



# Respect Thy Elders

## Preventing Geriatric Medication Errors in the Perioperative Continuum

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# The United States Pharmacopeia (USP)

- A non-profit standards-setting organization established in 1820
  - USP standards address the strength, quality, purity, naming, and packing of manufactured drugs and OTC products
  - USP standards are legally enforceable by way of the Food and Cosmetic Act, 1938



# USP

- Neutral 3<sup>rd</sup> party intermediary
- More than 3 decades experience in operating various reporting programs
  - Medical devices
  - Veterinarian products
  - Radiopharmaceuticals
  - Medication errors
  - Adverse drug reactions





# USP's Medication Error Reporting Programs

- Medication Errors Reporting (MER) Program (1991)
  - Processes 1,000 reports annually
  - Can be used by any clinician, any discipline, any setting
  - Operates in cooperation with the Institute for Safe Medication Practices (ISMP)



# USP's Medication Error Reporting Programs

- MEDMARX®
  - Launched in 1998
  - Voluntary, anonymous, subscription service
  - More than 850 subscribers
  - More than 1 million records
  - Receives 15,000 – 20,000 / month



# MEDMARX

- Houses the world's largest known database of medication errors from the perioperative setting
- USP will publish a 7-year summary of perioperative medication error findings in Fall, 2006



# USP-AORN-USUHS Partnership

- A 5-year history of collaboration between the three organizations
  - USP – medication error data
  - USUHS - Clinical Nurse Specialists
  - AORN – the professional association
- Research, presentations, publications, standards, visibility

•(Leape)





# Objectives

- Identify trends in medication errors for the geriatric population from the MEDMARX data
- Discuss recommendations from professional organizations for eliminating medication errors




# Purpose

- Review the general nature of geriatric medication error data from the perioperative environment
- Identify elements of risk that predispose geriatric patients to error
- Formulate risk-reduction strategies for the patient and the practitioner



# Medication Error

"A medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer."



Source: National Coordinating Council for Medication Error Reporting and Prevention





# The Dilemma

- The Institute of Medicine reported that medical errors significantly contribute to morbidity and mortality
  - Estimated 44,000 to 98,000 patients die per year due to preventable medical errors
  - Medical errors estimated to be the 8th leading cause of death
  - Medication errors are generally considered to be the largest subset of medical errors



# To Err is Human: Building a Safer Health System

- The estimated number of deaths from medication errors doubled between 1980s and 1990s
- 7,000 deaths yearly attributable to medication errors



# To Err is Human: Building a Safer Health System

- The IOM called for hospitals and health systems to participate in event reporting programs as a means of sharing the experiences at one institution with another in hopes of prevent future errors



# Medication Error Reporting

- If an error is not detected, it cannot be managed
- If an error is not reported, others cannot learn from the mistake
- If analysis is not done on reported errors, the information becomes buried in a data graveyard





# Impact of Medication Errors

- Patients/family members
- Organizations
- Staff
- Society

**Iceberg Model**

**Errors  
Reported**

**Errors Not  
Reported**



# Why Errors Aren't Reported

- Increased workload
- Perceived insignificance of the event
- Lack of knowledge/procedure
- Lack of value in reporting
- Lack of feedback
- Lack of awareness of an error itself

Shaw-Phillips (2002); Rosenthal & Booth (2005); Leape (2002)





# Limited Perioperative Data

- Few formal studies
  - Beyea et al., OR study
  - Beyea et al., Same Day Surgery study
  - Goeckner, et al., Perioperative
  - Hicks et al., PACU study
  - AIMS study (anesthesia providers)
  - Others

# A Unique Environment



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# Perioperative - Risky Business

- Fast paced environment
- Distractions
- Communication
- Complacency
- Care throughout lifespan
- Verbal orders
- Multiple handoffs
- Team hierarchy



# Objective 1

- Identify trends in medication errors for the geriatric population from the MEDMARX data



# Perioperative Continuum

- Same Day Surgery
  - The entry/exit point for ambulatory surgery patients
- Preoperative Holding
  - The holding area within the surgery department
- Operating Room
  - Where the surgery occurs
- Post Anesthesia Care Unit
  - Phase 1 Recovery

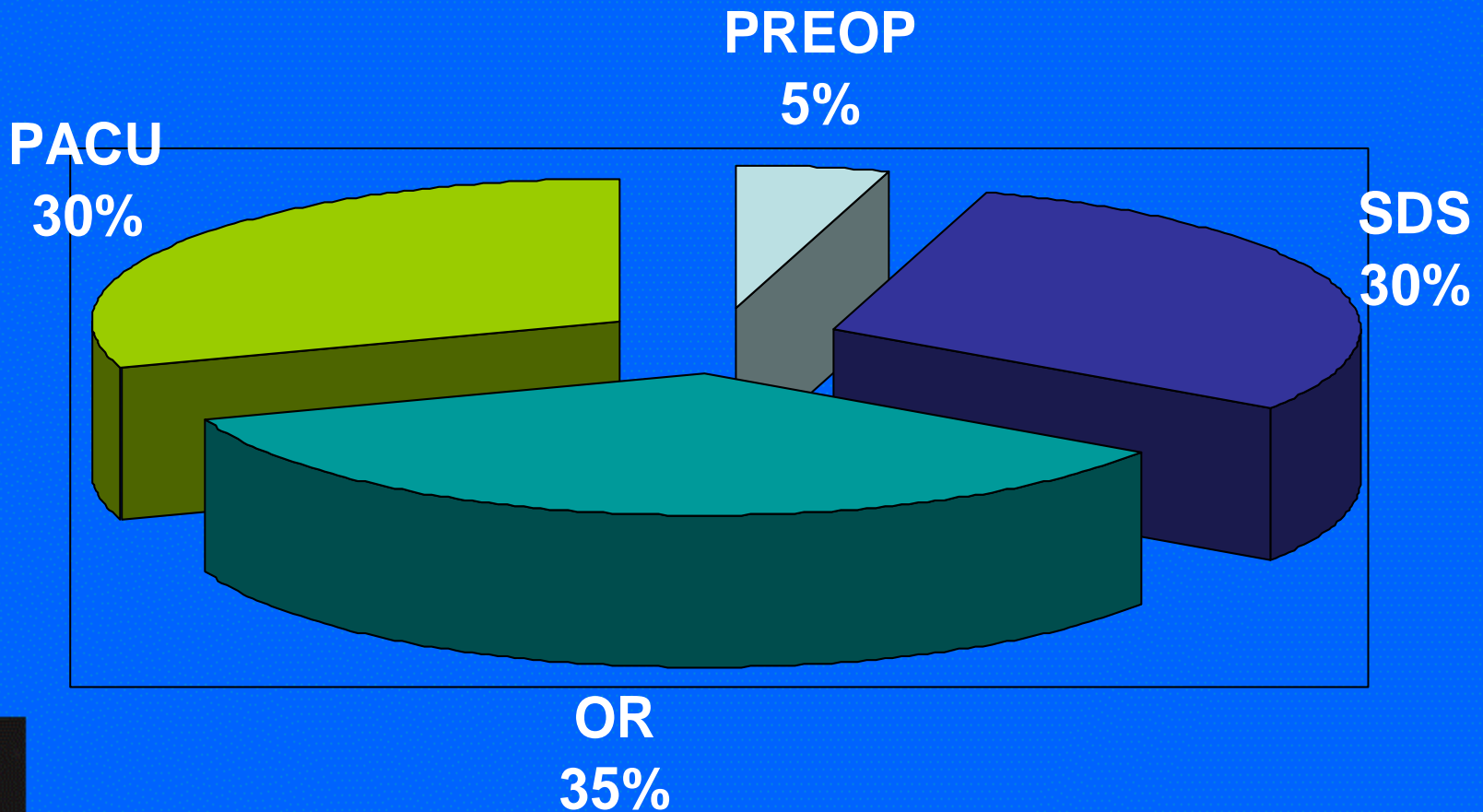




# Data (n = 1,529)

- Analyzed geriatric medication errors
  - Same Day Surgery (SDS) (n=453)
  - Preoperative Holding Area (PreOp) (n=78)
  - Operating Room (OR) (n=535)
  - Post-Anesthesia Care Unit (PACU) (n=463)
- Errors spanned Sept 1998 – Aug 2004

