INTERNSHIP TRAINING

AT

PAS DIGITAL PVT.LTD

RISING NEED FOR PATIENT SAFETY: IMPACT OF COVID-19

BY

SHRADHA CHANDAK

PG/019/080

UNDER THE GUIDANCE OF

DR. SUMESH KUMAR

PGDHM (HOSPITAL AND HEALTH MANAGEMENT)

2019-2021

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

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The certificate is awarded to

Name – Ms. Shradha Chandak

in recognition of having successfully completed his/her Internship in the department of

Product Team (Healthcare Department)

and has successfully completed her Project on

Rising need for patient safety: Impact of Covid-19

Date: 1st June, 2021

Organisation: PAS Digital Pvt. Ltd

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning.

We wish her all the best for future endeavors.

Sumit Sarkar
Co-founder
PAS Digital Pvt. Ltd.

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **SHRADHA CHANDAK** student of PGDM (Hospital & Health Management) from International Institute of Health Management Research New Delhi has undergone internship training at **PAS DIGITAL PVT LTD., GURUGRAM FROM 1ST MARCH** TO **1ST JUNE**.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.

Ms. Divya Aggarwal

Associate Dean, Academic and Student Affairs
IIHMR, New Delhi

Dr. Sumesh Kumar

Mentor
IIHMR, New Delhi

Certificate of Approval

The following dissertation titled **"Rising need for patient safety: Impact of Covid-19"** at **"PAS Digital Pvt Ltd."** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for a award of **PGDM (Hospital & Health Management)** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name Signature

Certificate from Dissertation Advisory Committee

This is to certify that **Ms. Shradha Chandak,** a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. She is submitting this dissertation titled "Rising Need for patient safety: Impact of COVID-19" at "PAS Digital Pvt. Ltd" in partial fulfillment of the requirements for the award of the **PGDM (Hospital & Health Management).**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Institute Mentor Name,
Name
Designation,

Organization

Organization Mentor

Designation, Co-founder

Organization PAS Digital Pvt. Ltd.

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **Rising need for patient safety: Impact of Covid-19** and submitted by **Shradha Chandak**, Enrollment No. **PG/19/080**. Under the supervision of for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from **1st March to 31st May** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institutions of higher learning.

Signature

FEEDBACK FORM

Name of the Student: Ms. Shradha Chandak

Dissertation Organisation: PAS Digital Pvt. Ltd

Area of Dissertation: Healthcare Product Team

Attendance: Complete, as per company norms

Objectives achieved: To minimize the traffic of the people in hospitals
To reduce chances of patients getting infected by other person.
Eliminate the need for physical visit

Deliverables: Understood workflow

Strengths: Focused, keen to learn, able to engage with customers.

Suggestions for Improvement: Writing ability; to accurately and comprehensively translate tests & data into a narrative.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni): Encourage more primary research.

Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Date: 19th June 2021
Place: Gurugram

Acknowledgments

I take the opportunity to express my gratitude to the people who have been involved in the completion of this project. This work has matured into the present shape with encouragement and guide from numerous people.

First and foremost, I would like to thank Mr. Sumit Sarkar, Director for helping me and gave me the opportunity to carry out this project. Working on the topic reveals some of the most interesting fact which I have never encountered, as well as all other employees of the organization who helped me either directly or indirectly in this undertaking.

My sincere thanks to Dr. Sumesh Kumar, my mentor, faculty of International Institute of Health Management and Research (IIHMR) for constant and timely support and supervision that all I needed during my project and making it a success.

Also, I would like to thanks external faculty and the other faculty who provided me the valuable points to add up in the dissertation topic during presentation.

I am extremely thankful to my friends and batch mates who has been a source of encouragement during my difficult times. Without their support this would have been just satisfactory. They bring out best in me.

Lastly, I am very grateful to my parents they are always supportive and cooperative throughout my journey and had faith that I can do it. Their endless support has always lifted me up through hard times and always been an inspiration to me.

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Internship Report

Chapter – 1 Introduction

PAS Digital Private Ltd, is a young virtual platform services company, cofounded by a few accomplished professionals from the services and technology industries.

The Go to market brand name of PAS Digital Pvt. Ltd is CALEEDO.

Caleedo is a multi-experiential hyper computerized B2B virtual platform for the Business Support Services (FM & different guide offerings) having an enterprise agnostic configuration.

Caleedo is constructed with the aid of using senior enterprise notion leaders and technologists, design & improvement philosophy for all of the goods is constructed on an enterprise first framework which we passionately consult with as 4E™ Emotion–Experience–Efficacy –Efficiency- tetrad.

The cutting-edge platform of Caleedo gives administrative center packages like IWMS and standalone packages like hygiene control, seat & meeting room control and health center offerings like virtual affected person care, asset tracking, tracking and navigation, digital visits and traveller control which addresses the cutting-edge demanding situations posed because of COVID disaster for workplaces & hospitals.

