Original Research Article

A Study on Patient Safety Practice Compliance in a Tertiary Care Teaching Hospital

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ABSTRACT

Healthcare associated infections are one of the most common adverse events in healthcare delivery and are detrimental to patient recovery. Patient safety is a core domain of quality which contributes to better healthcare. According to a research study, at any time, up to 7% of patients in the developed and 10% in the developing countries will acquire at least one HAI, causing a considerable economic burden to the society. Modern healthcare delivery requires the use of many types of invasive devices and procedures to treat patients. Hence, the risk of infection can be associated with the devices used in medical procedures, such as catheters or ventilators. The objective of the study was to study the patient safety practices in the tertiary care teaching hospital, compare it with the JACHO standards, identify the gap and to suggest measures to improve the patient safety practices. The study was a cross sectional observational study in intensive care unit, operation theatre and in-patient wards of the teaching hospital. Data required for the study was collected through direct observation and interviewing the concerned staff. The result showed partial compliance and less than partial in some areas and in some areas patient safety practice was satisfactory. The patient safety in whole related with the people who provide healthcare, people who receive health care, the system present in the organization and the process which is followed by the care providers. Each of these contribute significantly to enhancing healthcare delivery and patient safety. The process can be improved by regular monitoring and involvement of top management in the process.

Keywords: Quality management, Patient safety, JACHO, accreditation, infection control practices

1. INTRODUCTION

Healthcare associated infections (HAI) are one of the most common adverse events in healthcare [1] delivery and are detrimental to patient recovery. Patient safety is a core domain of quality and demands a system-wide effort [2]. The WHO definition of health care-associated infection is 'an infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and occupational infections among staff of the facility'.[3]

The Institute of Medicine (IOM) defined safety as "freedom from accidental injury," however, patient safety as a discipline or field of inquiry and action has not been fully defined. One of the challenges is to distinguish safety from quality, the demarcation remains important to some, while being dismissed by others as an exercise in semantics. The National Roundtable on Health Care Quality in 1998 organized by IOM, adopted the definition of quality that was widely accepted: "Quality

of care is the degree to which health care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge". [4]

The National Patient Safety Foundation identified the key property of safety as emerging from the proper interaction of components of the health care system, thereby leading the way to a defined focus for patient safety, namely systems.[5] Its goal has been defined as: "the avoidance, prevention, and amelioration of adverse outcomes or injuries stemming from the process of care." [6]

Despite hospitals being the places of cure with all the known power of modern medicine to cure and ameliorate illness, they are not safe places fraught with risk of patient harm. This realization resulted in the growth of interest in patient safety. Delivery of healthcare is challenged by a wide range of safety problems. The traditional medicine oath- "first do no harm"-is rarely violated intentionally by physician, nurses, or other practitioners. However, the fact remains that patients are harmed every day in every country across the globe while receiving healthcare.

Modern healthcare delivery requires the use of many types of invasive devices and procedures to treat patients. Hence, the risk of Infection can be associated with the devices used in medical procedures, such as catheters or ventilators. These healthcare-associated infections (HAIs) include central line-associated bloodstream infections, catheter-associated urinary tract infections, and ventilator-associated pneumonia. Infections may also occur at surgery sites, known as surgical site infections.

According to a research study, at any time, up to 7% of patients in the developed and 10% in the developing countries will acquire at least one HAI, [7] causing a considerable economic burden to the society. But the fact that HAIs are largely preventable through effective infection prevention and control (IPC) measure needs focus and compliance at all levels of patient care.

2. REVIEW OF LITERATURE

Much of the efforts in improving healthcare across the globe focus on improving care for diseases and thereby, substantially decreasing the mortality and morbidity associated with these disease conditions. It is equally important especially, in developing economies to focus on improving their health systems to care for their growing populations. [8]

Several parameters for quality care are pertinent and one of the factors being patient safety to examine the functioning of healthcare systems. Unsafe medical care-where patients are harmed by the medical care designed to help them-can have wide-ranging consequences. [9]

Adverse events, or injuries because of medical care, not only lead to direct harm and waste, but also have spillover effects on patient confidence in the healthcare system. [10]