# Geriatric Perioperative Errors (n = 1,529)





# MEDMARX Variables

- Severity of error
- Node
- Type of error
- Causes of error
- Products involved
- Actions Taken as a result of the error



# MEDMARX Error Outcomes

Category

A- No error

B- Did not reach patient/no harm

C- Reach patient/no harm

D- Extra monitoring/no harm

E- Temporary harm

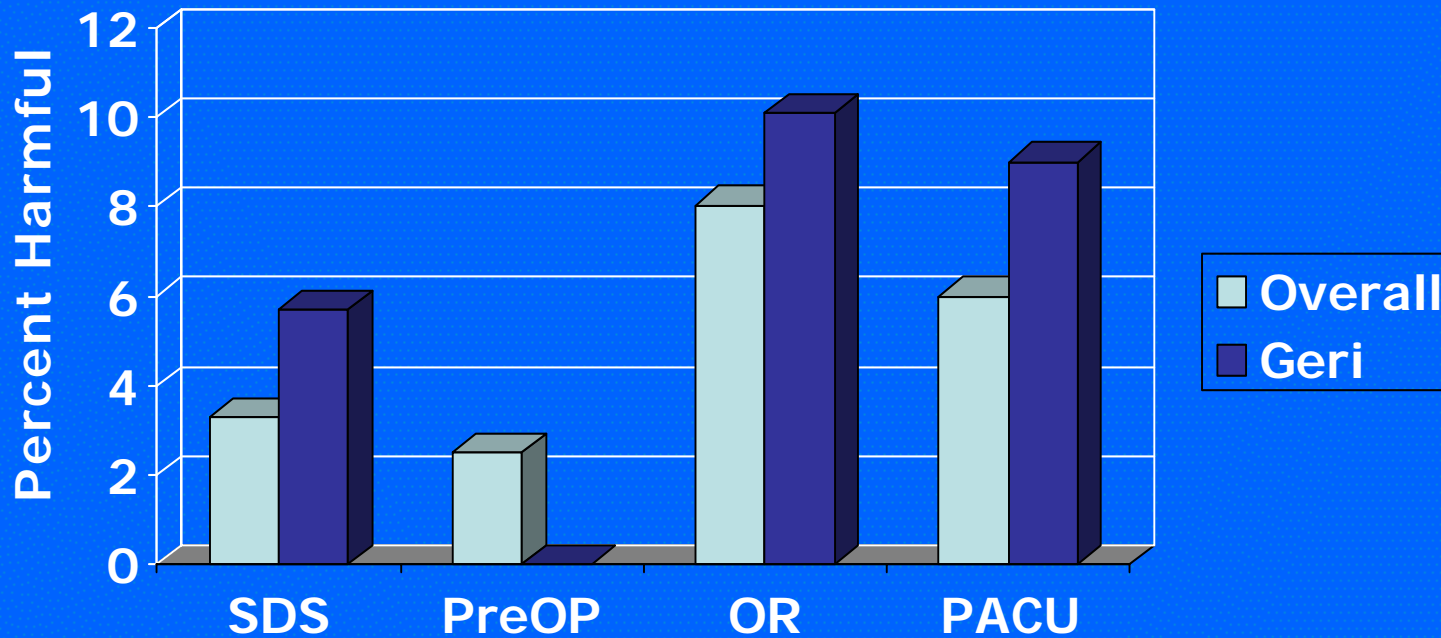
F- Temporary harm/hospitalization effected

G- Permanent harm

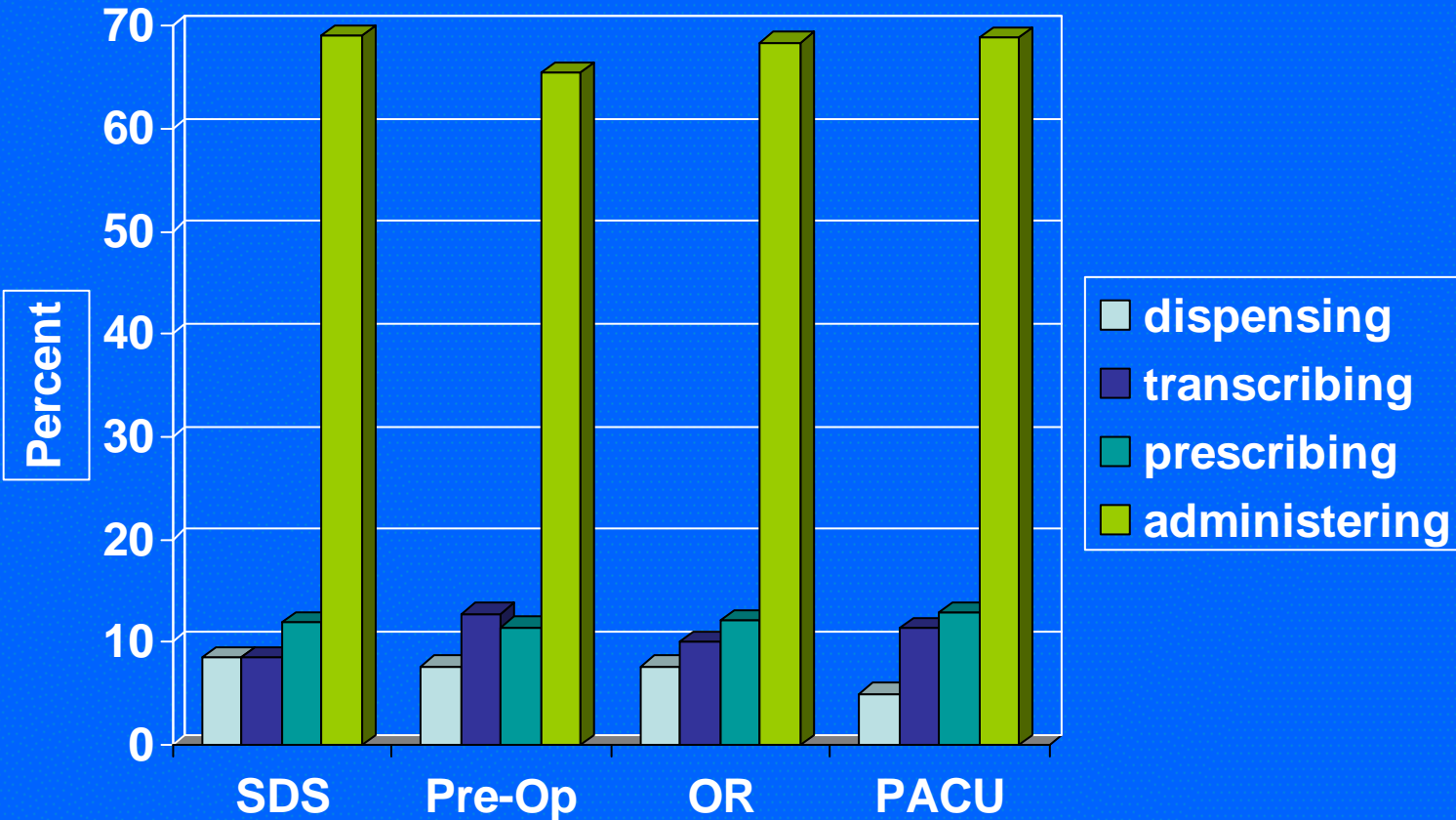
H- Life-sustaining event

I- Death from error

# Intra-group Comparison of Harmful Errors



# Medication Use Process





# Same Day Surgery

CPT Gregory Lara



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# Case Review

- For a 70-year old patient, a nurse was starting an IV line, when she was called to another room over the intercom. In haste, she left the roller clamp on the IV tubing undone. As a result, an entire bag of solution was rapidly infused.



