Medical Errors

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Learning Objectives

- Define medical error, adverse event, and near miss
- Understand current magnitude and types of errors (global & US)
- Review root causes and high-risk areas (human and system contributors)
- Discuss evidence-based prevention strategies and implementation

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Definitions

- Medical error: failure of a planned action or wrong plan to achieve intended outcome
- Adverse event: harm caused by medical care, not underlying disease
- Near miss: error that does not reach the patient

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Global Burden

~1 in 10 patients harmed while receiving care (WHO Global Patient Safety Report 2024)

134 million adverse events annually in low- and middle-income countries (LMICs)

~2.6 million deaths annually in LMICs related to unsafe care

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U.S. Perspective

- Johns Hopkins/BMJ estimate (2016): ~250,000 deaths/year attributed to medical error (widely cited)
- Diagnostic errors estimated to cause significant morbidity/mortality (Johns Hopkins 2023 estimates)
- Variability in methods & reporting — caution interpreting single-number estimates
- Underreporting remains common

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Cost of Medical Errors

- When taken just as a financial burden to the health care system, the cost of these errors is estimated to be around $20 billion per year
- When the financial burden to the families, employers, and overall economy are taken into account, aggressive estimates put the burden at $1 trillion annually

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Common Types of Errors

- Medication errors (prescribing, administration, dispensing) **Most Common**
- Diagnostic errors (delays, missed, incorrect)
- Communication/handoff failures
- Surgical/wrong-site and procedural errors

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Root causes — systems & human factors

- Complex systems and poorly designed processes
- Workload, fatigue, staffing shortages
- Poor communication and unclear roles
- Inadequate training & supervision
- Technology issues (EHR usability, alerts overload)

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Medication Errors

- Prescribing
  - Standardized order sets & computerized provider order entry (CPOE)
  - Minimize Verbal Orders as much as possible
- Dispensing
  - Barcode medication administration (BCMA)
- Administration
  - 5 rights of medical administration (patient, medication, dose, time, route)
- Monitoring
  - Pharmacist-led medication review & stewardship

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Acad Emerg Med. 2013 Aug;20(8):801-6. doi: 10.1111/acem.12189.

Effect of barcode-assisted medication administration on emergency department medication errors

Joseph Bonkowski [1], Cynthia Carnes, Joseph Melucci, Jay Mirtallo, Beth Prier, Erin Reichert, Susan Moffatt-Bruce, Robert Weber

Affiliations + expand

PMID: 24033623 DOI: 10.1111/acem.12189

Free article

Abstract

Objectives: Barcode-assisted medication administration (BCMA) is technology with demonstrated benefit in reducing medication administration errors in hospitalized patients; however, it is not routinely used in emergency departments (EDs). EDs may benefit from BCMA, because ED medication administration is complex and error-prone.

Methods: A naïve observational study was conducted at an academic medical center implementing BCMA in the ED. The rate of medication administration errors was measured before and after implementing an integrated electronic medical record (EMR) with BCMA capacity. Errors were classified as wrong drug, wrong dose, wrong route of administration, or a medication administration with no physician order. The error type, severity of error, and medications associated with errors were also quantified.

Results: A total of 1,978 medication administrations were observed (996 pre-BCMA and 982 post-BCMA). The baseline medication administration error rate was 6.3%, with wrong dose errors representing 66.7% of observed errors. BCMA was associated with a reduction in the medication administration error rate to 1.2%, a relative rate reduction of 80.7% ($p < 0.0001$). Wrong dose errors decreased by 90.4% ($p < 0.0001$), and medication administrations with no physician order decreased by 72.4% ($p = 0.057$). Most errors discovered were of minor severity. Antihistamine medications were associated with the highest error rate.

Conclusions: Implementing BCMA in the ED was associated with significant reductions in the medication administration error rate and specifically wrong dose errors. The results of this study suggest a benefit of BCMA on reducing medication administration errors in the ED.

