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MEDICATION SAFETY CONCERNS- IN PERIOPERATIVE PERIOD

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ABSTRACT

Medication administration in the perioperative setting presents particular patient safety challenges compared with other hospital settings. Unlike in the inpatient hospital ward setting, perioperative medication administration today often bypasses standard safety checks, such as electronic physician order entry with decision support, pharmacy approval of specific drugs before administration, and multiple nursing checks at the time of medication administration. Furthermore, the high-stress, time-sensitive nature of operating room care may lead to both higher rates of medication errors and errors of high severity.

Keywords :- Perioperative period, medication safety, medication administration, clinical practice..

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INTRODUCTION

Definition:

The perioperative medication administration process starts when a medication is requested or obtained from the anesthesia cart and ends with appropriate monitoring after the medication has reached the patient [1].

The medication-use process and safe medication use are two important principles that contribute to the safe use of pharmacological agents in perioperative clinical practice [2].

The medication-use process consists of procuring, prescribing, transcribing, dispensing, administering, and monitoring; however, variations in the medication-use process result from demands unique to the perioperative environment, and these variations can sometimes bypass the safety nets within the system [4].

THE THREE MOST COMMON TYPES of reported incidents were incorrect counts, equipment malfunction, and medication errors [3].

Areas for Peri operative safety concerns:

The perioperative surgery consists of three distinct phases of surgical procedure, which includes the preoperative phase, intra operative phase, and postoperative phase.Perioperative phase starts with admission of patient till the recovery of patients from surgery.Every surgery is divided into these phases to differentiate tasks and assigning these tasks to various team members and delivering each stage of care. By maintaining consist flow of procedures and a clear chain of command, hospital teams are able to deliver consistent, optimal care to the patient recovered.

PERIOPERATIVE SURGERY = Preoperative surgery + Intra operative surgery + Post-operative surgery

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Medication use in the perioperative setting presents unique patient safety challenges compared with other hospital settings.

For example, perioperative medication prescribing, and administration often bypasses standard safety checks, such as:

-Electronic physician order entry with decision support,

-Pharmacy verification of specific drugs before administration and

-Multiple nursing checks at the time of medication administration [5].

The perioperative setting necessitates patient movements across a continuum of healthcare settings, involving multiple providers and interdisciplinary teams. Multiple handoffs are required to transfer patient care responsibilities from one care setting to the next. This process introduces opportunities for inadequate information exchange or loss.

The transitory nature of the perioperative patient care path—coupled with multiple healthcare providers handling several drugs and caring for multiple patients simultaneously with the potential for limited oversight and work-related fatigue—raises concern for the possibility of medication errors, including errors of high severity. Also, in the operating room (OR), very rapid responses may be required of healthcare providers to administer and titrate medications [6].

Analysts reviewed medication errors that occurred in perioperative settings to identify factors contributing to events in these settings and propose system-based risk reduction strategies.

Reasons for concern -

Fig 1: Adverse drug event

Term	Definition	Examples
Medication errors	Failure to complete a required action, or the use of a wrong plan to achieve an aim; may involve any of the stages of medication administration (table 1) regardless of whether an injury occurred or the potential for injury was present.	Patient given a dose of medication that was not intended. Significant hypotension (mean arterial pressure < 55 mmHg) that is not treated.
Error with no potential for harm	Violates strict standards but has essentially no potential for patient harm.	Not including provider initials on a syringe label.
Error with little potential for harm	A medication error that has little possibility of causing injury.	Propofol infusion increased from 50 to 150 μg kg^{-1} min^{-1} but not documented.
Error with potential for an ADE	A medication error that has the possibility of causing injury.	A patient with history of upper gastrointestinal bleed given a nonsteroidal antiinflammatory drug with no resultant bleeding.
Error with an ADE	An injury due to a medical intervention related to a drug that resulted from an error in the medication process.	A patient with positive cocaine toxicology screen receives β-blockers and has severe hypertension. Administering penicillin to a patient with a penicillin allergy who subsequently develops a rash. A patient who develops mean arterial pressure < 55 mmHg after 4 mg/kg propofol bolus.
ADE without error	An injury due to a medical intervention related to a drug with no error in the medication process.	An allergic reaction in a patient not previously known to be allergic to that particular medication. A patient with a history of PONV who is given a combination of antiemetics perioperatively and subsequently develops PONV. A patient who develops mean arterial pressure < 55 mmHg after a standard dose of propofol.
Ameliorable ADE	An ADE whose severity could have been substantially reduced if different actions had been taken.	A patient with continuing PONV who did not receive antiemetics within 30 min. A patient with > 4/10 pain on emergence that is not treated until after arriving in the recovery room.

