

## AI &amp; DIGITAL HEALTH LEADER

# AI & Medication Safety

A practical guide for nurse educators on AI-assisted medication management, error prevention, and the nurse's accountability at every step of the process.

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AI Safety Pause™

## WHY MEDICATION SAFETY IS AI'S HIGHEST-STAKES ARENA

*The scale of medication errors in the U.S. makes this a critical AI competency for every nurse*

Medication errors are among the most common and preventable causes of patient harm in healthcare. AI is now embedded across the entire medication management continuum — from prescribing and dispensing to administration and monitoring. Nurses interact with AI-assisted medication systems every shift, often without formal training on how those systems work or fail.

The promise of AI in medication safety is real: faster allergy checks, smarter dose calculations, earlier detection of adverse drug events. But so is the risk: alert fatigue, automation bias, algorithm errors, and the erosion of the manual verification habits that catch what technology misses.

This resource equips nurse educators to prepare students for the reality of AI-assisted medication management — with the clinical judgment, ethical reasoning, and accountability skills to use these tools safely.

**1.5M**

Preventable medication errors occur in the U.S. annually

*Institute of Medicine*

**7,000+**

Deaths per year attributed to medication errors

*IOM / FDA*

**52%**

Of medication errors occur at the ordering or administration stage — where AI is most active

*ISMP 2024*

## AI ACROSS THE MEDICATION MANAGEMENT CONTINUUM

*Where AI is currently deployed — and where nurse judgment is most critical*

### AI-Assisted Prescribing (CDSS)

Clinical Decision Support Systems alert prescribers to drug-drug interactions, allergy conflicts, dose range violations, and contraindications. Nurses must understand that CDSS alerts are only as reliable as the data they draw from — and that alert fatigue causes clinicians to override 49–96% of alerts, including clinically significant ones.

### Automated Dispensing Cabinets (ADCs) with AI

Smart ADCs use AI to track inventory, flag unusual withdrawal patterns, and support controlled substance management. When AI unlocks a cabinet or flags a discrepancy, the nurse remains accountable for verifying the right drug, dose, route, time, patient — and reason.

### Barcode Medication Administration (BCMA) & AI Integration

AI-enhanced BCMA systems detect scanning workarounds, flag timing deviations, and predict administration errors before they occur. However, nurses who rely on BCMA without independent verification create a single point of failure when the system is wrong.

### AI-Powered Adverse Drug Event (ADE) Detection

Natural language processing and predictive analytics mine EHR data to detect early signs of adverse drug reactions — abnormal labs, vital sign patterns, symptom documentation. Nurses must know how to act on these alerts without over-relying on them or dismissing them due to alert saturation.

### AI in Pharmacokinetic Monitoring

AI tools calculate individualized dosing recommendations for high-risk medications (vancomycin, aminoglycosides, warfarin) based on patient-specific data. These tools reduce dosing errors — but nurses must verify that the patient data inputs are correct and that the recommendation makes clinical sense for this patient.

## CRITICAL RISKS: WHERE AI INCREASES MEDICATION ERROR POTENTIAL

*What nurse educators must teach — not just what AI promises*

### ■ Alert Fatigue

When AI systems generate too many alerts — the majority of which are non-actionable — nurses learn to dismiss them reflexively. Research consistently shows that high alert override rates include clinically significant warnings. Teaching students to recognize and resist alert fatigue is a patient safety imperative.

### ■ Automation Bias

Nurses who trust AI systems more than their own clinical assessment are susceptible to automation bias — accepting an AI recommendation without independent verification. This is especially dangerous when the AI input data is incomplete, outdated, or wrong. The algorithm does not know what the nurse knows at the bedside.

### ■ Garbage In, Garbage Out

AI medication safety tools are only as accurate as the data they process. An allergy not documented, a weight not updated, a lab value not yet resulted — any of these data gaps can cause an AI system to generate a recommendation that is dangerously wrong for a specific patient.

### ■ Workarounds and Workflow Shortcuts

When AI systems slow down clinical workflow, nurses develop workarounds — scanning badges instead of barcodes, overriding prompts without reading them, using override reasons that don't match the clinical situation. These behaviors, often adaptive responses to poorly designed systems, create medication safety gaps that AI cannot detect.

### ■ Accountability Diffusion

When multiple AI systems are involved in the medication process, there is a documented risk that nurses feel less personally accountable — 'the system would have caught it.' Nurse educators must be explicit: no AI system transfers accountability away from the nurse who administers the medication.

### THE AI SAFETY PAUSE™ FOR MEDICATION ADMINISTRATION

Before acting on any AI-generated medication recommendation or alert:

- 1. Does this make clinical sense? — Does this dose, drug, route, and timing align with my clinical assessment of this patient right now? Does it match their current weight, renal function, allergies, and diagnosis?**
- 2. What might the AI be missing? — Is the patient data complete and current? Has anything changed since the last documentation that the algorithm doesn't know? Is this a high-alert medication requiring independent double-check?**
- 3. Who is accountable for this decision? — The nurse who administers the medication is accountable — regardless of what the AI recommended, what the CDSS approved, or what the ADC dispensed. Document your verification.**

The five rights of medication administration do not change because AI is involved. They become more important.

