extremely beneficial in all aspects of clinical and non-clinical activity, and it makes work much more manageable and convenient for everyone. However, according to various studies, many information technology (IT) issues continue to plague the healthcare industry. Qualitative research is still the most common way to show that IT problems that affect patient safety are real.

According to the electronic medical record (EMR) system, prescription errors are similar to pharmaceutical errors in a number of situations. The majority of doctors make mistakes when it

comes to prescribing the proper dosage of medications.

These are just a few examples of how human error can cause havoc in the field of health information technology. It's no surprise that human error was the most significant contributing factor, accounting for 33 percent of the total. Doctors and nurses sometimes make mistakes when they choose the wrong item from a drop-down menu or enter the wrong patient room number.

Medical professionals want to use a lot of different technologies to keep their patients safe, even though the Joint Commission report says that there are only a few risks to using information technology in the health field.

The following day, after hearing the debate, I looked into it further by looking at the various authors in various publications. I discovered that technology has two sides that are dependent on the individual's knowledge, abilities, and practice. People need to keep an eye on and audit information technology all the time, as well as have regular audits, to find and fix problems.

Observing and identifying specific categories of adverse events and risk circumstances, the Joint Commission of certified organisations and concerned health care professionals explains the common fundamental reasons for these events and risk circumstances, and advises reducing the critical risk and advocating for avoiding future possibilities time and time again.

This must be changed and maintained. - Develop, promote, and maintain a company-wide culture of safety, dependability, and successful change management.

It is necessary to make improvements to the procedure. Take a proactive, systemic approach to improving health information technology processes, which should include examining patient safety concerns.

To provide dynamic leadership in the areas of health information technology strategy, implementation, and evaluation, among other things.

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