ADE = adverse drug event; PONV = postoperative nausea and vomiting.

Concerns with Solutions -

A) Wrong Identification of Patient -

Wrong identification of patient can cause a major sentinel event in the hospital; it can lead to loss of life or surgery of wrong patient.

Prevention:

By following international patient safety goal No.1, wrong identification of patient can be prevented. According to Joint Commission International (JCI) & National Accreditation Board for health care providers (NABH). Every Patient must be identified by two identifiers.

1. Patient Name 2. Patient Registration no. - It could be MRN OR UHID.

So if organizations sincerely follow the two identifiers process, possibility of wrong identification of patient comes down to a minimal no.

B) If the medication name was not reported in the specified field -

An analyst adjusted the field if the medication name was provided within the free text of the event description. Medication error events reported through PA-PSRS database with the subtype. Other were subcategorized by analysts into more specific categories.

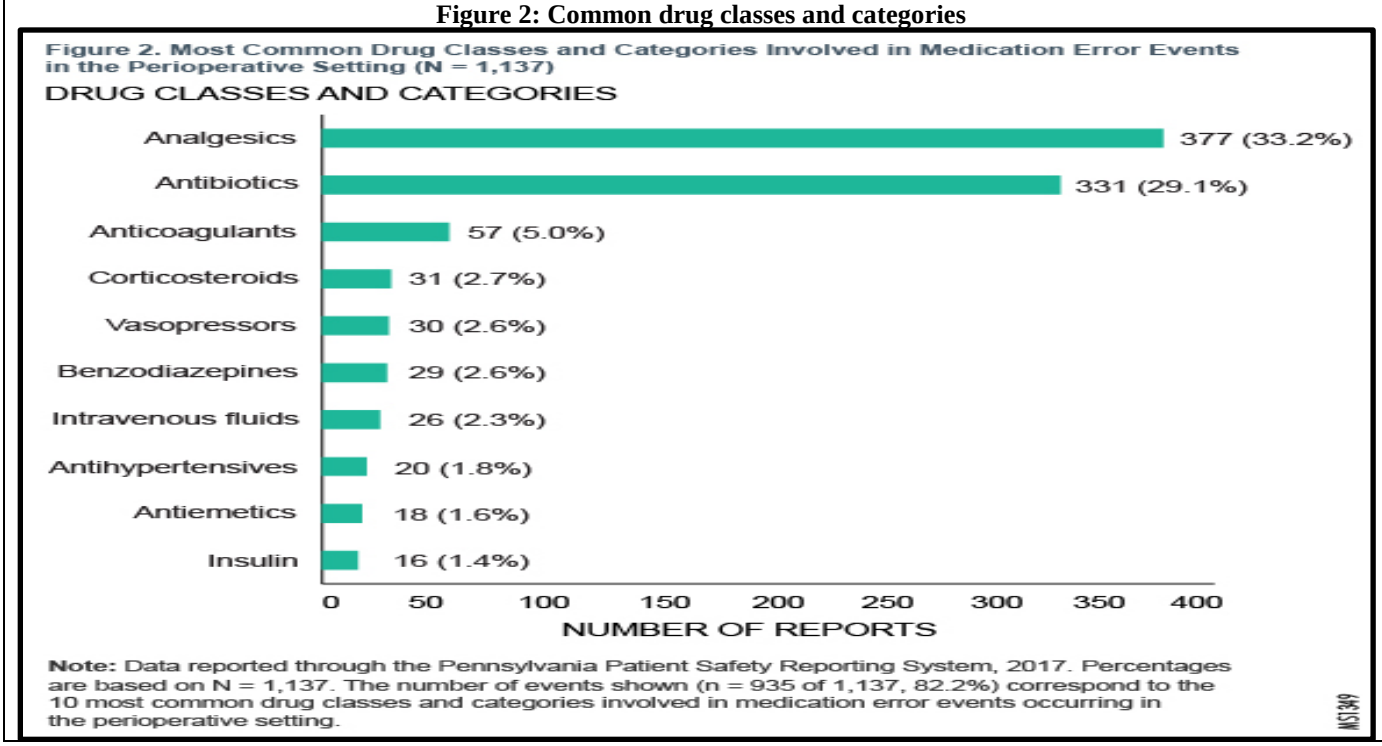
The event description, medication error cause, and event recommendation fields were further reviewed for common themes and contributing factors associated with the events reported [7].