## THE NURSE'S AI MEDICATION VERIFICATION FRAMEWORK

*A structured approach to independent verification when AI is involved*

AI does not replace the nurse's independent medication verification process — it augments it. Use this five-step framework when working with AI-assisted medication systems.

- 1 Verify the Data Inputs**  
Before trusting any AI medication recommendation, confirm that the data it drew from is accurate and current: patient weight, allergies, renal/hepatic function, current medication list, and relevant labs. Garbage in, garbage out.
- 2 Apply Independent Clinical Reasoning**  
Before scanning, dispensing, or administering, independently calculate or verify the dose. Ask: does this make sense for this patient's size, diagnosis, and current clinical status? Do not rely on the AI as your only check.
- 3 Evaluate the Alert Before Overriding**  
When an AI generates a medication alert, read it fully before overriding. Identify whether it is a high-priority clinical warning or a low-level informational alert. Document your clinical rationale when overriding a significant alert.
- 4 Confirm the Five Rights — Always**  
Right patient, right drug, right dose, right route, right time. AI can support each of these checks but cannot replace them. Add: right reason and right documentation to the traditional five.
- 5 Document Your Reasoning**  
When you act on, modify, or override an AI medication recommendation, document your clinical reasoning. This protects the patient, establishes your accountability, and creates data that can improve the AI system over time.

## CLINICAL SCENARIOS FOR CLASSROOM USE

*Discussion cases grounded in real AI-assisted medication safety contexts*

### SCENARIO 1 | Alert Fatigue & Override

A medical-surgical nurse receives 47 medication alerts during a 12-hour shift. The 31st alert — flagging a potentially life-threatening drug-drug interaction between a newly ordered antibiotic and a patient's existing QT-prolonging medication — is overridden in 4 seconds with the default reason 'Clinically appropriate.' The patient develops a dangerous arrhythmia six hours later.

**Reflect:** How does this scenario illustrate the relationship between system design, alert fatigue, and individual nurse accountability?

**Consider:** What should the nurse have done differently, and what systemic changes should be advocated for at the institutional level?

**Discuss:** How does the AI Safety Pause™ apply at the moment of alert override?

### SCENARIO 2 | Automation Bias in High-Alert Medication

A nurse is preparing to administer IV insulin to a patient with type 2 diabetes. The AI-assisted CDSS has approved the order and the ADC has dispensed the correct vial. The nurse scans the barcode and receives a green confirmation. She does not independently verify the dose because 'the system already checked it.' The dose was calculated based on a weight entered at admission three weeks ago — the patient has lost 18 lbs since then.

**Reflect:** What is automation bias, and how does it manifest in this scenario?

**Consider:** What independent verification steps should the nurse have taken regardless of AI confirmation?

### SCENARIO 3 | AI Pharmacokinetic Recommendation & Clinical Context

A nephrology nurse receives an AI-generated vancomycin dosing recommendation for a 71-year-old patient with chronic kidney disease. The recommendation is based on the patient's most recent serum creatinine from 18 hours ago. Since that lab was drawn, the patient has received two doses of IV contrast for an urgent CT scan and has had significantly decreased urine output — both documented in the nursing notes but not yet reflected in any updated labs.

**Reflect:** What does 'what might the AI be missing?' mean in this specific clinical context?

**Consider:** What is the nurse's accountability before administering the AI-recommended vancomycin dose?

## FACULTY CHECKLIST: AI & MEDICATION SAFETY CURRICULUM COVERAGE

- Students can explain how CDSS, BCMA, and ADC systems use AI and where errors can occur
- Students understand alert fatigue and can identify strategies to resist reflexive overrides
- Students apply the AI Safety Pause™ to medication administration scenarios
- Students practice independent dose verification alongside — not instead of — AI confirmation
- Students understand automation bias and can identify examples from clinical practice
- Students know how to document clinical reasoning when overriding an AI medication alert
- Students can identify high-alert medications that require independent double-check regardless of AI
- Students understand that nurse accountability for medication safety is not reduced by AI involvement
- Simulation includes at least one scenario where AI provides an incorrect or incomplete recommendation
- Students know how to report AI-related medication near-misses through institutional safety channels

### REFLECTION FOR NURSE EDUCATORS

Where in your pharmacology or clinical courses do you explicitly address AI-assisted medication systems and their failure modes?

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Which of the five AI medication risks (alert fatigue, automation bias, data gaps, workarounds, accountability diffusion) is most prevalent in your clinical partners' environments?

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### KEY RESOURCES

AI Competency Domains for Nurses (Deane & Koyfman, 2026) • ISMP Medication Safety Alert • Institute for Safe Medication Practices • ANA Principles for Nursing & AI • The Joint Commission National Patient Safety Goals • AI Safety Pause™ Faculty Toolkit