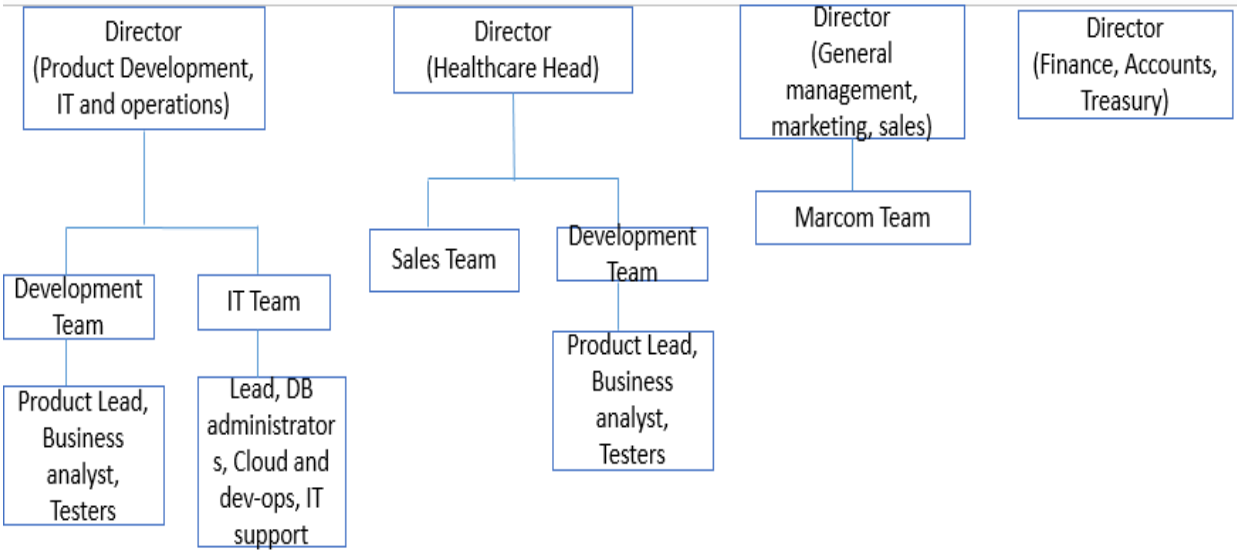
The Caleedo platform offers the consumer with configurable reports, dashboards, forecasts, analytics and seamless integration to each legacy and standalone packages/software program that the commercial enterprise may also have already on-boarded for his or her operations thereby making it a in reality flexible virtual solution.

Caleedo units out to disrupt this area with the aid of using constructing use case-primarily based totally virtual packages on a modern-day tech stack that might paintings both on a standalone mode or as an incorporated business enterprise platform.

The services are cloud-hosted and mobile-first answers which are scalable, secure & extraordinarily smooth to onboard. We provide a mess of workflow orchestration answers & particular persona-primarily based totally consumer interfaces for all stakeholders, in assembly their respective commercial enterprise goals within side the ecosystem.

The Caleedo platform offers the consumer with configurable reports, dashboards, forecasts, analytics and seamless integration to each legacy and standalone packages/software program that the commercial enterprise may also have already on-boarded for his or her operations thereby making it a in reality flexible virtual solution.

Organization Structure/ Organogram



Vision

Caleedo aims to empower the administrators of facilities management services with innovative digital solutions that enhance insights & outcomes and elevate experience & efficiency.

Values

1. **Integrity**
   Thinking, performing and speaking with unwavering probity, honesty and respect.

2. **Customer Centricity**
   We stay due to our clients. Our precedence is to make our clients win. And exceed their expectancies each time.

3. **Innovation and enterprise effect**
   Challenge the obvious. We may have sparkling views and create or recreate if it has an effect on enterprise, human beings and groups.

4. **Teamwork**
   Together we win. Our group and teamwork is our recipe for success.

5. **Good citizenship**

We take satisfaction in being suitable residents in our groups in which we stay and work

Products

❖ **Caleedo Express**

1. **Visitus**- It safeguards the workplace to enhance the visitor experience.
   Through a digitally orchestrated seamless process for check in & check out, meeting with host, lost & found, feedback and a host of industry leading features.
   It is a zero contact visitor management process and administer social distancing including contact tracing wherever required.

2. **Meetable-** is a meeting room management playbook which digitally orchestrates meeting room reservation from anywhere-anytime.

3. **Seat-In**- facilitates reservation of flexi/hot seat and workstations by the employee. The facility administrators can plan & release flexi seat inventory periodically, on the basis of occupant demand charts and track the workstation/seat reservations.

4. **Hygienio-** is a digital application that checks the surface & air hygiene levels of critical locations of the workplace or any location where Hygieneo is used to assess the hygiene standards being maintained there. Hygieneo opens a new world for users and consumers in workplaces, restaurants, schools, and any public location to validate hygiene levels.

❖ **Caleedo Health**

1. **E-vizit** - An easy to use digital solution for a patient's family member to connect with the patient admitted to the hospital from the comfort of their homes or any other location. Interact with doctors and other care providers to get to know about your patient's condition.

2. **P-vizit**- **A**n integrated digital solution for orchestrating physical visits to hospitals for patient relatives and associates. Facilitates the patient's family member to plan & schedule visits based on the hospital's visiting hours while keeping in view contact less and social distancing norms post Covid-19 pandemic.

3. **TRIACK** can cater to all your in-hospital service requests and delivery problems through its uberization model. TRIACK assists you during your stay in hospital to have a stress free environment for your quick recovery.

Various departments

1. Product Department
2. Technical Department
3. Marcom(Marketing and Communication Department)
4. Sales Department
5. Operations Department
6. Finance Department

Work experience in the organization

Internship position

As an intern with Pas Digital, I worked in a Business Analyst intern position and was responsible for various tasks. I was part of the Healthcare team to accomplish goals.
The work experiences I encountered during the internship allowed me to develop analytical skills, communication skills, problem solving skills, time management skills. I think I still need to work on my skills to gain more expertise in the role. However, the overall experience was positive, and everything I learned during internship period will be useful in my future career in this field.