An estimate of the global burden of disease reflects how much suffering is caused by individual diseases and as an essential step towards global actions in strengthening healthcare systems, WHO undertook the challenge of estimating the global burden of unsafe care. Understanding the burden of disease due to unsafe care helps policy makers to prioritize interventions and precautions aimed at improving quality of care and thereby reducing unsafe care. [11]

Effective infection prevention and control (IPC) measures help to a large extend to reduce the healthcare associated infections (HAI). Global pandemics of severe acute respiratory syndrome (SARS), influenza and Ebola, and the role of the HCF as an epicenter and amplifier of outbreaks, have emphasized the importance of IPC. [12]

In high-income countries, approximately 30% of patients in ICU are affected by at least one HAI. In Low- and middle-income countries the frequency of

ICU-acquired infection is at least 2-3 fold higher than that in high-income countries; device-associated infection densities are up to 13 times higher than those in the USA. Similarly, newborns admitted in NICUs are at higher risk of acquiring HAI in developing countries, with infection rates 3 to 20 times higher than those in high-income countries. [13]

According to the research study, Patient, therapy, and environment-related risk factors for the development of HAI are:

- Age >70 years
- Shock, major trauma, acute renal failure, coma
- Prior antibiotics
- Mechanical ventilation
- Indwelling catheters
- Immunocompromised patients on steroids or chemotherapy
- Prolonged ICU stay (>3 days) [14]

According to the National Health Care Safety Network, Patient Safety component includes four modules that focus on events associated wide devices, procedures, antimicrobial agents used during healthcare, or multidrug resistant organisms. (National Health Care Safety Network Overview)

1. Bloodstream Infection (CL ABSI-Central line-associated bloodstream infection)
2. Central Line Insertion Practices (CLIP) adherence
3. Urinary Tract Infection (CAUTI-Catheter-associated urinary tract infection)
4. Ventilator - associated Events (VAE) (adult locations only)
5. Pneumonia (VAP-Ventilator-associated pneumonia)
6. Surgical site infection (SSI)
7. Antimicrobial Use and Resistance Module (AUR)
8. Multidrug-Resistant Organism

The Joint Commission International (JCI) has given some guidelines to protect the patient from getting harm or injury. Patient safety guidelines are very helpful to protect the patient from getting potential harm (National patient safety goals by joint commission January 2015)

- Improve the accuracy of patient identification
- Improve the effectiveness of communication among the health care workers.
- Medication safety and special care with high alert medication.
- Ensure correct-site, correct-procedure, correct-patient surgery
- Reduce the risk of health care associated infections
- Reduce the risk of patient harm resulting from fall
- Reduce the harm associated with the clinical alarm system
- Infection control practice (Hand hygiene, prevention of CAUTI, CLABSI, SSI, VAP)
- Checklists for Improving Patient Care

The Partnership for Patients Hospital Engagement Networks are designed to improve patient care across 10 areas of patient harm through the implementation and dissemination of best practices in clinical quality. This guide includes checklists, developed by Cynosure Health, for these 10 areas:

- Adverse drug events (ADEs)
- Catheter-associated urinary tract infections (CAUTIs)
- Central line-associated blood stream infections (CLABSIs)
- Early elective deliveries (EEDs)
- Injuries from falls and immobility
- Hospital-acquired pressure ulcers (HAPUs)
- Preventable readmissions
- Surgical site infections (SSIs)
- Ventilator-associated pneumonias (VAPs) and ventilator-associated events (VAEs)
- Venous thromboembolisms (VTEs)

3. OBJECTIVE

Patient safety being at the epicenter for all quality improvement programmes aimed at safe medical care requires basic

understanding of the standards, prevailing practices and thereby intervention to bridge the gap. This study was undertaken with the objective to assess the prevailing patient safety practices in the hospital in comparison to the standards.

4. MATERIALS AND METHODS

The study was conducted in an 1800 bedded tertiary care teaching hospital.

Study design involved a cross sectional observational type of study in the intensive care unit, operation theatre and in-patient wards of the teaching Hospital. Intensive care units (ICUs) house patients who are particularly vulnerable and at five-to ten-times at higher risk of HAI. A clean operating environment is essential to prevent SSI. The OT is a multifunctional area and needs to be cleaned and disinfected on regular basis to prevent microbial contamination. Among the several sources of infection, the exogenous sources of infection in the OT include not only people, but also equipments such as anaesthesia equipment, surfaces such as walls floors and furniture, air and dust, instruments supplies and medications.