# Case Review

- A patient with glaucoma was scheduled for surgery. The pre-operative orders were written as: “∅ rt eye dilation” The nurse instilled eye drops in the right eye contrary to the written order prior to surgery.
- ∅ was interpreted as ① (order number 1; instead of NOT right eye)

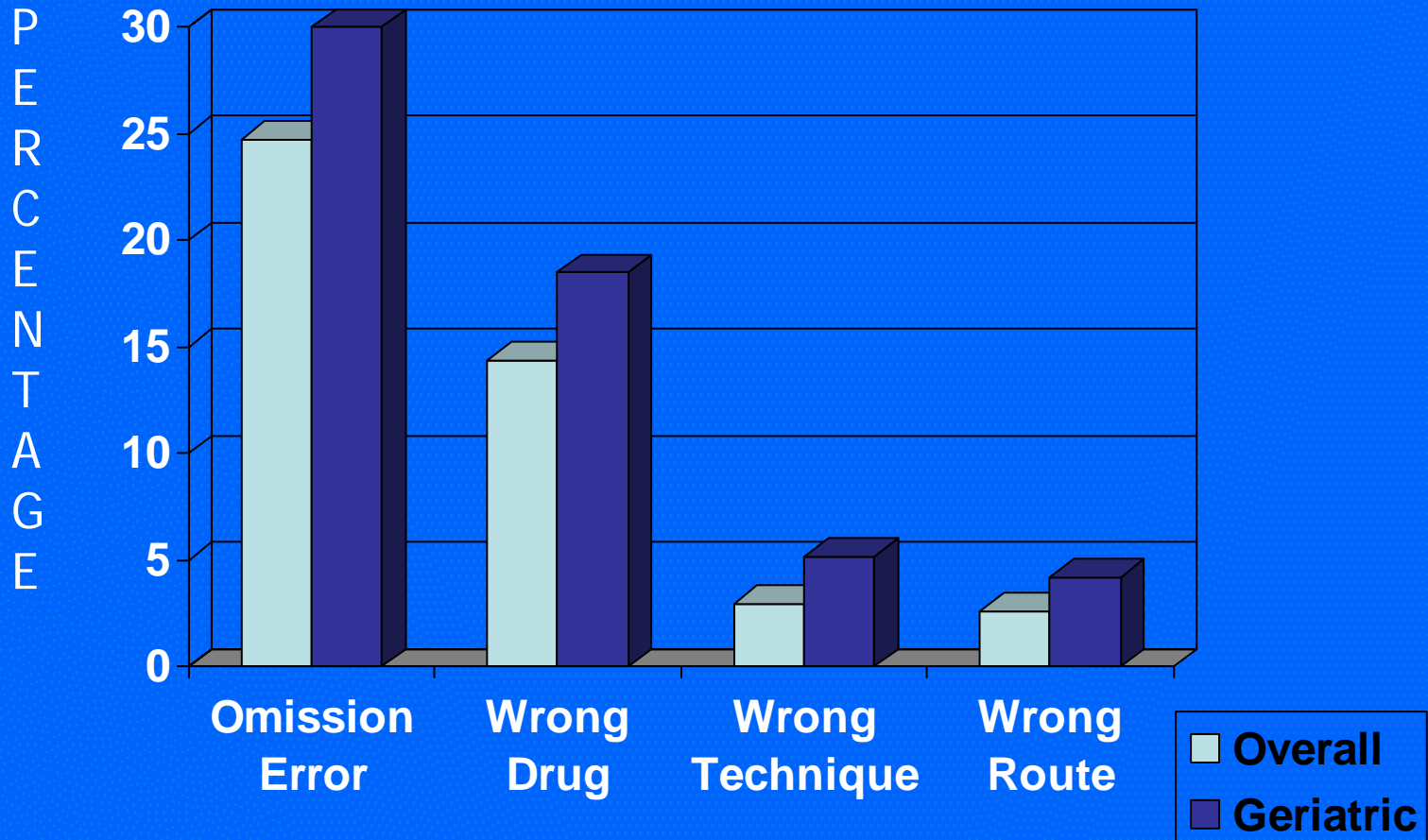


# Error Management

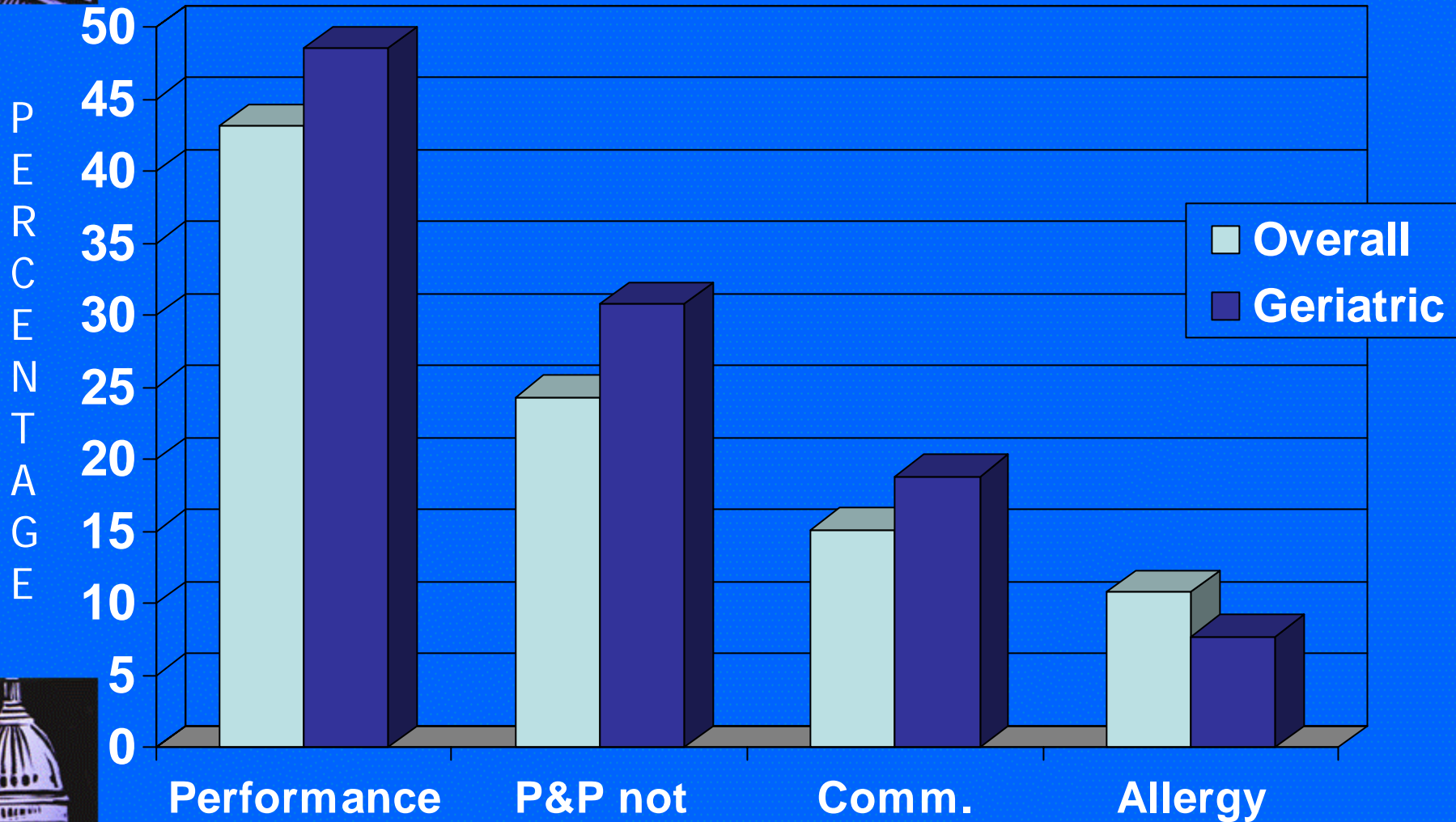
- The ophthalmologist was notified and met with the patient. After revealing the error to the patient, the patient elected to have the procedure performed on the right eye.