Lessons Learned

Technical skills learned from tasks

1. Requirement analysis from the client
2. Swim lane and process flow diagrams of the requirements gathered
3. Competitor analysis
4. Integration with Vendor partners
5. Prepare documents using PAS digital IT Governance guidelines
6. User Acceptance Testing
7. Priority analysis
8. Implementing product at client side
9. Providing on-site and off-site customer support

Non-Technical skills learned from tasks

1. Co-coordinating with various team members.
2. Developed inter-personal and time management skills
3. Good communication and organizing skills

4. Friendly personality
5. Ability to handle people and pressure.
6. Learnt to handle pressure to deliver task as per deadline
7. Learnt to accept criticism in a friendly manner.
8. Quick decision making skills

The work was challenging and I learned about work and gained more confidence about in myself. It was a valuable experience.

Abstract

Aim – To understand the reasons for breach of patient safety and impact of covid-19 on patient safety.

Methodology- Literature based review was done. Multi-tier search strategy was used using keywords like patient safety, patient harm etc. ProQuest, PubMed, Google Scholar, Academia, Research Gate, Web of Science, EBISCO were used to search the articles. The literature review would be carried out using relevant research papers which are used for different research purposes and will be given credits under references.

Result- From the literatures, it was found that: Before covid pandemic, medication error was more prominent in causing patient harm and after covid pandemic, hospital acquired infection (HAI) is more prominent in causing patient harm. Other Patient safety issues include: Diagnostic errors, unsafe surgical care procedures etc.

Conclusion- In the study, it was concluded that there is need for patient safety due to increase number of medical errors, diagnostic errors, adverse events, HAI's to prevent patient harm. Due to covid, the number of cases has increased several folds. The pandemic acts as an reminder for us that besides providing care, we need to improve and adapt to new things and technologies. Healthcare technology helps in improving patient safety by reducing medication errors, adverse drug reactions, hospital acquired events, improving patient compliance.

Keywords- Patient safety, Patient harm, adverse drug events, Covid-19

Chapter- 1 Introduction

Patient harm is any injury (major, minor, psychological) or death of a patient while in hospital caused due to negligence of healthcare settings rather than the underlying disease of the patient. Patient safety is the method that emerged to balance the act of patient harm.

Patient safety aims to reduce the risk of patient errors, the harm that can be caused due to negligence in healthcare. It is one of the international reasons of demise within the world. The chances of the person being harmed by traveling in the plane might be 1 in a million but the chance of patient harmed during healthcare setting is 1 in 300 [3]. According to the conservative estimates, patient harm is the 14 leading causes of death of global disease burden [3].

The adverse events occurring in healthcare due to unsafe care is 1 in 10 such cases [1]. These adverse events of medical treatments are those events that occur to the patient during a hospital stay.
These adverse events may cause injury to patients which may extend the patient's stay in the hospital, may cause any type of disability, any prolonged illness, or some irreversible medical condition and in extreme cases may lead to the death of a person. The reason for the adverse events is mismanagement by the hospital or errors by hospital staff and not because of the already existing disease which the patient is suffering from. These events are 80% preventable [4].

There are many instances of adverse events happening in hospitals. For example, a medication error is a very common and very serious issue in hospitals. Wrong medication can be prescribed due to similar packaging of medicines, similar sounds of certain medicines, or due to poor storing conditions of medication, quality of medicine gets compromised.
Prescription passes from different hands of the staff of the hospital starting from a doctor who prescribes it, a pharmacist who dispenses it, and a nurse who administers the dose, and error can occur at any stage. If there would be any safety measures to check then, this error could be prevented.

Another example of adverse events is the poor condition of equipment or machines in hospitals if maintenance is not checked from time to time. At a hospital in California, people died due to mismanaged equipment. They were not cleaned properly and the hospital took stern steps to prevent future infection from these. Not only the patient is at risk but the hospital staff is also at risk of coming in contact with the infected patient or asset in the hospital**.**

Some other types of patient harm include:

a) Hospital-acquired infections (HAI) - the infections caused by pathogens like bacteria, viruses, or other microbial agents acquired during the stay of the patient in the hospital like pneumonia, urinary tract infection.
b) Medication Errors occur due to illegible writing in prescription, dispensing the wrong formulation, administering the wrong drug, failed monitoring therapy, or patient compliance errors.

Types of error include:

i. Knowledge-based error- this consists of loss of knowledge. For e.g. giving Penicillin, without understanding the affected person is allergic.
ii. Rule-based Errors- this includes errors due to lack of training, education. For e.g Injecting diclofenac into thighs rather than buttocks
iii. Action-based Error- this may be due to the same appearance or same sound of medications i.e look-alike-sound-alike (LASA) medications.
iv. Memory-based medications- Maybe the prescriber forgot that the patient is allergic to certain medications.

c) Surgical error or wrong-site surgery error includes performing the surgeries on the wrong side of the body or due to wrong procedures.
d) In Hospital injury may be because of a fall.
e) Misdiagnosis includes possibilities like diagnosing a disease that is not present in an inpatient, failure to diagnosing a disease that is present.
f) Deep-vein thrombosis is a blood clot formed in the body during a hospital stay due to major surgery or immobility.

All these errors contribute to patient harm in the hospital. Globally, unsafe care results in over 3 million deaths each year.