C) Medication error :

Medication error remains a leading cause of adverse events among patients undergoing anes- thesia. Misidentification of ampoules, vials, and syringes is a common source of error.

Drugs involved in medication error events:

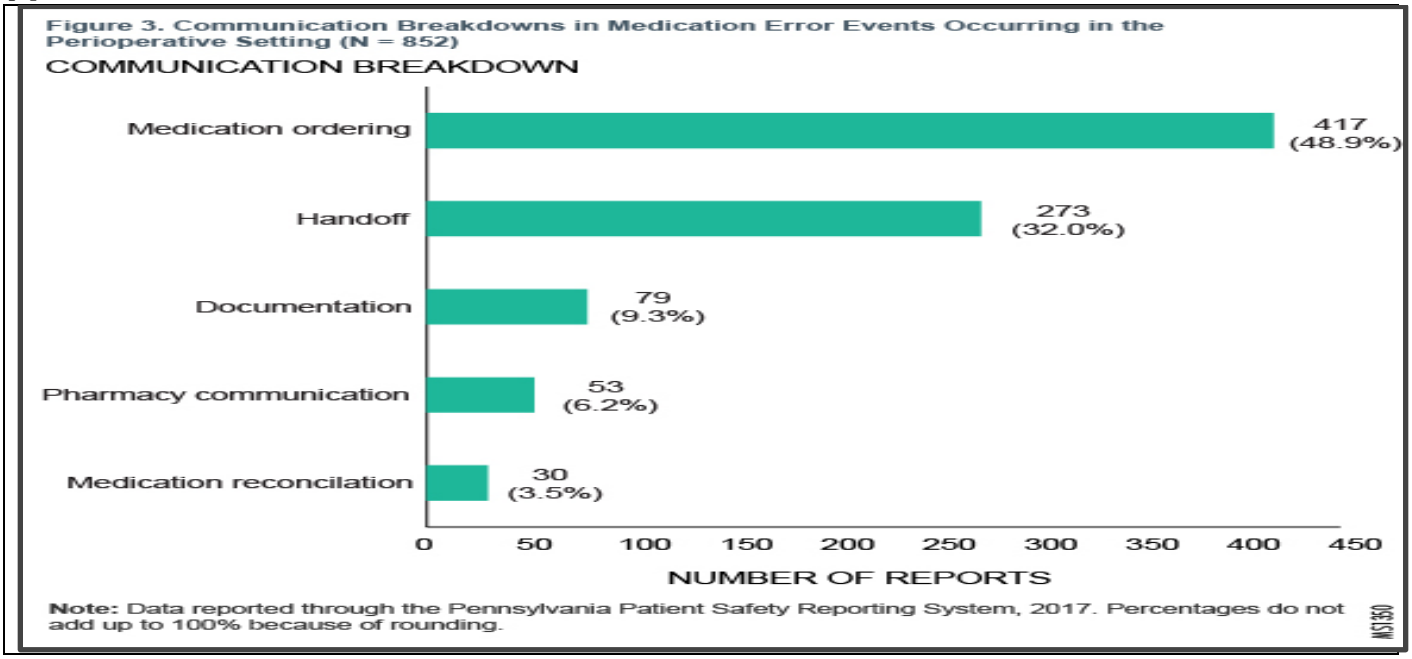
Figure 2: Common drug classes and categories



Medication error events -

Evidence suggests that the use of perioperative β-blockers in high-risk individuals can reduce the incidence of perioperative cardiac events. The Agency for Healthcare

Research and Quality has identified that the use of perioperative β-blockers can reduce perioperative morbidity and mortality [8].