Sources of Data

The study involved collection of both primary and secondary data for achieving the objectives.

Primary data was collected by doing direct observation in the intensive care unit, operation theatre and in-patient wards using the checklist. Practice of patient safety by the healthcare workers was observed. Checklist was prepared using the patient safety goals given by the Joint Commission International on January 1st, 2015. A structured questionnaire was also used to collect information from the healthcare professionals in the above-mentioned areas. The questionnaire was constructed using the patient safety goals given by the Joint Commission International on January 1st, 2015. Convenient Random sampling was used to collect information for the questionnaire and checklist from healthcare workers.

The secondary data was collected from published articles, textbooks, and articles of reference available from different sources.

5. RESULTS

The information collected as per the questionnaire and the observations made using the checklist were compiled and analyzed with respect to the prescribed parameters pertaining to patient safety.
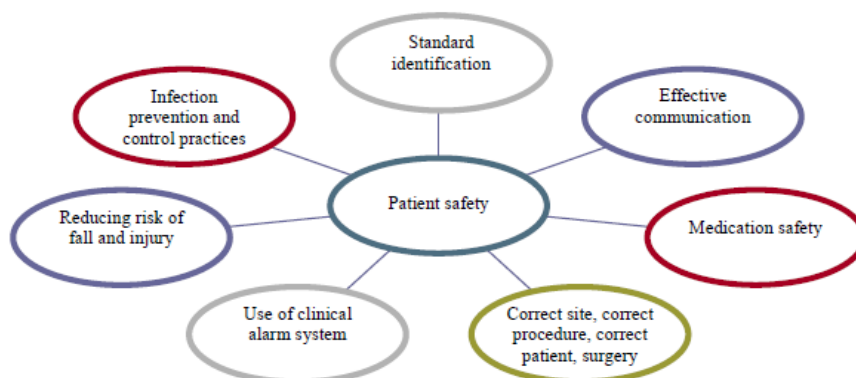

Figure 1: Parameters for Patient safety standards

The parameters considered were patient identification, effective communication, medication safety, correct sire, correct procedure, correct patient, surgery, use of clinical alarm system, reducing risk of fall and injury and infection prevention and control practices (Figure 1). The results are discussed in the subsequent section.

1. Standard practice on patient identification

Observation showed keeping identification band was being practiced in 60% of patients in intensive care unit, 70% in operation theatre and 67% in-patient wards. Patients not having identification band is 40% in intensive care unit, 30% in operation theatre and 33% in in-patient wards. Cross matching of blood was practiced 100% in all three areas and staff interview also reflected 100% practice of cross matching and two-person verification. Checking patient identification during medication administration was observed in 70% of patients in intensive care unit, 100% in operation theatre and 90% in-patient ward. Checking patient identification during medication administration was not observed in 30% intensive care unit, 10% in-patient wards.

2. Effectiveness of communication among healthcare workers

Communication in healthcare is vital for proper care delivery and avoid errors. Observation showed effective communication happening 70% in intensive care unit, 65% in operation theatre and 70% in in-patient wards. The communication was not practiced effectively in 30% of cases in intensive care unit, 35% in operation theatre and 30% in in-patient wards.

3. Practice of medication safety among the healthcare workers

Observation showed practice of labeling the medication name on infusion is practiced 90% in intensive care unit, 100% in operation theatre and 40% in in-patient wards. 10% in intensive care unit, 60% in-patient wards medication labeling is not happening. Writing the concentration of the medication which the infusion is having is practiced 25% in intensive care unit, 85% in operation theatre, 15% in in-patient wards. Medication strips found with expiry date is 70% in intensive care unit and 90% in in-patient wards. Medication strips without expiry date observed is 30% in intensive care unit and 10% in in-patient wards.

Multi-used injection vials observed with the opened date is 20% in intensive care unit and 40% in in-patient wards. Without expiry date medication observed is 80% in intensive care unit and 60% in in-patient wards. Staff interview showed staffs are unaware of using alert stickers for high alert medication but all respondents aware that there is authorized person to look after high alert medication, taking consent before giving narcotic drugs and double lock system for narcotic drugs.

4. Ensure correct-site, correct-procedure, correct-patient surgery

Observation showed receiving patient with the consent forms, proper site marking and having proper diagnostic images is practiced 100% in operation theatre and team time out procedure was not being practiced.