To solve these problems globally, IPSG (International Patient Safety Goals) were introduced.

The Joint Commission International (JCI) expanded the International Patient Safety Goals in 2006.

The goals were taken from the JCAHO's National Patient Safety Goals. In JCI-accredited hospitals compliance with IPSG has been observed since January 2006[5].

To help the hospital to execute IPSG standards the JCI approves targeted solution tools[6]

There are 6 Patient Safety Goals:

Figure 1.1: International Patient Safety Goals

Source: https://mediculity.com/internatioanl-patient-safety-goals/

But throughout the covid-19 pandemic, the chance of patient harm proportion has magnified and cases of hospital-acquired infection because of covid-19 cases ranges from 12.5% to 44%. Pandemic has created terribly new issues concerning patient safety.

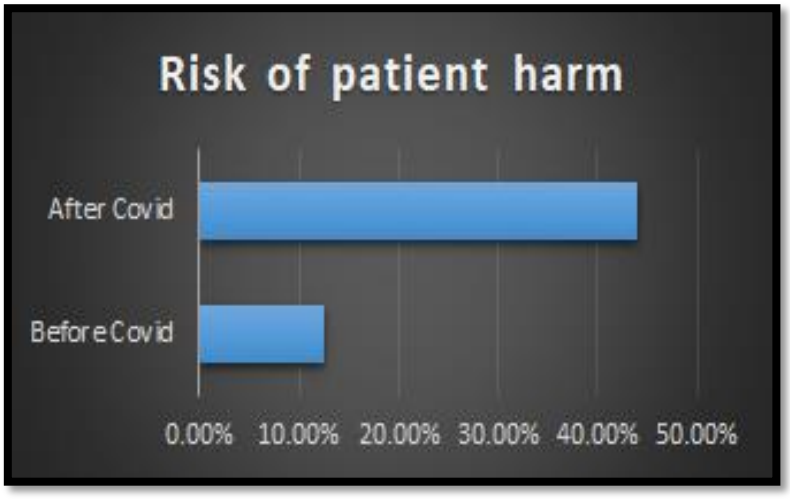


Fig 1.2- Risk of patient harm before covid and after covid due to HAI's

The covid-19 has placed huge stress on the hospital and healthcare systems. The terrible consequences of the COVID-19 are taking the lives of millions of people.

Pandemic has created very new troubles associated to patient safety at couple of stages of the healthcare system. Examples, hospital-acquired infections, not-on-time diagnosis or neglected diagnosis via way of means of clinicians. Medical errors by inexperienced practitioners.

In fact the vaccination used against covid, in some cases it is causing serious and severe adverse events which may even lead to death. It is not sure whether the death is because vaccination, there is no causal relationship with the usage of vaccine.

To solve all the patient harm errors, several technologies like Bar code medication administration to solve the problem of a medication error etc. can be used. Consistent use of technology will help in improving patient safety and hence decrease the cases of patient harm.

Thus, the study aims to access the reason for the rise in cases of patient harm due to covid and what factors can help to solve the problem.

Chapter -2 Review of Literature

Before COVID Cases

- Li H, Dong S, Liao Z, et al 2020[7]:
  Study design and sample: Retrospective cohort study; data obtained from a computerized database.
  Results: Medical technology errors accounted for 91.8% of the Claims and medical ethics errors for 5.8%.

- Eva Montané et.al 2018[8]
  Study design and sample: an analytic and retrospective cohort study; Germans Trias Pujol Hospital, with 511 beds for a population of about 850 000 people living in Barcelona
  Results: Drug-Related Deaths; hospital-acquired adverse drug reactions

- Faris Hussain et.al 2019 [9]
  Study design and sample: cross-sectional mixed-methods design using an exploratory descriptive analysis and thematic analysis of patient safety incident reports. Primary data were extracted from a national database of patient safety incidents
  Results: 2288 cases of confirmed diagnostic error: 1973 (86%) delayed and 315 (14%) wrong diagnoses. Staff human factors, including mistakes, were common. Other contributory factors with these reports include inadequate skill and clinician mistakes.

- Heng Li et. al2020
  Study design and sample: Retrospective cohort study. Grade A hospital of China having 4380 cases of medical malpractice claims.
  Results: 72.5 %of the claims involved medical errors and medical technology errors accounted for 91.8% of the claims and medical ethics errors for 5.8%.

- René Schwendimann et.al 2018[10]
  Study design and sample: Scoping review method was used and comprehensive literature search in PubMed and CINAHL in May 2017 and February 2018. Retrospective medical records review using Harvard methods or similar screening methods was used – conducted in acute healthcare settings on adult patients (≥18 years).
  Results: A total of 25 studies were included conducted in 27 different countries across six continents. Median of 10% patient were affected by at least one AE (range: 2.9-21.9%), with a median of 7.3% (range: 0.6-30%) of AEs being fatal. 83% of AEs are preventable. Three most common types of AEs reported were operative/surgical related, medication related, and HAI(healthcare associated infections.

- Alexander Hodkinson et.al 2020:
  Study design and sample: Systematic review and meta-analysis
  Result: From the findings it was concluded that preventable medication harm is a serious problem and has life threatening outcomes, highly in geriatric patients. It was found that prevalence for pooled preventable medication harm was 3% and overall medication harm was 9%. Preventable harm was greatest in medicines affecting the central nervous system and cardiovascular system.