D) Error Prone Medication management -

Medicine has an important role in the perioperative surgery (anesthetic medicine). Sometimes it is observed. That dose and route of anesthetic medicine is not appropriate or according to the requirement of patient.

Prevention:

According to the IPSG 3 Certain medicine must be stored separately from other medicine with distinguish colour

marking. These certain medicines are identified as HIGH ALERT MEDICINE, HIGH RISK MEDICINE, LOOK ALIKE AND SOUND ALIKE MEDICINE, NARCOTIC MEDICINE (stored in double lock).
Benefit of this storage is that nursing/anesthetist always double check medicine before administration.

E) Wrong site wrong procedure wrong patient surgery
This kind of error are increasing day by day due Monitoring issues involve enforcing existing published monitoring standards and recognizing the risk of danger to the patient from hypoventilation during procedural sedation and from postoperative intravenous pain medications.

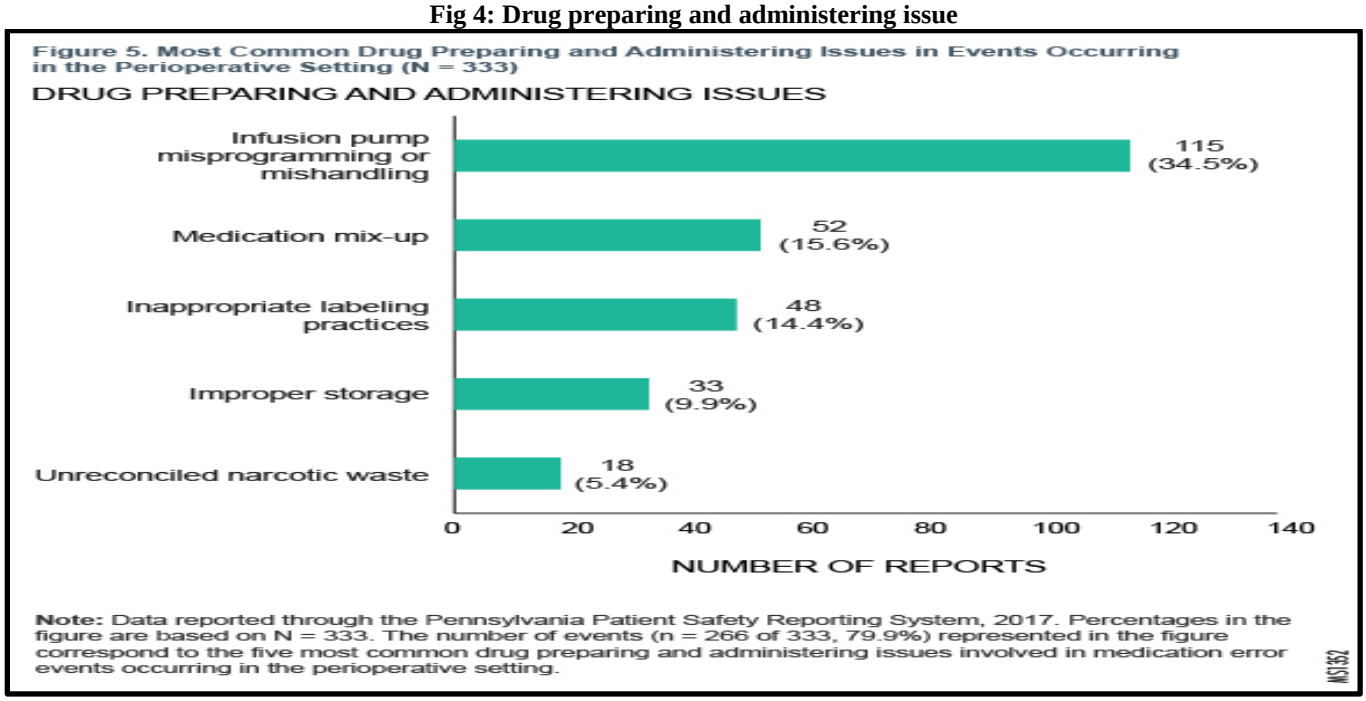
Issues of clinical care include medication errors in the operating room, cerebral hypoperfusion (especially in the head-up position), dangers of airway management, postoperative residual weakness from muscle relaxants, operating room fires, and risks specific in obstetric anesthesia [9].