# Type of Error



# Cause of Error





# Products - All Categories

- 133 unique products reported in error
  - Cefazolin (9.8%)
  - Vancomycin (4.4%)
  - Meperidine (4.0%)
  - Cyclopentolate (3.8%)
  - Phenylephrine (3.8%)



# Products - Harm

- Fentanyl (11.5%)
- Insulin (11.5%)
- Vancomycin (7.7%)



# Themes

- Wrong eye preps (Left versus Right)
- Allergy communication
- Failure to properly identify patients
- Errors occurring due to lack of availability of patient information were highest in the geriatric population



# Pre-Op Holding



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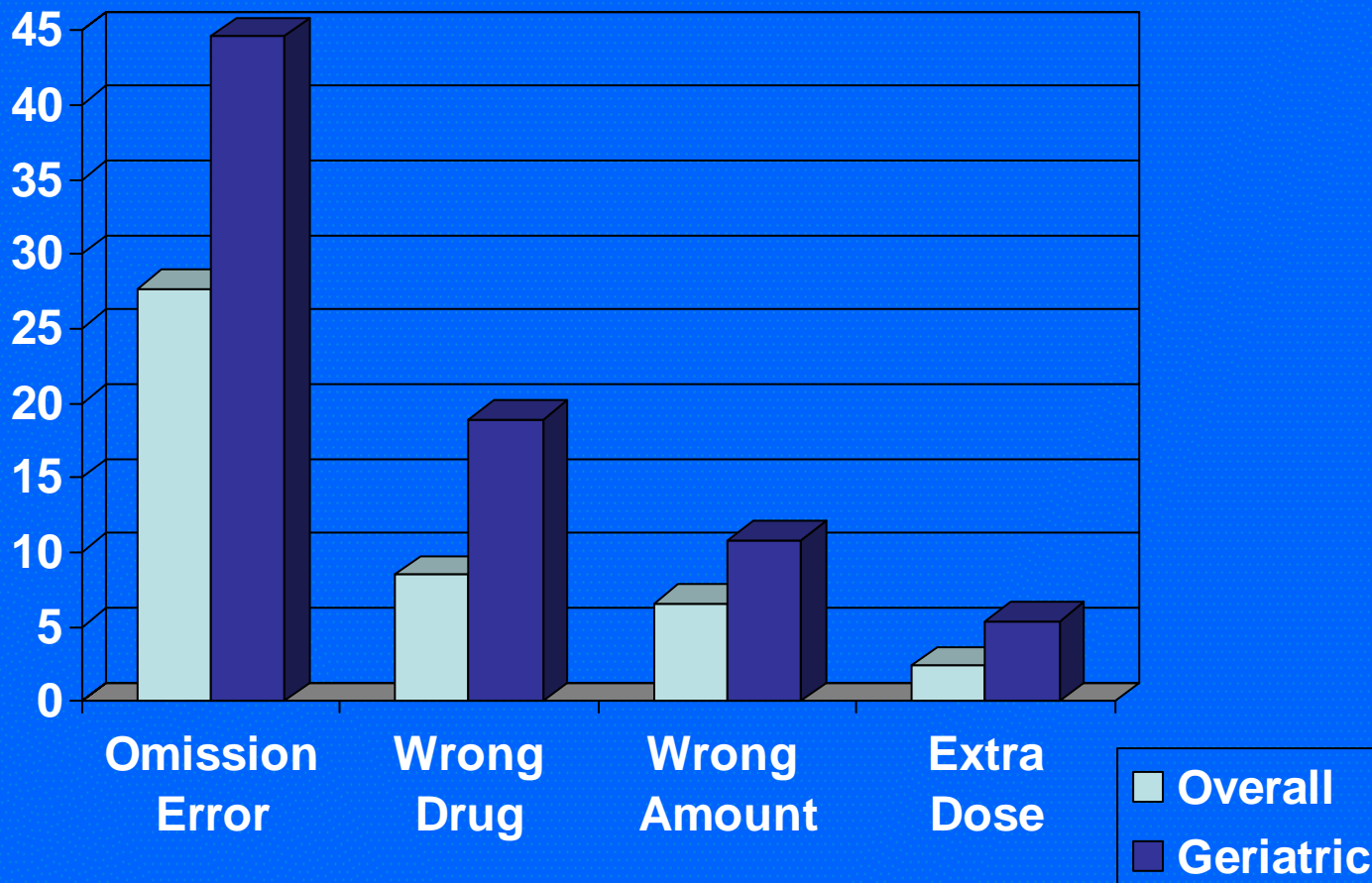