5. Knowledge of healthcare workers to identify the alarms effectively

Observation showed 75% of staff in intensive care unit, 80% of staff in operation theatre and 60% of staff in in-patient wards had had the training to identify the alarm system. 25% of healthcare workers in intensive care unit, 20% in operation theatre and 40% in in-patient wards did not have training to identify the alarms. 60% of healthcare staff had awareness about the alarm in intensive care unit, 55% in operation theatre and 40% in in-patient wards. 75% of the staff had the knowledge to operate the system in intensive care unit, 60% in operation theatre and 60% in in-patient wards. Whereas the other 25% staff in intensive care unit, 40% staff in operation theatre, 40% staff in in-patient wards were not having the knowledge to operate the system. Interview with the staff revealed that there was training provided to staff about clinical alarm system but only 85% of staff were aware of clinical alarm system and 15% of staff were unaware.

6. Safety practice to avoid the risk associated with the fall and injury

Observation showed 45% in intensive care unit and 30% in-patient wards side rails being used. 55% in intensive care unit and 70% in in-patient wards side rails is not being used. The patients' toilets 90% in intensive care and 40% of in in-patient wards are safe from patient fall but the remaining percentage faces the problem of patient fall because of slippery floor of various reasons. 40% of patients from intensive care unit and 33% of patients from in-patient ward were found using seat belts in wheelchair, remaining 60% from intensive care unit and 67% from in-patient ward were not practiced. Staff interview revealed there is no fall injury prevention team in the hospital but there is tool to identify patient vulnerability of fall risk and there is CNE to prevent patient fall and injury.

7. Infection Control

Infection control in a hospital environment requires strict compliance at every stage to prevent cross infection and Nosocomial infections. Training, monitoring, and evaluation play significant role in reducing infection rates in a hospital. The following parameters were considered for checking infection control practices in the present study and the findings are discussed below.

Figure 2: Parameters of Infection control Practices

a. Proper hand hygiene practice to prevent the cross infection.

Observation shows healthcare workers practicing proper hand washing technique is 55% in intensive care unit, 80% in operation theatre and 40% in-patient wards and 45% in intensive care unit, 20% in operation theatre and 60% in in-patient wards not practicing proper hand washing techniques. The using of hand rub before and after touching the patient was observed in 60% in intensive care unit, 73% in operation theatre and 30% in in-patient wards. The hand rub was not being used properly in 40% in intensive care unit, 27% in operation theatre and 70% in in-patient wards.

b. Standard practice to prevent the catheter associated urinary tract infection (CAUTI)

Observation showed labeling the date of insertion was practiced 60% in intensive care unit and 40% in in-patient wards and 40% in intensive care unit and 60% in in-patient wards did not practice. Daily care of insertion site in intensive care unit was observed in 90%, whereas in in-patient ward it was 55%. Staff interview showed that care documentation was not in practice. Under pads were used in intensive care unit 73% and 27% not used. In other areas it was not being practiced. Betadine dressing in catheter site was not being practiced and staff interview also revealed the same. CAUTI bundle of checklist was also not in practice as the staff interview revealed.

c. Standard practice to prevent the central line associated blood stream infection (CLABSI)

Observation showed 60% of the patients with central line in intensive care unit were having insertion date and 40% of patients were not having the insertion date. Daily review of line and sterile dressing was being practiced 100%. As the staff interview revealed, checklist of criteria for central line insertion and ultrasound guideline before inserting central line was not practiced.

d. Skin care to prevent pressure ulcer

As per the observation special beds for the vulnerable patients in critical care area is strictly practiced (100%) among the

patients, in 70% of them second hourly positioning was being practiced and in 30% of the patients it was not being practiced and 30% of patients found with wet skin.

e. Standard practice to prevent the surgical site infection (SSI)

Observation showed pre-operative administration of antibiotic and pre-operative skin asepsis was being practiced in 100% of the cases.

f. Standard practice to prevent ventilator associated pneumonia (VAP)

Observation showed 100% of intensive care patient were kept in head elevated position. The practice of second hourly oral care was being done in 50% of the patients and for 50% it was not being done. 55% of the patients had received deep endotracheal suctioning and 45% of them had not received. Sterility practice during suction was found in 60% and in 40% it was not being practiced. Staff interview revealed that checklist was not practiced controlling VAP.