F) Risk of healthcare associated infections:
Infection prevention and control are challenging in most health care settings, and rising rates of health care–associated infections are a major concern for patients going for surgery or in peri operative phase.Infections common to many perioperative surgery settings include bloodstream infections or surgical site infections.

Prevention:
So by following internationally acceptable hand hygiene guidelines available from the World Health Organization & implementing an effective hand hygiene program hospital associated infection can be reduced significantly.

G) Inaccurate or Incomplete Documentation:
Inaccurate documentation often leads to subsequent errors, such as instances described above in which repeated doses have been administered because the previous dose was not recorded16 or was not recorded promptly.
The following are examples of documentation errors:
1 -Medication Preparing and Administering:

Fig 4: Drug preparing and administering issue



2) Pharmacy verification:
Medication and allergy reconciliation was performed at the time of hospital admission by the pharmacy technician under the supervision of the hospital pharmacist.
This reconciliation resulted in a list of drugs that was accepted by the treating surgeon; it was then considered the gold standard with which the drug and allergy histories documented by the anesthesiologist and the pharmacy technician at the preoperative screening clinic were compared. At the time of hospital admission, the patient was asked whether he had stopped or continued the antithrombotic [Orser, BA *et al*, 2001].

Historically, pharmacy involvement in perioperative areas primarily consisted of providing medication stock for access by operating room (OR) staff, confirming appropriate storage conditions, checking expiration dates, submitting billing, and maintaining controlled substance accountability.
Over the last decade drove increased pharmacy involvement in the perioperative medication-use.

H) Electronic physician order entry -
Computerized medication order entry is an extremely powerful

method that can be used to advance and refine the process of prescribing medications.[18] The universal adoption of health information technology (IT) and anesthesia information management systems (AIMS) remains low despite the potential benefits. Electronic medical records, and hence AIMS, are at the intersection of patient safety with a focus on clinical decision support systems (CDSS) and computerized physician order entry (CPOE) as hallmarks that may lead to improvement in patient safety and quality in the perioperative setting [10].

CDS was implemented as part of Computerized Physician Ordering Entry (CPOE) system:

As per the study of Singapore general hospital, when they incorporated the CDS into their CPOE system, it increases the physicians adherence to the guidelines and policies of the hospital for few preoperative investigations. The use of computerized physician order entry with clinical decision support reduces practice variance in ordering preoperative investigations: A retrospective cohort study [11].

I) Multiple nursing checks

As per the study was conducted in a single academic center in the Northeast with only 24 participants. Findings may not be transferable to other health care settings.

One assumption going into the study was that gaps in communication exist in the perioperative environment.

This assumption was based on the lead researcher's nursing experience working in the preoperative and postoperative environment. Hence, the suggestion is to conduct the training session as well as effective by the educator team on better [12].

Contributing factors and Safety solutions -

Organizations and healthcare facilities can strive to identify system-based causes of errors associated with patient care in perioperative settings. Training and education are commonly recommended to prevent errors, but this strategy, while important, is less reliable due to being heavily influenced by individual performance. System-based improvements such as constraints and standardization are more effective and produce results with less variability. Consider the strategies described below,

which are based on a review of current literature, events submitted to the Authority, and observations from ISMP:

A) Establish a procedure for evaluating infusion pump settings and pump stability (i.e., make sure there are no line disconnections) prior to patient transfer, during transfer, and upon arrival at the new care unit in the pre-, intra-, and postoperative care paths.