# Case Review

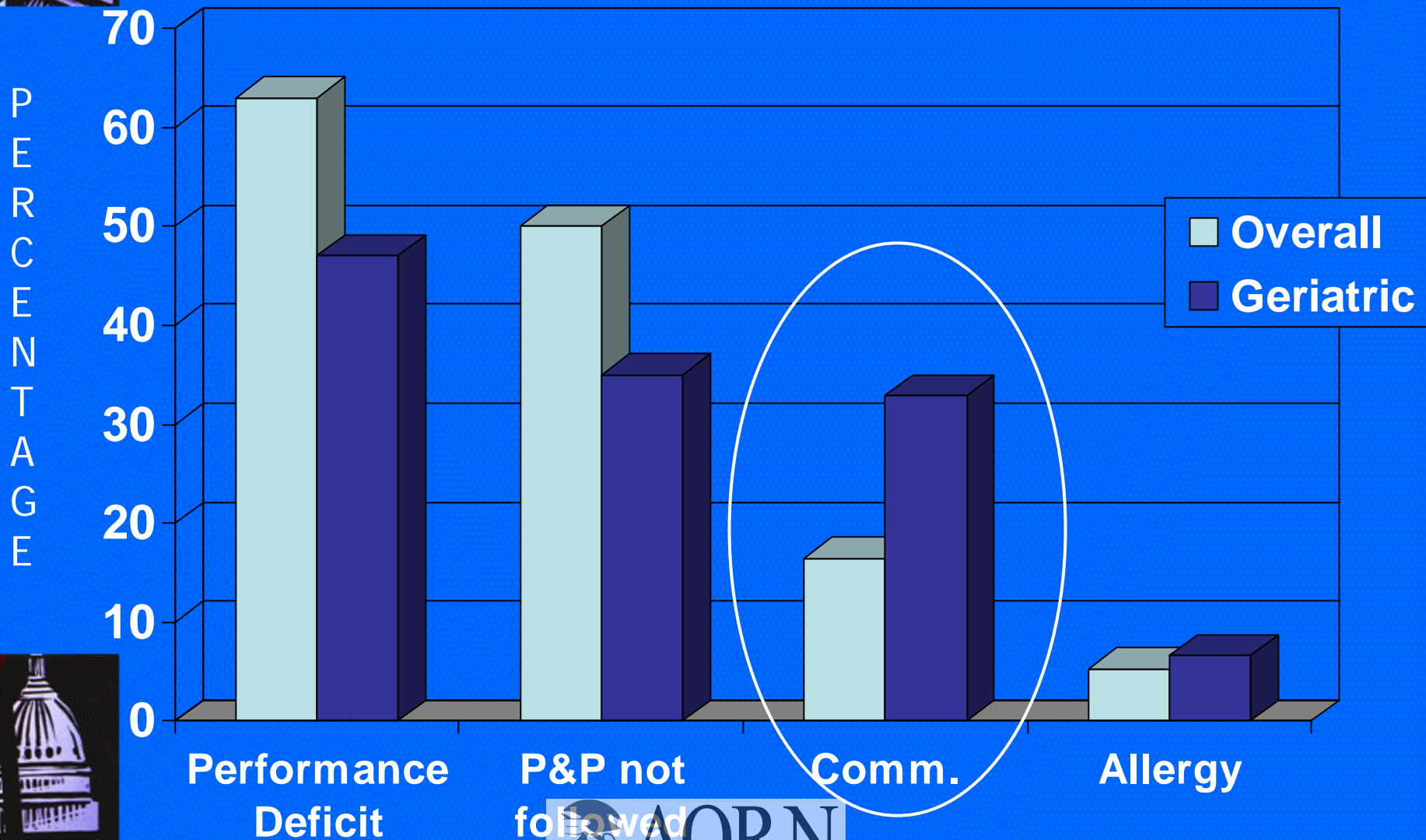
- The pre-operative order sheet indicated a patient's weight as 228 pounds (103 kilograms). The heparin dose was calculated based on the listed weight. In another part of the chart, the patient's correct weight was listed as 176 pounds or 80.1 kilograms. An excessive dose was given.

# Type of Error

P  
E  
R  
C  
E  
N  
T  
A  
G  
E



# Cause of Error





# Products – All Categories

- 22 Unique products reported in error
  - Cefazolin (13.7%)
  - Vancomycin (7.8%)
  - Ampicillin (2.9%)

**Antimicrobials involved in 26.4% of the errors**



# Themes

- Pre-Op antibiotics not given accurately
- Neuromuscular blockers given inadvertently in the Pre-Op holding area
- Patient readiness was an issue





# Operating Room

CPT Stacey Freeman



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# Case Review

- A nurse drew up 1.6 mL of 2% lidocaine from a 20 milliliter bottle and then added 1.6 mL of 8.4% sodium bicarbonate, for a total of 3.2 mL in the syringe. A physician then injected the syringe contents to provide local anesthesia during an ophthalmic procedure and completed the case without difficulty.



# Cont.

- At the beginning of the next case, the nurse realized that the order was misinterpreted. The correct instructions were to withdraw 1.6 mL of the lidocaine and discard. Then add 1.6 mL of the sodium bicarbonate to the original bottle so that there was a total of 20 mL in the bottle. The preference card was updated with these instructions.