After COVID CASES

- Niccolò Buetti et.al 2021 [17]
  Study design and sample: Matched case-cohort study; collected the data from large ICU in France. Critically ill Covid-19 patients were matched with similar non-covid-19 patients.
  Results: The ICU- blood steam infections risk was higher in the covid-19 patients than non-covid patients even after seven days of ICU stay.

- Giacomo Grasselli et.al ; 2020
  Study design and sample: Retrospective analysis; data collected of adult patients with severe COVID-19
  Results: Critically ill patients with COVID-19 are at higher risk of hospital acquired infections like Hospital acquired multiresistant (MDR) bacteria, ventilator associated bacteria.

- Xu Xiaominga et.al 2020:
  Study design and sample: Cross sectional study; An online survey.
  Results: The prevalence of depression, anxiety, somatic symptoms, and SSI were 30.2%, 20.7%, 46.2%, and 6.5%, respectively. There were a high level of psychological impact and SSI among hospital workers.

- Ingrid Arevalo-Rodriguez et.al2020:
  Study design and sample: Systemic review and meta-analysis of diagnostic test accuracy studies.
  Results: It was suspicion that 54% of the covid-19 patient had initial false negative reports RTPCR. There is large hetereogenicity in the false negatives results.

- Brad Boserup 2020[19]
  Study design and sample: Retrospective analysis using CDC data for ED(Emergency department) visits for covid and influenza illnesses. Motor-vehicle collision (MVC) data was collected from different cities. Descriptive statistical study and two sample t-test was

done ED data for significance and descriptive analysis was conducted for impact on MVC data.
Results: Mean of ED visits due to MVC has been decreased significantly across all cities of new York during pandemic to 66% from 45%.

- Melissa K. Cousino 2020[21]
  Study design and sample: Cross-sectional study, Electronic survey was conducted. Eligible participants were parents of the children with CHD, acquired CHD, caregivers of adult with CHD.
  Results: Total 1220 participants from 25 countries completed the survey from April 16 to 4 may 2020.Cardiac care problems were significant with reporting 38% delays in pre-pandemic situation with scheduled cardiac surgeries and 46% experience postponed clinic visits. About 75% respondents has high concern of becoming ill from covid-19.

Articles on Technological factors

- Kristine M. Thompson et.al 2018[26]
  Study design and sample: Intervention based study. All the inpatients nursing units at large academic medical centre with recognition as magnet. The organisation also had existing technology- CPOE computerized physician order entry.
  Results: It was found that after BCMA technology was introduced, medication error was reduced by 43.5%. The rate of medication errors decreased from 0.65 per 100,000 medications pre interventions to 0.29 per 100,000 post interventions. This technology has lowered the actual patient harm by 55.4%.

- Yasser K. Alotaibi et.al 2017 [23]
  Study design and sample: Descriptive Study
  Results: There is evidence that implementing an EMR (electronic medical record) reduces medical errors and also improves patient's safety. CPOE and CDSS are also one of the most beneficial health information technologies that will help in improving patient safety.

Chapter-3 Aims and Objective

AIM- To identify reasons for patient safety and technological factors that can solve the problem.

Objective-

- To identify the reasons why there is breach of patient safety in hospitals.
- To identify the impact of covid-19 on patient safety
- To formulate technological factors for improvement of patient safety based on reasons identifies

Chapter-4 Methodology

Study Design – Literature Based Review

Data Collection:

- Secondary Data
- Search Strategies

- Database and the terms used
  - Database used for searching the articles were: PubMed, Google Scholar, IndMed, ProQuest, and Reasearchgate.
  - Multi-tier search strategy was used to find the eligible studies.
  - At the first tier, the search was for the term reflecting 'patient Safety, patient harm'.
  - At second tier it was 'adverse events/ patient negligence cases related to patient safety' for the year ranging from 2017-2021.
  - At the third tier, the search was related to term 'patient safety and covid-19'.
  - At fourth tier, 'factors improving patient safety' was searched. These tiers were guided by the initial databases searches.
  - And then these tiers were integrated and used for further searches.

- Reference from the bibliographies of existing articles was also used for further searching.
- Filter of 'Full-Text article was used'.
- Search strategies were used in combination and were adjusted according to the database used for the extraction of articles.

Study Selection

Studies were selected on the basis of titles, keywords, abstracts of the articles. The articles that match the inclusion and exclusion criteria were solely enclosed within the study.
Studies which didn't meet the inclusion and exclusion criteria were discarded from the literature review.

Inclusion criteria

1. The Literature review was confined only of the articles in Scientific Journals. The titles of the papers were screened and then the articles were selected on the basis of the abstract.
2. Articles of year range 2017-2021 were included in study.
3. Articles published in English were selected for review.
4. All included studies focused on patient safety, patient harm, cases of medical negligence, covid-19 impact.