B) Work with the organization's EHR/CPOE/AIMS and mobile-application vendors to optimize and streamline patient information exchange among these systems, as well as facilitate rapid and accurate documentation of medication administration.Ensure that the systems support accurate exchange of information for all types of medication orders (e.g., PCA, continuous infusions, antibiotics). Also, optimize clinical decision support capabilities in these systems.

C) Avoid pre-labeling empty syringes prior to intraoperative use and develop institution-specific practices and protocols for drug handling and labeling in the procedural areas. Verify each medication and label at the time of preparation.

D) Standardize stock and use pre-filled syringes supplied by manufacturers to minimize risks from mislabeling. When using pre-filled syringes from outsources (e.g., 503b pharmacies), purchase and use syringes that follow USP <7> labeling requirements to list the concentration as the total amount of drug per the total volume in the syringe, as is required for all commercial manufacturers. Also, consider storing look-alike products separate from one another when feasible.

Systems are now being engineered to reduce the likelihood of medication misidentification through approaches such as revision of standards for labelling of drug ampoules and vials and the development of bar code systems that allow ‘‘double checking’’ or drug verification in the operating room. Also, efforts are being made to improve medication reconciliation, a process for accurately communicating a patient's medication information during transitions from one healthcare setting to another.

E) Systems designed to reduce medication errors in the operating room and high- light three Canadian initiatives:

1) systematic efforts to improve the labelling of drug ampoules and vials,

2)introduction of bar-coding in medication systems, and

3) novel tools for ‘‘reconciliation’’ or for accurate documentation and adjustment of patients' medication taken before and during their hospital stay [13].

F) Drug Allergies - Safety:

- Do NOT take a drug if you are allergic to it or any of its ingredients.
- Keep a list of your drug allergies, and always share it with your doctor. It's helpful to include what happens when you take it and when the reaction first happened.
- You can develop an allergy to any drug at any time, and you can develop allergies to both prescription and over-the-counter drugs.

Drug allergies and side effects are not the same thing, and it's important to know the difference. Common signs of drug allergies are:[25]

G) Solution to reporting of Adverse Drug Event (ADE)26,27

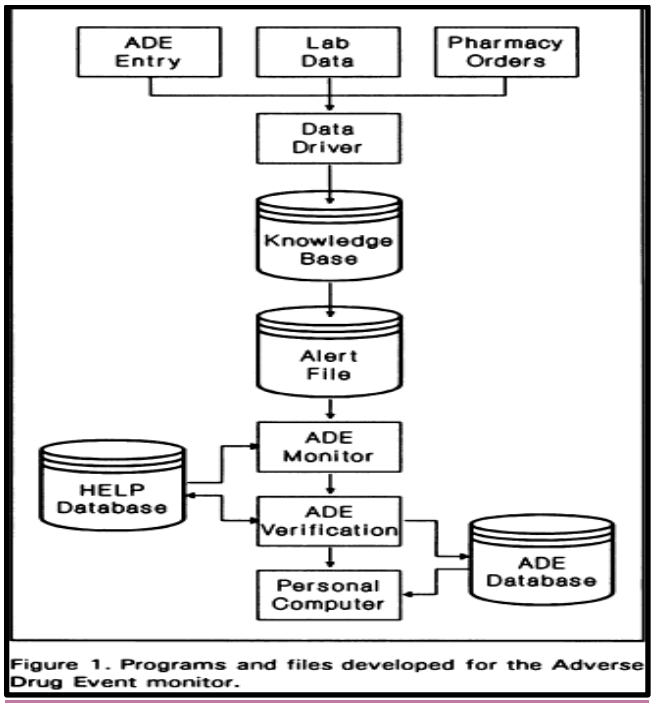


Figure 1. Programs and files developed for the Adverse Drug Event monitor.

There are two categories of adverse drug event **Type A** (Predictable ADEs and known cause of toxicity of drugs) and **Type B** (These are idiosyncratic, non predictable and allergic).