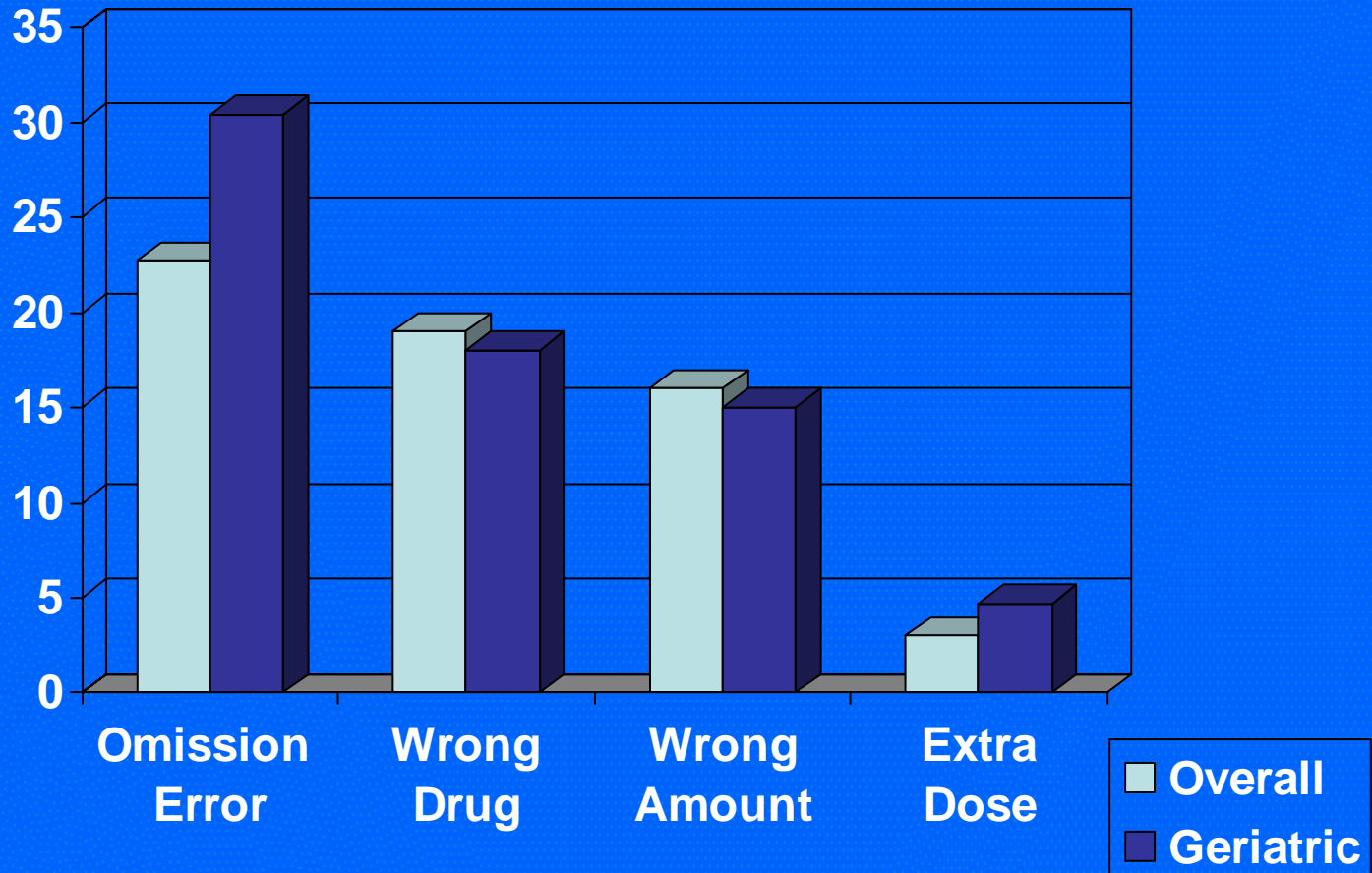


# Case Review

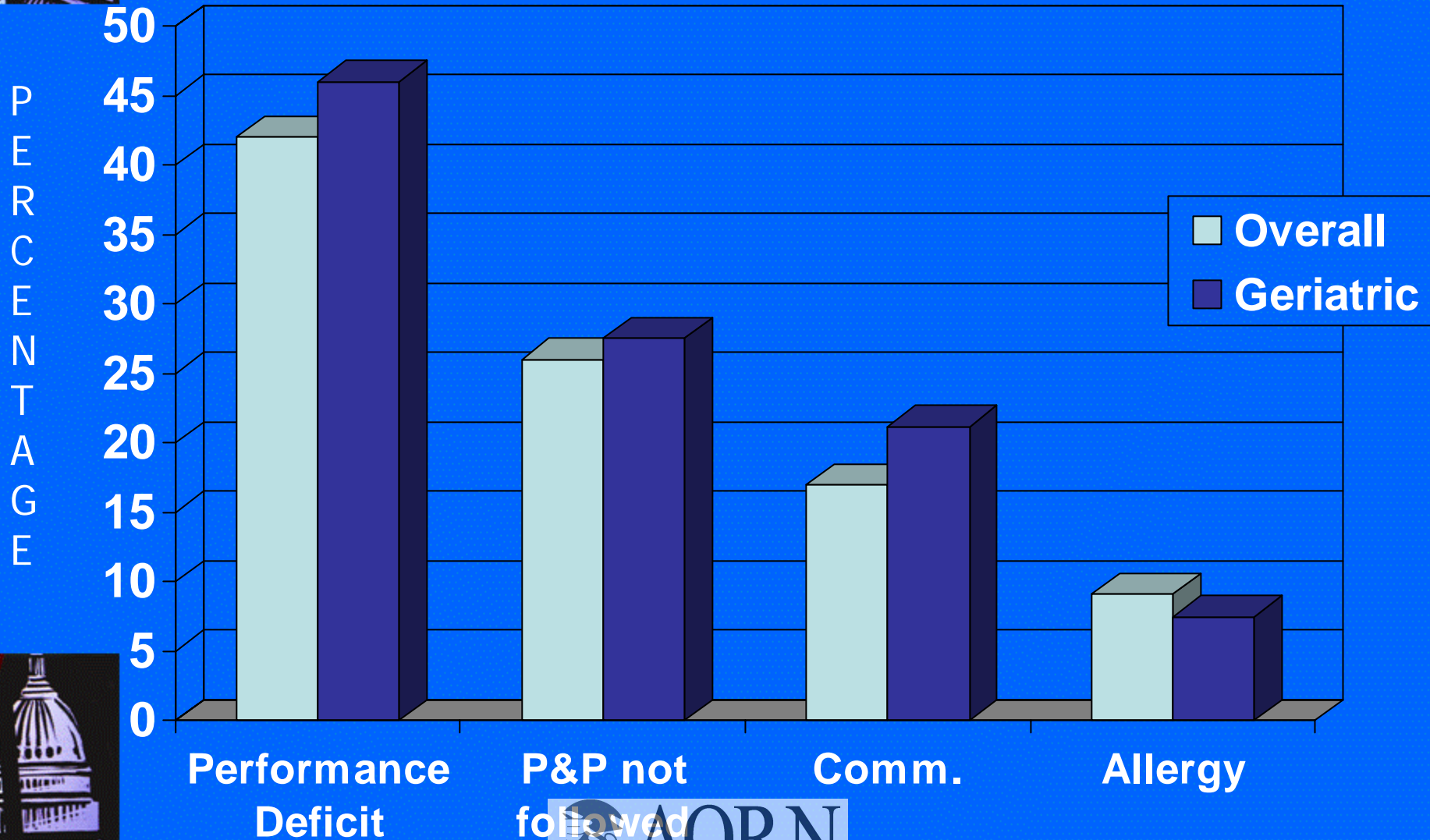
- A surgeon, using a resectoscope with storz cutting loop, lost fulguration, which resulted in the patient bleeding, requiring prolonged anesthesia. The equipment (Bovie machine, cords, resectoscope and cutting loops) was replaced during the surgery, but fulguration was still not achieved. At that point, it was noted that lactated ringer's solution had been hung instead of glycine solution, which could account for the loss of current.

# Type of Error

P  
E  
R  
C  
E  
N  
T  
A  
G  
E



# Cause of Error





# Products – All Categories

- 149 Unique products reported in error
  - Cefazolin (16.3%)
  - Heparin (5.6%)
  - Vancomycin (4.2%)
  - Morphine (3.9%)
  - Gentamicin (3.5%)
  - Midazolam (3.2%)
  - Fentanyl (2.3%)
  - Lidocaine (2.3%)



# Products - Harm

- 34 Unique products reported in error
  - Cefazolin (10.2%)
  - Heparin (6.8%)
  - Sufentanil (6.8%)
  - Vancomycin (6.8%)
  - Bupivacaine (5.1%)
  - Fentanyl (5.1%)
  - Lidocaine (5.1%)



# Themes

- Communication breakdowns
- Unlabeled contents





# Post-Anesthesia Care Unit



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# Case Review

- An order was written for ondansetron to be given for nausea while the patient was in the PACU. The order was processed through the Computerized Prescriber Order Entry (CPOE) system with a comment field of “Give in PACU only”. The patient was transferred to the patient care unit and still had nausea. The nurse on the patient care unit saw the ondansetron as an active order and gave a subsequent dose.



# Case Review

- A nurse administered an excessive dose of heparin via a Quinton catheter to a post-operative patient. The nurse was unfamiliar with the different strengths of heparin and the process of flushing a Quinton catheter.