Exclusion criteria

1. Studies which only includes hospital management, covid-19 vaccine, medical error, other cultural innovations were excluded.
2. Commentaries, unpublished articles, case reports, abstracts, conferences, and dissertation were excluded

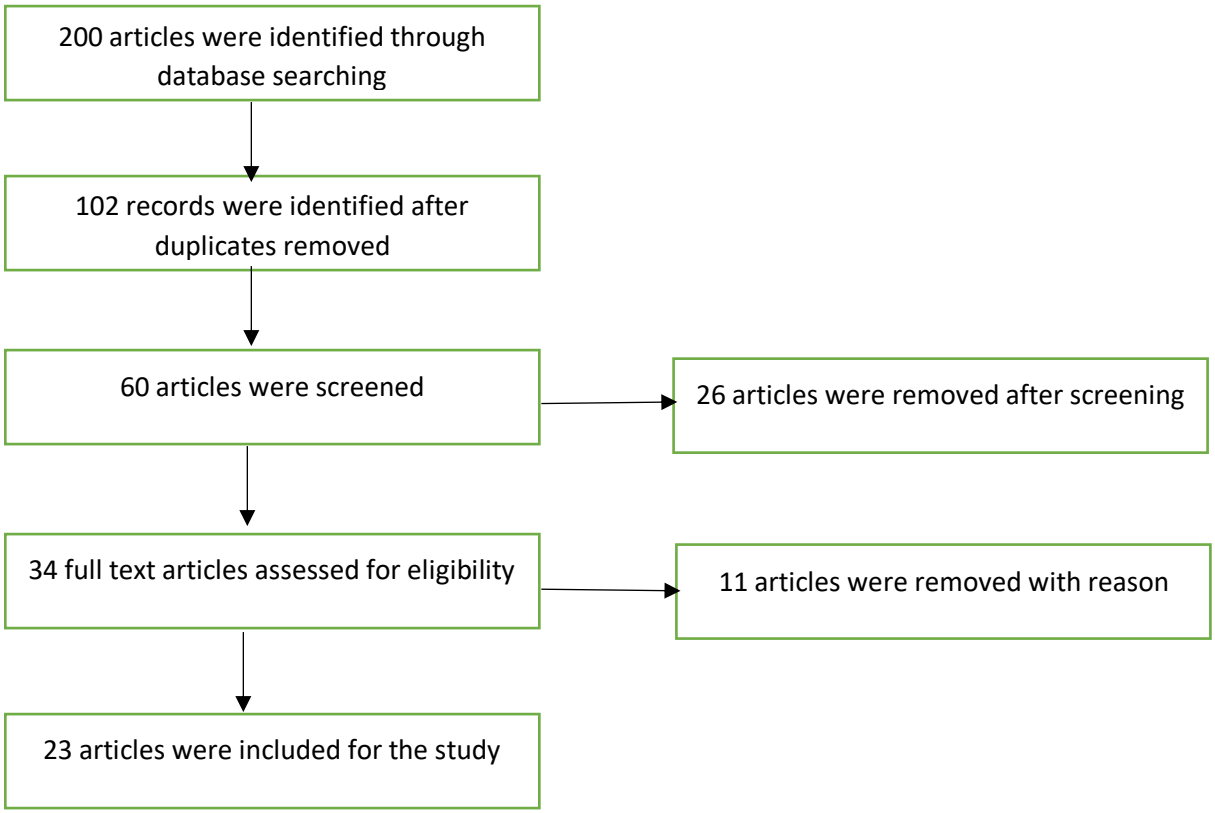


Fig. 4.1 Prisma Guidelines

Chapter – 5 Results

A) The reasons why there is breach of patient safety in hospitals.

To identify the why there is breach for patient safety, certain cases for patients admitted in hospitals were considered from studies. Six articles were taken of cases before COVID-19 to study the reason why there is breach of patient safety in hospitals.

Articles	Medical technology Errors	Medication Error	Diagnostic Error	HAI	Surgical Error
Li H, Dong S, Liao Z, et al 2021	☑	☒	☒	☒	☒
Eva Montané et.al 2018	☒	☑	☒	☒	☒
Faris Hussain et.al 2019	☒	☒	☑	☒	☒
Heng Li et. al2020	☑	☑	☒	☒	☒
René Schwendimann et.al 2018	☒	☑	☒	☑	☑
Alexander Hodkinson et.al 2020	☒	☑	☒	☒	☒
Percentage	33.33333333	66.66666667	16.66666667	16.66666667	16.66666667