Some studies have been conducted to determine ADE rates in hospitals. As per these studies 20 percent of hospitalized patients occurred ADEs [17].

H) Effect of bar-code technology and proper label contrast:

Use of the bar-code eMAR substantially reduced the rate of errors in order transcription and in medication administration as well as potential adverse drug events, although it did not eliminate such errors. Our data show that the bar-code eMAR is an important intervention to improve medication safety.

Text	Background
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Looking forward:

Develop a standardized card/form for the patient to carry that details the patient's current list of medications and safety concerns. Consider use of technological support and electronic medical records to facilitate the perioperative medication process.

Potential Barriers:

Time commitment for policy development,

- Staff education, and form development.
- Insufficient staffing and perception of insufficient staffing.
- Inefficient implementation by adding duties rather than redesigning workflow patterns.
- Assigning duties to individuals who have not been deter- mined competent for those duties [14].

Outdated information and structural barriers to communications were responsible for many procedural delays, procedural interruptions, and staff member work-arounds. Opportunities for improvement are identified, including redesigns and enhancement of information technology systems [15].

Patient wealth and home location may predict barriers to surgery. Addressing gender disparities, access to providers, and patient perception of barriers in addition to removal of barriers may help maximize patient health benefits [16].

Patient-Related Risk Factors:

Potential patient-related risk factors fell into the following general categories: age; chronic lung disease; cigarette use; congestive heart failure; functional dependence; American Society of Anesthesiologists (ASA) classification; obesity; asthma; obstructive sleep apnea; impaired sensorium, abnormal findings on chest examination, alcohol use, and weight loss; and exercise capacity, diabetes, and HIV infection [18].

Risk reduction strategies

A) Risk management involves the identification of the patient at risk, optimization of preoperative health status, risk reduction through medical intervention as well as appropriate perioperative care. Thus, patient outcome can be improved, specifically for the sicker patients at a higher risk [19].

B) Perioperative briefing and debriefing

An important issue that can make staff reluctant to engage in briefings and debriefings is the assumption that they consume much time and delay surgical programmes [20].

C) Bar code–assisted syringe labeling systems have the potential to eliminate labeling errors.

Point-of-care bar code–assisted anesthesia documentation systems allow the syringe label to be scanned immediately before drug administration and automatically populate the anesthesia record with the medication and/or dose administered. These have the potential to reduce the incidence of documentation errors.

Specific drug decision support, including features such as dose calculators and maximum dose checking, has the capacity to reduce the incidence of wrong dose and wrong drug errors[21].

The electronic medical record, including computerized provider order entry, can have an important effect on medical error detection and reduction.

DISCUSSION:

A) Medication discontinuity errors in the perioperative period:

Medication errors occur frequently in the perioperative period, even in the era of an electronic medication file. Errors in prescription, administration and intake of medication are not easily solved because no single health care professional is responsible for adequate intake of medication in surgical patients.

The anaesthesiologist should take on a more prominent role in regulating perioperative medication intake in surgical patients [23].

B) Physicians' and Nurses' Attitudes and Actions Regarding Perioperative Medication Management:

As per the analytical research design performed at a Danish University Hospital, where 18 questionnaire given to the nursing and physicians during the perioperative period. The study concluded that, The study confirms a knowing-doing gap in medication management in perioperative settings.

To highlight the need to address this issue, to ensure that physicians and nurses act in accordance with their beliefs and consider the importance of medication safety in interdisciplinary work across specialties [22].

CONCLUSION:

Medication Safety concern in Perioperative period denotes various areas which needs to be focused and highlighted, various problems and concerns are to be studied includes the preoperative phase, intra operative phase, and postoperative phase [24].

Perioperative phase starts with admission of patient till the recovery of patients from surgery needs to be monitored.

Wrong Identification of Patient , Error Prone Medication management, WRONG SITE, WRONG PROCEDURE WRONG PATIENT SURGERY, RISK OF HEALTHCARE ASSOCIATED INFECTIONS.

Multiple nursing checks, Inaccurate or Incomplete Documentation. All this needs to be zoned out.

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Nil

CONFLICT OF INTEREST

No interest

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