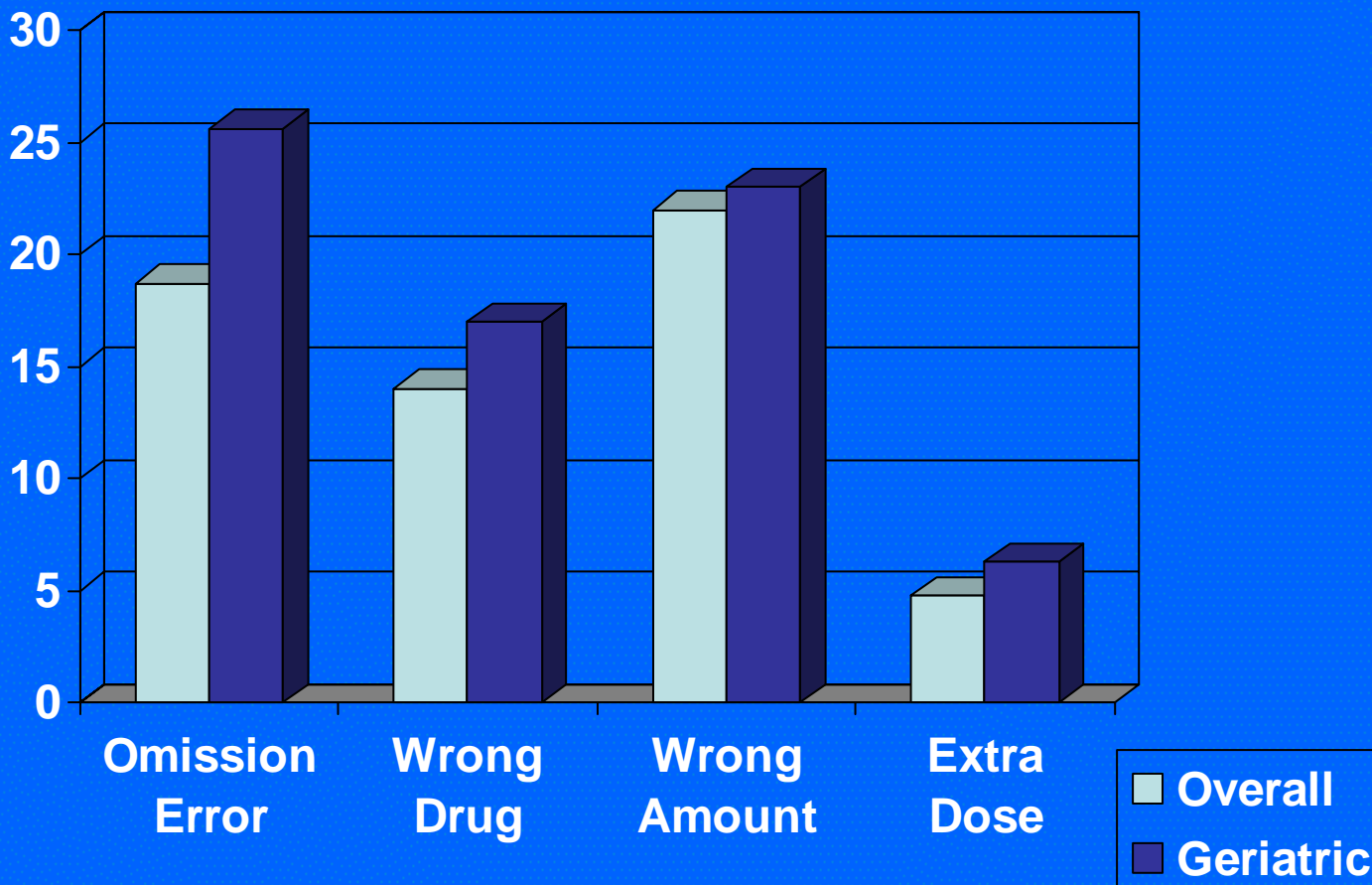
# Case Review

- As a result of the error, the patient developed bleeding, which resulted in a low blood pressure. Despite treatment, the patient expired 10 hours later.
- The institution initiated a protocol that only dialysis nurses would care for Quinton catheters.

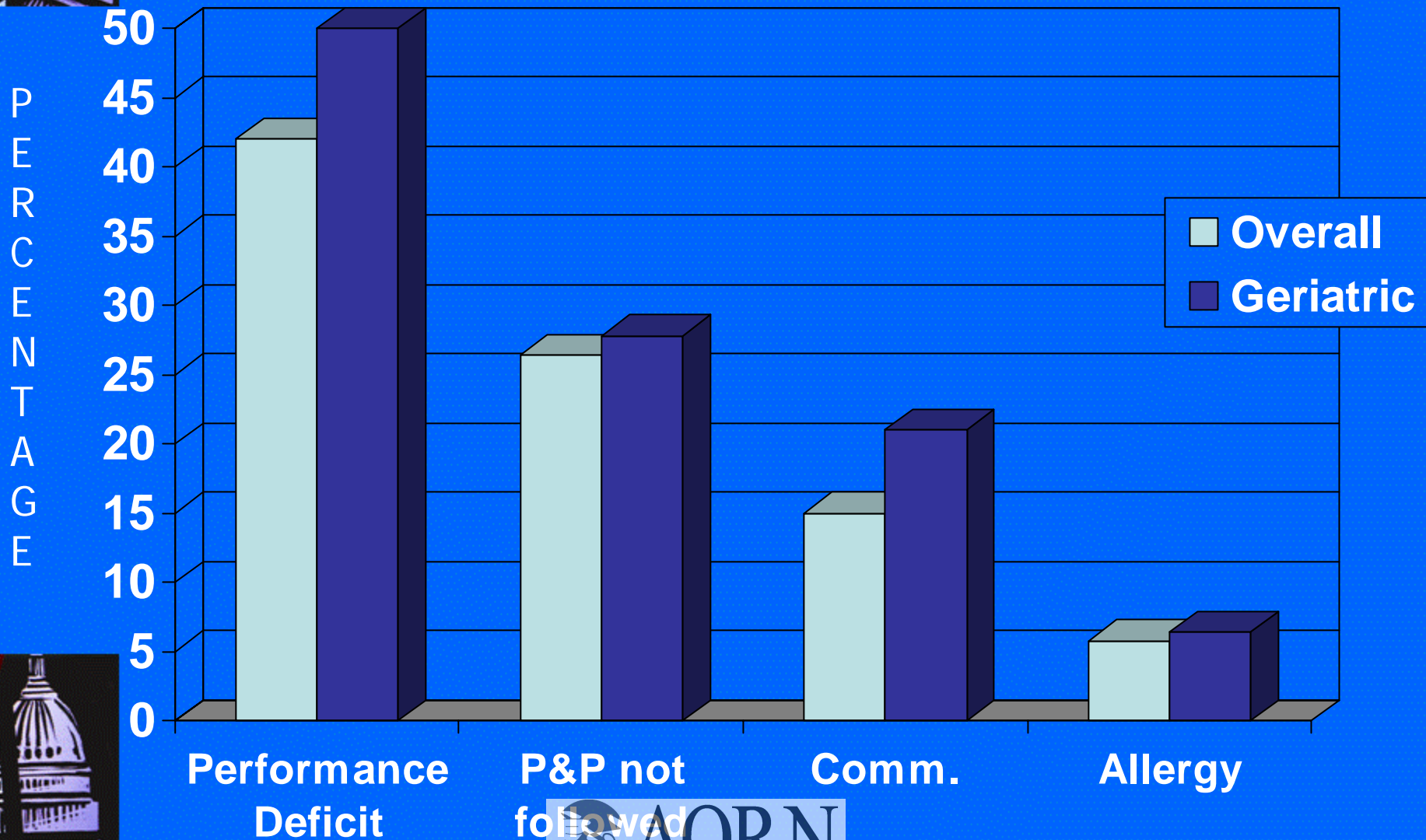


# Type of Error

P  
E  
R  
C  
E  
N  
T  
A  
G  
E



# Cause of Error





# Products – All Categories

- 125 Unique products reported in error
  - Morphine (19.7%)
  - Cefazolin (6.6%)
  - Meperidine (5.8%)
  - Heparin (5.4%)
  - Fentanyl (4.6%)
  - Hydromorphone (4.6%)



# Products - Harm

- 22 Unique products reported in error
  - Morphine (31.9%)
  - Meperidine (10.6%)
  - Heparin (8.5%)
  - Insulin 6.4%)
  - Fentanyl (4.3%)