6. DISCUSSION

Safe patient care in the hospital is one of the prime important criteria for accreditation. JACHO has given some important standards which need to practice for the safe patient care (harmless care). Identification of the patient with standard techniques during medication administration and blood transfusion which is safe practice and avoids the errors. The observations in this study revealed that practice of patient safety was not fully compliant with the standards in many patient care areas, an observation which revealed the potential risk for patient safety.

Healthcare facilities are high-risk environments where the development and spread of drug resistance bacteria is high and hence have the highest burden of multidrug-resistant organisms (MDROs). Effective infection prevention and control measures reduce the opportunities for resistant pathogens to spread in HCFs and contribute to the containment of antimicrobial resistance (AMR). The observations from this study revealed that practice of hand hygiene by the healthcare professionals was found to be noncompliant and thereby enhancing the risk of healthcare associated infections.

A recent systematic review found that healthcare-associated infections are found everywhere and occur at much higher rates in low-income countries than in HICs. [15] This may increase the proportional mortality as well as morbidity rates and subsequently increase the burden of disease.

Safe practice while dealing with the medication like labeling the concentration and strength of the medication, always having expiry date on the strips of medication, labeling opened date on the multi used vials. Practicing the use of surgical safety checklist will prevent the surgery of wrong patient or the wrong site. Hospital has different alarms, and each indicates different kind of emergencies. For the effective practice of alarms, it is important that all the staffs should have knowledge about the alarms.

Patient fall risk can be avoided by using safety belts while transferring the patient in wheelchairs and stretchers and important to see that patient toilets are free from fall risk.

Good infection control practice is a goal of patient safety which starts from proper hand washing practice and using hand rubs while touching the patients. Good infection control practice avoids health care associated infections like CAUTI, CLABSI, SSI, pressure ulcer and VAP.

Though considerable variation is observed across countries with respect to costs associated with health care associated infections, they not only affect patient care but also substantially affect health budgets. An example of such infections is that cost US$ 7-8.2 billion every year in the United States alone. [16]

In addition to generating additional costs, they also substantially increase morbidity and mortality, thereby increasing burden of healthcare expenditure. [17]

According to a study, health care-associated infections not only prolong hospital stays by an average of 10-15 days per infection but subsequently, form the basis for litigation against physicians, nurses, and hospitals.[18]

Communication among the different care providers is an important aspect of patient safety. The existence of knowledge at different levels affects patient safety. The transfer of information, communication and handovers between providers remain central to optimizing patient safety. In an analysis in 2005, communication problems were identified as the cause of nearly 70% of sentinel events. [19]

Many institutions are advocating techniques such as read-back confirmation, interruption-free 'time-outs' and cross monitoring. However, the emphasis for effective communication needs to be prioritized to reduce the errors of communication in patient care.

Communication has a dominating role in health care, effective communication between health care providers prevents delay and errors. Communication is the cornerstone of healthcare. Effective communication is not only critical to meeting patient needs and providing safe, high-quality, and patient-centered care, it is necessary to how we manage healthcare delivery. [20] Poor communication between the different care providers and with patients affects patient care. According to the Joint Commission's (TJC's) Sentinel Event Database, communication was identified as a leading root cause of sentinel events in the United States. [21] Lack of interprofessional communication between physicians and nurses, shortage of patient-staff interaction, and deficiency of effective nurse handovers, pose major risk point leading to poor patient experience, thereby influencing both patient safety and clinical outcomes. [22]

As Bates and Gawande noted, "failure of communication, particularly those that result from inadequate handoffs between clinicians has been shown to be a common factor underlying adverse events". [23]

Inadequate communication between providers and patients can lead to patient harm or even death (Joint Commission International, 2018). Among the various reasons for malpractice claims, communication failures in the US were partly responsible for 30% of all malpractice claims, resulting in 1,744 deaths and $1.7 billion in malpractice costs over five years, according to the Risk Management Foundation of the Harvard Medical Institutions (CRICO Strategies, 2016).

Considering the implications of harm during care, it becomes imperative for administrators to step up their Infection prevention and control strategies and ensure compliance at all levels to the fullest to minimize the harm during patient care. This requires stringent policies, strict implementation, training, monitoring and review at frequent intervals to overcome the challenges in quality patient care.