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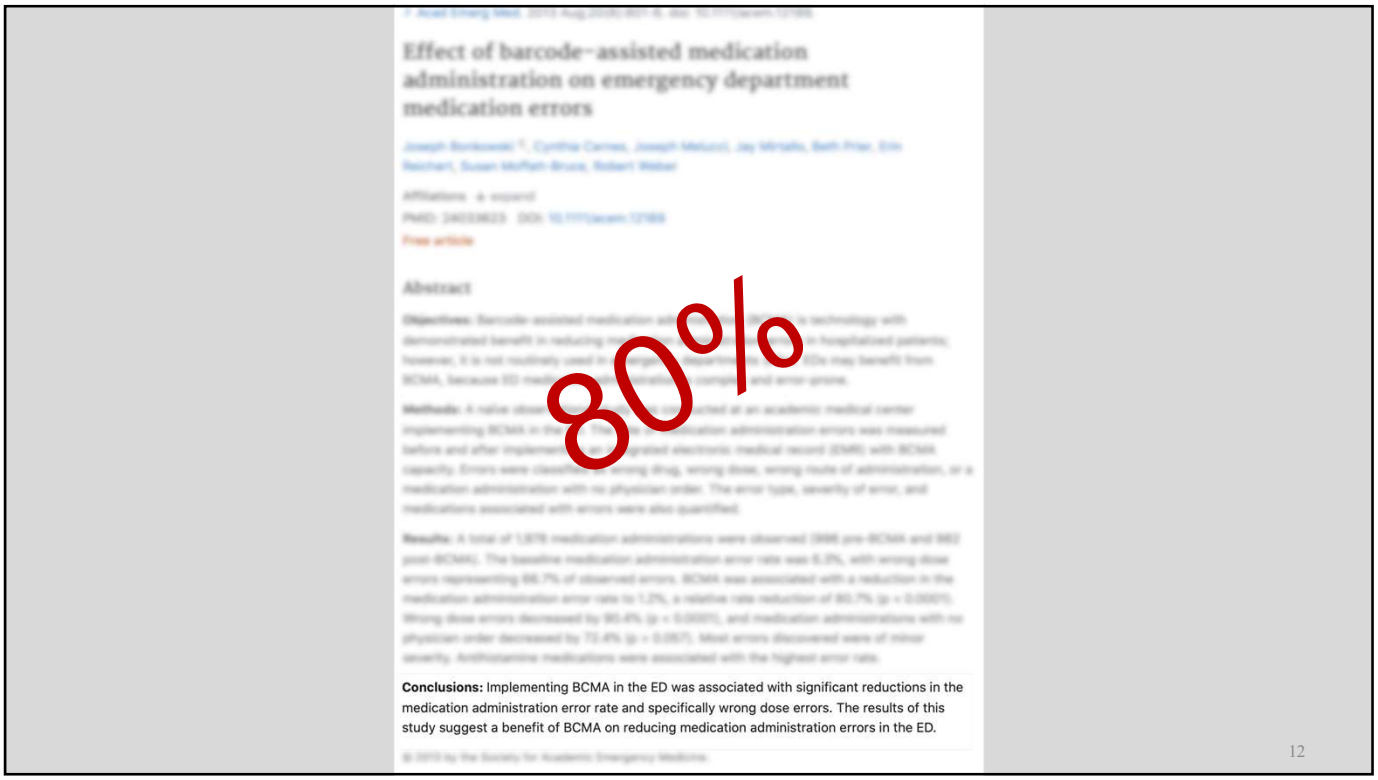

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80%

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Diagnostic Errors

- Missed diagnoses – complex patients with multiple co-morbidities
- Delayed diagnoses – Large workloads, complex systems, fractured delivery
- Incorrect diagnoses – lack of complete knowledge, delay in getting tests

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Reducing Diagnostic Errors

- Diagnostic checklists and cognitive debiasing training
- Second-review for high-risk cases and peer review
- Improved access to diagnostic tests & follow-up systems
- Use of decision support, structured reflection, and safety-netting

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Improving communication & handoffs

- Structured handoff tools (SBAR-situation, background, assessment, recommendation)
- Face-to-face or recorded handoffs for complex patients
- Standardized transfer checklists and read-backs
- Interprofessional rounds and family involvement