**Most products were “High-Alert” medications**



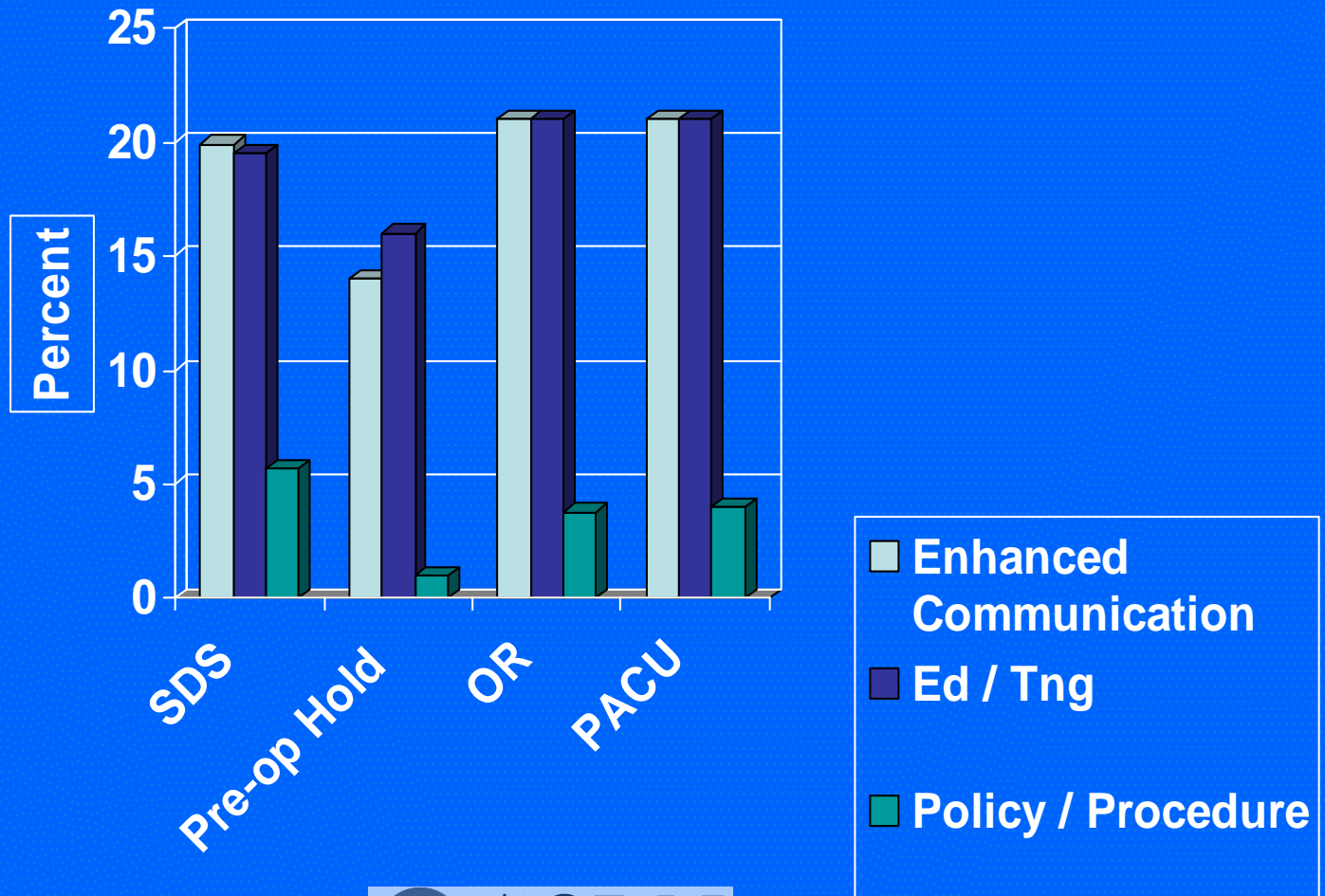


# Themes

- PCA pumps errors
- Tubing inter-connectivity
- Confusion between dose and volume
  - (0.5 mg VERSUS 0.5 mL)



# Actions Taken





# Data Limitations

- Utilization of a self-reporting system
- Secondary analysis of data
- Data from facilities who subscribe to MEDMARX



# Objective 1

- Identify trends in medication errors for the geriatric population from the MEDMARX data





# Objective 2

- Discuss recommendations from professional organizations for eliminating medication errors



# Patient Safety Strategies



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# Patient Safety Work Plan

- Conduct surveys
- Education
- Implementation
- Blameless reporting
  - Accident -vs- error
  - Learning -vs- judgment
  - Accountability -vs- blame



# Risk Reduction Strategies

- Policies, procedures, and practices
- Forcing functions
- System safeguards
- Technology



# Policies, Procedures, and Practices

- Must have access to up-to-date reference material



# A Changing Culture

- Institute of Medicine's characteristics of the ideal system
  - Patient-centered
  - Safe
  - Efficient
  - Effective
  - Equitable

*Crossing the Quality Chasm, 2001*



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# Proactive Prevention

- Identify risk
  - How do accidents happen?
  - Are they foreseeable?
  - Are they preventable?
  - Is there systemic risk?
  - How does human performance affect risk?



# Forcing Functions

- Electronic allergy documentation prior to medication administration
- Purchase drugs in unit of use rather than multi-dose (when possible)
- Obtained drugs in sterile, ready-to-use containers



# System Safeguards

- Independent verification
- Package and storage of medication
- Pharmacy department support
  - Experts in the medication use process
  - Involvement of pharmacists throughout the perioperative continuum
- Standardization
- Checklists
- Redundancies



# Technology

- Electronic prescribing software
- Hard stops in technology devices
- Robotic prescription preparation and dispensing
- Electronic transfer of prescriptions



# Addressing Themes - SDS

- Patient identification
- Wrong eye preps
- Allergy communication
- Available patient information



# JCAHO National Patient Safety Goals

- **Goal 1:** Improve the accuracy of patient identification
- **Strategies:**
  - Patient's wrist bands linked with barcode medication system
  - Two identifiers
  - Patient being proactive
  - Creative scheduling of procedures





# JCAHO National Patient Safety Goals

- Goal 2: Improve the effectiveness of communication among caregivers
- Strategies
  - Pre-printed order forms
  - Standardized documentation
  - Review “Do Not Use” list
  - Chart Completeness Audits



# JCAHO National Patient Safety Goals

- Goal 8: Accurately and completely reconcile medications across the continuum of care.



# Addressing Themes - Pre Op

- Pre-Op antibiotics
- Safety around Neuromuscular blockers
- Patient readiness



# JCAHO

## 2006 Patient Safety Goal

- Goal No. 3, Improve the safety of using medications
- Strategies
  - Antimicrobial audit
  - Ensuring activation of IVPB
  - Eliminating presence of NMBA in area



# Addressing Themes - OR

- Communication breakdowns
- Unlabeled contents





# Time Out

- Expand time out to include a review of medications involved in the case



# Other Strategies

- Communication Board
  - List team members





# JCAHO

## 2006 Patient Safety Goal

- Goal No. 3, Improve the safety of using medications
- The new revisions require labels to include:
  - Drug name
  - Strength
  - Amount, if not apparent from the container
  - Expiration date when not used within 24 hours
  - Expiration time when expiration < 24 hours
  - Labels can be developed commercially or by the facility



# JCAHO Medication Label Criteria

- JCAHO is also requiring labels to be verified
  - both verbally and visually
  - by two qualified individuals when the person preparing the medication is not the person administering the medication



<http://www.aorn.org/managers/news/0112/article1.htm>





# AORN Guidance Statement

- Safe Medication Practices in Perioperative Practice Settings
  - Develop standardized procedures
  - Consistent with JCAHO National Patient Safety Goals
  - Lists elements of safe medication practices
  - Identify risk reduction strategies
  - Provides sample protocol for safe medication handling and administration

<http://www.aorn.org/about/positions/pdf/7f-safemeds-2004.pdf>





# AORN Safe Medication Administration Tool Kit™

- Perioperative medication competencies
- Herbal/dietary supplement-drug interaction
- Conversions and calculations
- Safe medication resource list
- Medication safety test
- Safe medication self learning module



# Standing Orders and Preference Cards

- May contribute to an error
- Build safety around their use
  - Review prior to case start
  - Periodic review
- An important component of documentation
- Easily understood



# Addressing Themes -PACU

- PCA pumps errors
- Tubing inter-connectivity
- Confusion between dose and volume
  - (0.5 mg VERSUS 0.5 mL)



# American Society of PeriAnesthesia Nurses

- PACU nurse competencies
  - Assessing educational needs and barriers to learning
  - Age-specific care
- Safe Medication Administration Position Statement
  - Follows JCAHO guidelines
  - Restrict noise/distractions in medication preparation area





# Objective 2

- Discuss recommendations from professional organizations for eliminating medication errors





# In Summary

- Dilemma
- Medication error reporting
- Examined MEDMARX data
- High risk caring for geriatric patients
- Proactive prevention
- Patient safety work plan
- Guidelines / Standards for risk reduction





# Special Thanks

- Perioperative Clinical Nurse Specialist Class of 2007 (USUHS)
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- Capt Theresa Vernoski





# Support

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Thank you

Questions?