The findings of this study helped identify areas of noncompliance and thereby ascertain reasons for noncompliance. The intervention in terms of training and orienting the concerned staff with clear explanation of the expectation for patient safety had to be arranged. The involvement of people from all levels of patient care delivery was evident and accordingly the findings of the study was used as the basis for developing training modules to different levels of employees involved in patient care. The monitoring and review of the outcomes of training was the responsibility of the concerned supervisor and feedback in the form of reports were collected at regular intervals to ensure compliance.

7. LIMITATIONS OF THE STUDY

This study included observations made using the standard parameters on patient safety from the accreditation body. However, several studies have shown that other factors such as working condition, stress, fatigue, staffing, workload, organizational culture could influence the

delivery of patient care and thereby outcome of health care.

According to a study considering human factors affecting safety, it was observed that several individual factors affect a person's performance, thus predisposing them to error. Two of such factors with the greatest impact are fatigue and stress. There has been strong scientific evidence which links fatigue and impaired performance, making it a known risk factor in safe practice. Low levels of stress are also counterproductive, and it is important to recognize stress as they can lead to boredom and failure to attend to a task with appropriate vigilance. [24]

Surveys of health-care consumers and practicing physicians indicate that nurse understaffing in hospitals and 'burnout' (physical or emotional exhaustion, especially because of long-term stress or dissipation) and fatigue of health-care providers are the main causes of medical errors in today's hospitals. [25][26][27]

Environmental factors such as working conditions also affect providers' ability to provide safe, high-quality care. Some of these factors are staffing levels, workload, working hours, shift rotation patterns, physical environment, workflow design and organizational culture. Working conditions, including consecutive and weekly work hours, staffing levels and workload, affect the ability of providers to give safe, high-quality care. As working conditions can affect the ability to deliver care in any setting (medical, surgical, inpatient and outpatient), interventions to improve working conditions can broadly reduce the risks for many types of clinical error, including misdiagnoses, surgical errors, medication errors and health care-associated infections. Nurse workload and nurse–patient ratio have also been found to affect patient safety.

A more elaborate study is required to understand the role of different factors responsible for patient safety and thereby ascertaining the factors which are

overlooked or not prioritized but eventually, comprising the care delivered to the patient.

8. CONCLUSIONS

The observations in this study revealed certain grey areas in patient care which could potentially delay recovery and pose challenge to safe care. Compliance with standard practices should be always adhered to at all levels. Training and frequent monitoring of staff practices are required to ensure adherence to practices. Patient safety must be an attribute of the health care system and the core of all activities around patient care. This demands design of systems to make risky interventions reliable. The ultimate center of focus for patient safety is the microsystem. The microsystem is the immediate environment in which care occurs—the operating room, the emergency department, and intensive care areas, etc. It is in the microsystem where the "sharp end" resides, where patient-caregiver interactions occur, where failures of safety emerge, and where patients are harmed. A simple model of patient safety as advocated by Linda et al., divides health care systems into four main domains: [28]

- Those who work in health care.
- Those who receive health care or have a stake in its availability.
- The infrastructure of systems for therapeutic interventions (health care delivery processes).
- The methods for feedback and continuous improvement.

Accreditation is a formal process in which a recognized entity assesses whether a health-care organization meets published, specified standards.[29] Regulation is governmental establishment of standards to which organizations and providers must adhere if they wish to avoid legal penalties.[30]

The study for patient safety emerged from the various adverse events happened in the hospital and most of them being avoidable. The patient safety in whole related with the people who provide health

care, people who receive health care, the system which is present in the organization and the process which is followed by the care providers. Most crucial aspect in improving patient safety throughout the world focusses on the culture of health care, where quite often it is a blame game without actual examination of the underlying systemic factors. Therefore, reducing harm will require greater understanding of the causes of these events, identification of the factors responsible for such events, a process which requires involvement of all levels of healthcare delivery personnel including the top management.