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Surgical Safety

- WHO Surgical Safety Checklist reduces complications and mortality
- Time-outs, site marking, instrument counts
- Team briefings and debriefings

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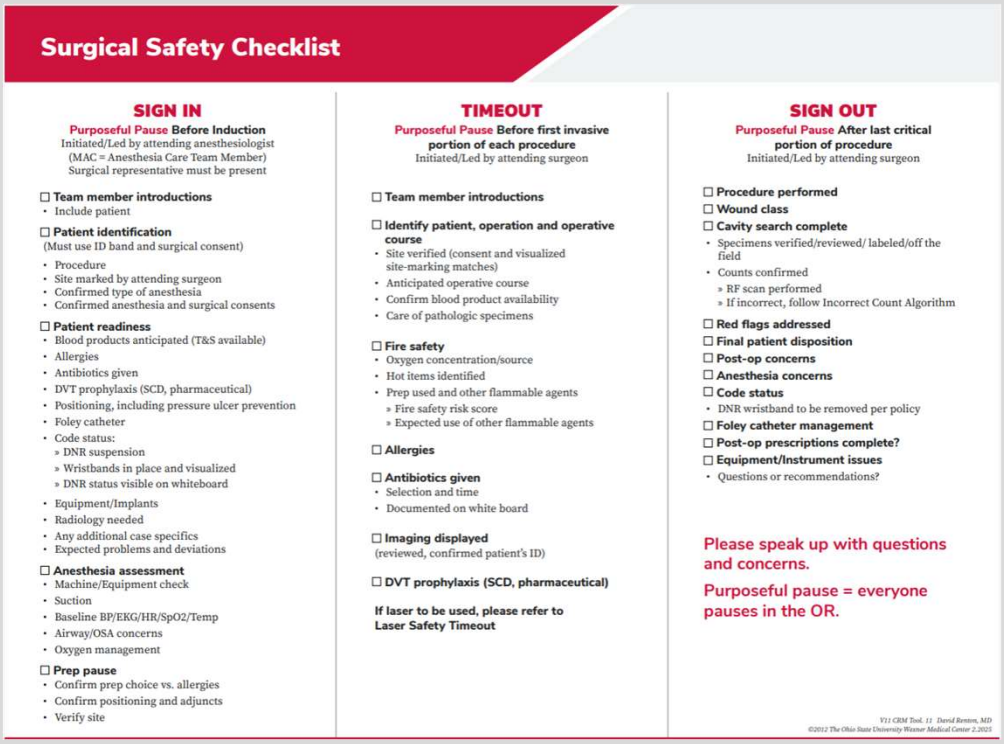

Surgical Safety Checklist

SIGN IN

Purposeful Pause Before Induction
Initiated/Led by attending anesthesiologist
(MAC = Anesthesia Care Team Member)
Surgical representative must be present

☐ **Team member introductions**
- Include patient

☐ **Patient identification**
(Must use ID band and surgical consent)
- Procedure
- Site marked by attending surgeon
- Confirmed type of anesthesia
- Confirmed anesthesia and surgical consents

☐ **Patient readiness**
- Blood products anticipated (T&S available)
- Allergies
- Antibiotics given
- DVT prophylaxis (SCD, pharmaceutical)
- Positioning, including pressure ulcer prevention
- Foley catheter
- Code status:
  - » DNR suspension
  - » Wristbands in place and visualized
  - » DNR status visible on whiteboard
- Equipment/Implants
- Radiology needed
- Any additional case specifics
- Expected problems and deviations

☐ **Anesthesia assessment**
- Machine/Equipment check
- Suction
- Baseline BP/EKG/HR/SpO2/Temp
- Airway/OSA concerns
- Oxygen management

☐ **Prep pause**
- Confirm prep choice vs. allergies
- Confirm positioning and adjuncts
- Verify site

TIMEOUT

Purposeful Pause Before first invasive portion of each procedure
Initiated/Led by attending surgeon

☐ **Team member introductions**

☐ **Identify patient, operation and operative course**
- Site verified (consent and visualized site-marking matches)
- Anticipated operative course
- Confirm blood product availability
- Care of pathologic specimens