Table 5.1- Results of Before covid articles

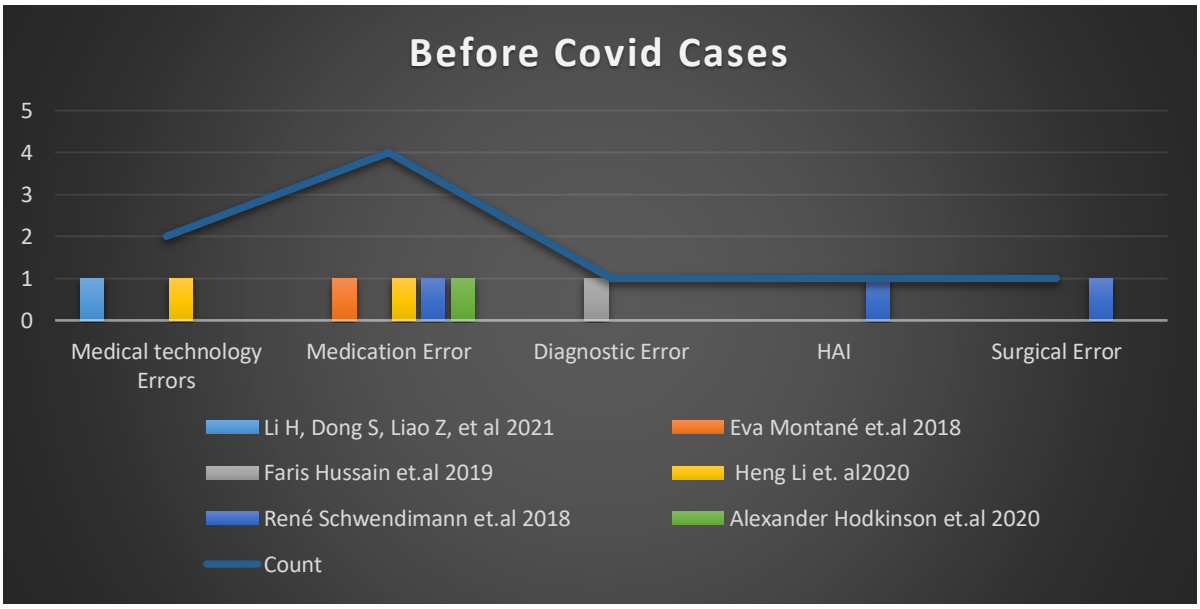


Fig. 5.1 Chart showing reasons for patient harm before covid

From table it is concluded that, Out of six articles:

Patient harm in two articles is because of medical technology errors; four articles contributed to medication errors; hospital acquired infection is found in one articles and similarly surgical errors are found in one article. All these cases were captured before pandemic situation.

So, 66.67% of patient harm is caused due to medication errors whereas other include medical technology (33.33%), Diagnostic errors (16.66%), and hospital acquired infections (16.66%), surgical errors (16.66%). From the studies it is found that medication errors is the major reason because of which patient safety is tampered.

Cases: After COVID-19 (Post pandemic situation)

Articles	HAI (hospital acquired infections)	Psychological error	Diagnostic error
Niccolò Buetti et.al 2021	☑	☒	☒
Giacomo Grasselli et.al	☑	☒	☒
Xu Xiaominga et.al 2020:	☒	☑	☒
Ingrid Arevalo-Rodriguez2020	☒	☒	☑
Percentage	50%	25%	25%

Table 5.2- Results of After covid articles

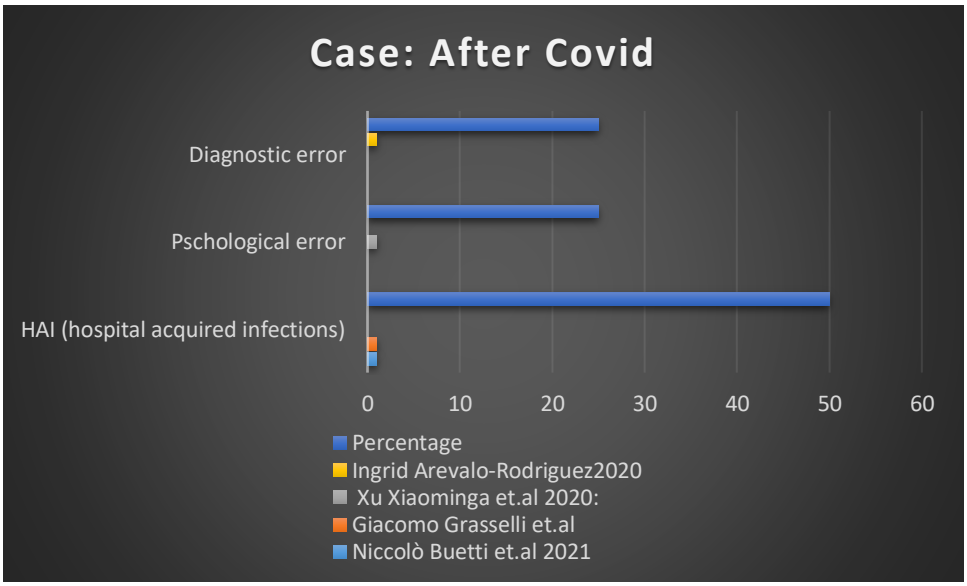


Fig. 5.2 Chart showing reasons for patient harm after covid

From table it is concluded that, Out of four articles taken for post covid cases:

Patient harm in two articles is because of hospital acquired infection; diagnostic error is found in one article and similarly psychological error is found in one article. All these cases were captured after pandemic situation.

So, post pandemic situation, there are more number of (approximately 50%) of hospital acquired infection than before. The number of infections has been increased post pandemic. And psychological error and Diagnostic errors contribute to 25% each.

Because of the following challenges faced in hospital, patient safety in hospital is breached

Fig. 5.3 Reasons for breach of patient safety in hospitals

As, these errors are increasing in hospitals in an exponential manner, so there rise in cases of patient harm and hence, a need to introduce better safety methods.

B) Impact of covid-19 on patient safety

❖ **Negative Impact of Covid-19**

- **Decision to limit the number of healthcare workers-**

Some healthcare workers have been restricted to treat only the covid infected people. This has led to overworking and exhaustive situations among clinicians as for the non-covid people there are few workers to look upon which is likely to cause errors.

- **Untrained workers causing errors –**

Due to fewer numbers of workers left for the patient more fresh healthcare workers are being recruited. A fresher healthcare worker has no clinical experience and is assigned to unfamiliar tasks with little or no formal training. This is putting patient safety at risk. Providing just-in-time training not always help.

- **Infection Issue-**

Even the right use of PPE kits is inflicting protection troubles with the transmission of infection. One such instance is there has been a pandemic of multiresistant micro-organism with inside the covid ward due to transmission on the gloves of healthcare people carrying PPE all of the time.

- **Communication as Barrier**

Physical limitations like masks, face shields, respirator hoods intervene with communication among patients, clinicians, and others, leading to misdiagnoses or non-adherence.