REFERENCES
1. https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf
2. World Health Organization. Prevention of hospital-acquired infections: a practical guide. 2nd ed. Geneva, 2002.
3. Benenson AS. Control of communicable diseases manual. 16th ed. Washington DC: American Public Health Association, 1995
4. Chassin MR, Galvin RW. The urgent need to improve health care quality. Institute of Medicine National Roundtable on Health Care Quality. JAMA 1998; 280: 1000-1005.
5. Cooper JB, Gaba DM, Liang B, et al. The National Patient Safety Foundation agenda for research and development in patient safety. Med Gen Med 2000; 2: E38.
6. Vincent C. Patient safety. London: Elsevier; 2006
7. WHO Health care-associated infections, Fact Sheet (https://www.who.int/gpsc/country work/gpsc_ccisc_fact_sheet_en.pdf, accessed 25 July 2019).
8. Mills A, Brugha R, Hanson K, et al. What can be done about the private health sector in low-income countries? Bull World Health Organ 2002;80:325–30.
9. Hiatt HH, Barnes BA, Brennan TA, et al. A study of medical injury and medical malpractice. N Engl J Med 1989;321:480–4

10. Thomas EJ, Petersen LA. Measuring errors and adverse events in health care. J Gen Intern Med 2003;18:61-7.
11. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet 1997; 349: 1269-76.
12. National Guidelines for Infection Prevention and Control in Healthcare Facilities
13. Pradhan NP, Bhat SM, and Ghadage DP. Nosocomial infections in the medical ICU: a retrospective study highlighting their prevalence, microbiological profi le and impact on ICU stay and mortality. J Assoc Physicians India. 2014;62:18-21.
14. Mehta Y, Gupta A, Todi S, Myatra SN, Samaddar DP, Patil V et al. Guidelines for prevention of hospital acquired infections. Indian J Crit Care Med. 2014;18:149-63
15. Allegranzi B, Bagheri Nejad S, Combescure C, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet 2011;377:228–41.
16. World Health Organization. Global patient safety challenge launched. Press release, 2005. http://www.findarticles.com/p/articles/mi_m0FSL/is_1_83/ai_n16100927/print. [last consulted 10 August 2006
17. Pittet D et al. Considerations for a WHO European strategy on health-care-associated infection, surveillance, and control. The Lancet Infectious Diseases, 2005, 5:242-250
18. Salamati P et al. Neonatal nosocomial infections in Bahrami Children Hospital. Indian Journal of Pediatrics, 2006, 73:197-200
19. Joint Commission. Sentinel event statistics-March 31, 2006. Oakbrook Terrace, Illinois. http://www. jointcommission.org/Sentinel Events/Statistics/ [last consulted 17 August 2006].
20. James Merlino, Communication: A Critical Healthcare Competency, November 6, 2017-PSQH https://www.psqh.com/analysis/communication-critical-healthcare-competency
21. The Joint Commission. Sentinel Event Data Root Causes by Event Type. The Joint Commission Web site. http://www.jointcommission.org/. Accessed July 21, 2016
22. Bruton J, Norton C, Smyth N, Ward H, Day S. Nurse handover: patient and staff experiences. Br J Nurs. 2016;25(7):386-393

23. Bates DW, Gawande AA. Improving safety with information technology. N Engl J Med. 2003;348(25):2526-2534.
24. Smith CS, Folkard D, Tucker P, Evans MS. Work schedules, health, and safety. In: Quick JC, Tetrick LE, editors. Handbook of occupational health psychology, 2nd edition. Washington, DC: American Psychological Association; 2011:185–204
25. Blendon RJ et al. Views of practicing physicians and the public on medical errors. New England Journal of Medicine, 2002, 347:1933-1940
26. Aiken LH et al. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. Journal of the American Medical Association, 2002, 288:1987-1993
27. Unruh L. Licensed nurse staffing and adverse events in hospitals. Medical Care, 2003, 41:142-152.
28. Emanuel L, Berwick D, Conway J, et al. What Exactly Is Patient Safety? In: Henriksen K, Battles JB, Keyes MA, et al., editors. Advances in Patient Safety: New Directions and Alternative Approaches (Vol. 1: Assessment). Rockville (MD): Agency for Healthcare Research and Quality; 2008 Aug. Available from: https://www.ncbi.nlm.nih.gov/books/NBK43629/
29. Rooney AL, von Ostenberg PR. Licensure, accreditation, and certification: approaches to health services quality. Quality Assurance Project funded by the Agency for International Development, Bethesda, Maryland, 1999
30. Devers KJ, Pham HH, Liu G. What is driving hospitals' patient-safety efforts? Health Affairs, 2004, 23:103-115.

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