☐ **Fire safety**
- Oxygen concentration/source
- Hot items identified
- Prep used and other flammable agents
  - » Fire safety risk score
  - » Expected use of other flammable agents

☐ **Allergies**

☐ **Antibiotics given**
- Selection and time
- Documented on white board

☐ **Imaging displayed**
(reviewed, confirmed patient's ID)

☐ **DVT prophylaxis (SCD, pharmaceutical)**

If laser to be used, please refer to Laser Safety Timeout

SIGN OUT

Purposeful Pause After last critical portion of procedure
Initiated/Led by attending surgeon

☐ **Procedure performed**
☐ **Wound class**
☐ **Cavity search complete**
- Specimens verified/reviewed/ labeled/off the field
- Counts confirmed
  - » RF scan performed
  - » If incorrect, follow Incorrect Count Algorithm

☐ **Red flags addressed**
☐ **Final patient disposition**
☐ **Post-op concerns**
☐ **Anesthesia concerns**
☐ **Code status**
- DNR wristband to be removed per policy

☐ **Foley catheter management**
☐ **Post-op prescriptions complete?**
☐ **Equipment/Instrument issues**
- Questions or recommendations?

Please speak up with questions and concerns.

Purposeful pause = everyone pauses in the OR.

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abcNEWS VIDEO LIVE SHOWS 2020 ELECTIONS CORONAVIRUS

Medical Errors, Past and Present

Amid recent news of medical mistakes, a number of past medical errors stand out.

By **DAN CHILDS**
February 19, 2009, 8:51 AM • 15 min read

Nov. 27, 2007— -- It's every surgical patient's worst nightmare. And it happened three times at Rhode Island Hospital.

According to Associated Press reports, the hospital was fined $50,000 and reprimanded by the state Department of Health on Monday after the third episode this year involving a doctor performing brain surgery on the wrong side of a patient's head.

Fortunately, the chance of a serious mistake occurring during any given medical procedure is small. But these errors do happen -- a fact evidenced by this recent news.

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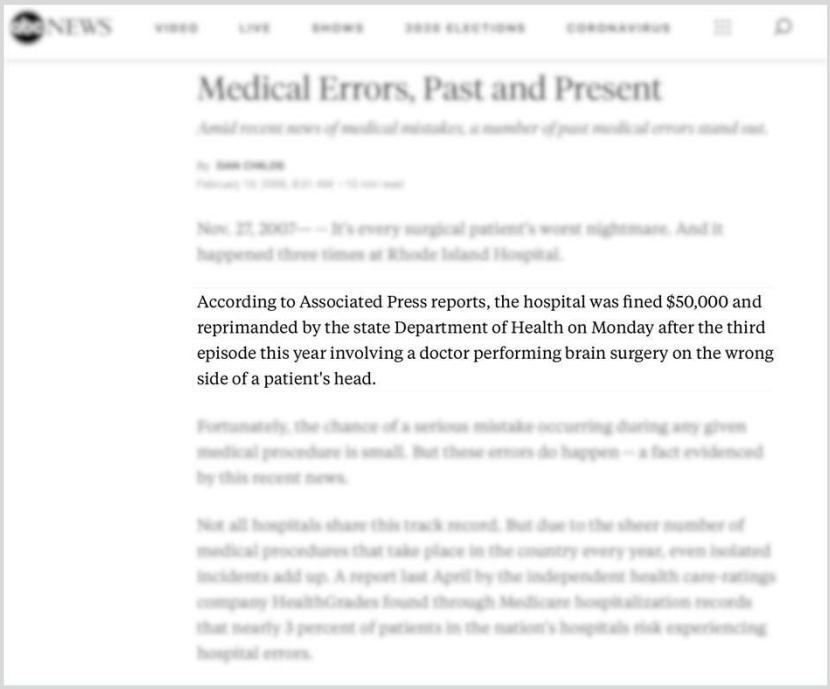

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Surgical Safety – instrument counts