- **Delayed or Diagnostic error**

There have been delays in providing care to the patients due to the shut down of ambulatory clinics and patients are also scared to go out for check-up due to the contagious environment outside. Incidents have been reporting delays in the screening of the diseases like cancer etc. Similarly, too many other diagnostic tests, the covid-19 test is also causing misdiagnosis. There have been certain false negatives reports leading to exposure of others to infection. Thus delays and diagnostic errors are causing harm to the patients.

- **Psychological Impact on healthcare workers:**

Pandemic has caused a psychological impact on the healthcare workers. Workers have fear of getting infected and are scared of their families getting infected. This has impacted their psychological health. All this impact the safety of patient whom they are treating.

- **Policies of Hospital affected patient**

Policies of the hospital to restrict the number of visitors coming to the hospital to avoid spreading of infection has adversely affected the patients' health and families. All this affects the patient's health, as they find themselves confined in four walls.

- **Financial Impact**

The pandemic has also caused a financial impact on the healthcare system. Many countries are estimated to have lost billions in revenue and many businesses are at risk. Even hospitals lack funding which in turn affects the innovation technique, all of which affects patient safety negatively.

❖ **Positive Impact of Covid-19**

- This is a moment when healthcare has been united for the single enemy covid-19.
- Significant decrease in the motor vehicles accidents due to less people coming out of their houses.
- Globally, everyone running for a common purpose to broaden and put in force new solution.
- People accepting new challenges in order to combat with the illness.
- To prevent infection, people coming up with new ideas like PPE kit and following standard precaution.
- People more likely to adapt the technology than earlier, like people are using telemedicine technology.

C) Technological factors for improvement of patient safety based on reasons identified

From Review of literature it was concluded that, following technologies can help reducing patient harms and ensure patient safety

Technology	Used against Errors
Computerized physician order entry (CPOE)	Reduction in the rate of medication errors.
Bar code medication administration (BCMA)	Reduction in medication errors & adverse drug reactions. Reduction in mislabeled laboratory specimens.
Telemedicine - virtual visits	Improved clinical outcomes. Used in providing clinical care; reduces hospital acquired infections
Electronic Medical Record EMR	Reduction in Medication errors. Reduction in Adverse drug reactions.
Smartphone app, low-power Bluetooth technology	Digital Contact tracing (to prevent community transmission in case of covid-19);
Chatbots	Personalized information

Table. 5.3- Technological factors for enhancing patient safety

Chapter- 6 Discussion

The Present study was to understand the reason for breach of the patient safety as it is one of the global cause of death. Literature was reviewed from year 2017 to year 2021 and it was found that mainly the rise in cases of patient harm due to clinician negligence because of more workload and less staff as most of the staff are engaged in the covid cases.

The more staff hired are less trained causing more negligence due to less experience. Wrong site surgeries are also one of the cause of patient harm due lack of trainings amongst the new people.

Medication error is causing more harm due to inappropriate use of medicines which may be due to bad handwriting prescription, dispensing errors, look-alike-sound-alike drugs or administering of wrong drugs. In this study, it was found that during covid scenario, more of hospital acquired infections are reported than the other adverse events.

It was concluded from the study that before covid era, more number of medication errors were reported. But post pandemic situation, hospital acquired exceeded the medication errors in causing harm to the patient.

Covid has severe negative impacts on the lives of people and has given the people the 'new normal' terminology to deal with still there is silver lining in the black environment. Healthcare workers has joined hands, open for collaboration, become more humble and ready to accept the things more than before.

Digital Technology has also played a key vital role in dealing with the situation. Pandemic has exposed to more evaluation and adoption of the technology.

The provision of safe services will also help to restore people's trust in the health care systems and hence will also increase patient satisfaction.

Chapter- 7 Conclusion

- In the study, it was concluded that there is need for patient safety due to increase number of medical errors, diagnostic errors, adverse events, HAI's to prevent patient harm.
- Due to covid, the number of cases has increased several folds. The pandemic acts as a reminder for us that besides providing care, we need to improve and adapt to new things and technologies.
- Healthcare technology allows in enhancing protection of patient through lowering medicine errors, adverse drug reactions, hospital acquired events, enhancing affected persons compliance.
- We have a unique to transform our way of work so that once the pandemic is fully over we can look and back and appreciate the changes we made amongst ourselves and amongst the society and conclude that critical care is stronger than before.

Chapter-8 Recommendations

1. RTLS (Real time location system technology) can be used to ensure patient safety by reducing patient risks. It can automatically track and create alerts throughout system. For example, People dies in hospital due to mismanaged duodenoscopes as they were not cleaned properly. If RTLS was introduced, alerts could have been created at all the stage of cleaning process. Staff could also make out that when to use the instruments and what is the infection risk of using the device.
2. More of virtual visits to hospital to reduce HAI (Hospital acquired infections) rather than physical visits. This will ensure more people to contact their patients virtually than physically and hence ensure more patient safety.
3. Contactless check-in physical visits. If visitor wants to physically meet the patient then a contactless check-in procedure can be followed using any QR code or OTP based system.

Chapter- 9 Limitation

1. Research articles were taken between 2017-2021. Several cases of issues of patient harm was reported before that. However, the study searching was for limited period so could not include the cases of patient safety errors before that.
2. Despite the efforts, it is possible that some relevant studies and relevant data about the deaths due to patient harm has been missed.
3. There were study in different language. We limited our study search for English which might lead to exclusion of some other international articles.

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