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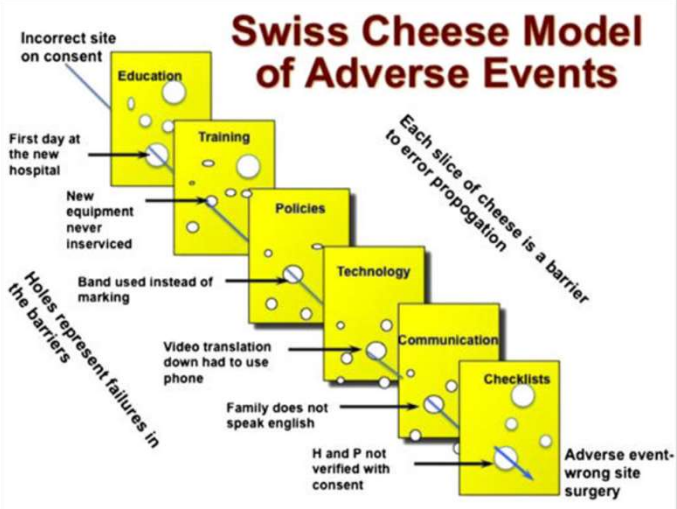
How Does a Mistake Happen?



Seshia SS, Bryan Young G, Makhinson M, Smith PA, Stobart K, Croskerry P. Gating the holes in the Swiss cheese (part I): Expanding professor Reason's model for patient safety. J Eval Clin Pract. 2017;1–11

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System Factors

- Workflow design – make all checklists easy to follow and accessible
- Staffing and training – everyone on the same page
- Every voice is important
- Technology usability – adequate training and supervision

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Every Voice is Important

- Adopt the model of communication used in Aviation
- Crew Resource Management
  - Every voice is heard
  - Any member of the team can stop the line at any time to address issues

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Safety Culture

- Non-punitive reporting systems and learning culture
  - The more reports you get the better
- Executive-level commitment and resources
- Transparency and patient engagement
- Report back as often as possible

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Measurement, reporting & learning systems

- Implement local incident reporting and RCA for serious events
- Use trigger tools and routinely measured safety indicators
- Benchmarking and external reporting (e.g., Joint Commission data)

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Quality improvement methods

- PDSA cycles, Lean, Six Sigma for process redesign
- Human factors engineering for workflow and device design
- Simulation for team training and crisis resource management

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Technology

- EHRs, Computer Provider Order Entry (CPOE), and Clinical Decision Making (CDM) reduce some errors but introduce new risks
- Alert fatigue, copy-paste errors, interoperability gaps
- User-centered design and rigorous testing required

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Case Example

- Scenario: look-alike drug confusion leading to wrong infusion
- Root cause analysis findings: labeling, storage, nurse workload
- Interventions implemented and outcome

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Implementing a safety program — roadmap

- Assemble multidisciplinary patient safety team
- Prioritize high-risk processes with data
- Pilot interventions, measure outcomes, scale successful changes
- Sustainability: embed into policy, training, hiring

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Barriers to implementation

- Resource constraints and competing priorities
- Resistance to change and blame culture
- Data limitations and measurement burden

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Engaging patients & families

- Encourage patients to ask questions and maintain medication lists
- Use teach-back, involve families in handoffs
- Transparent disclosure and apology practices

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Policy & regulatory levers

- National action plans (WHO Global Patient Safety Action Plan 2021–2030)
- Accreditation standards (Joint Commission) and reporting requirements
- Payment incentives and penalties tied to safety metrics

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Practical checklist: 10 actions to reduce errors (for teams)

1) Standardize high-risk processes
2) Implement medication reconciliation
3) Use checklists/time-outs
4) Improve handoffs (SBAR)
5) Invest in training & simulation
6) Use CPOE/BCMA where effective
7) Encourage reporting & RCA
8) Engage patients
9) Measure and publish safety data
10) Leadership commitment

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Measuring impact — sample metrics

- Rate of adverse drug events per 1,000 patient days
- Handoff-related incident counts
- Surgical site infection and wrong-site surgery rates
- Patient-reported safety incidents

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Takeaways & call to action

- Medical errors remain a major global patient safety challenge
- Focus on systems, not blame; start with high-impact interventions
- Measure, learn, and scale what works; involve leadership and patients

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