The Change To Implement Technology In Promoting Safety Environment For The Patient

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Introduction

Health technology can improve patient safety when it is selected for a clearly defined problem, designed around clinical work, and introduced with adequate training and evaluation. (World Health Organization, 2017) Nurses once depended mainly on observation and manual documentation to detect deterioration, confirm medication orders, and communicate changes. Modern devices and information systems can provide more precise measurements, automate checks, and make current information available across departments. A pulse oximeter, for example, gives an objective estimate of oxygen saturation, while electronic medication administration records can connect orders, pharmacy verification, patient identification, and bedside documentation. Technology is not automatically safe, however. Poor configuration, alert fatigue, unreliable equipment, difficult interfaces, and weak implementation can create new errors. This essay proposes the implementation of an electronic medication administration record combined with barcode medication administration to reduce preventable medication errors and promote a safer patient environment.

The Patient-Safety Problem

Medication administration is a high-risk process because it involves multiple people, systems, decisions, and transitions. A prescriber selects a medicine and dose, a pharmacist verifies and supplies it, and a nurse confirms the patient, medication, dose, route, timing, indication, allergies, and relevant clinical information before administration. Errors can occur because of illegible handwriting, outdated paper charts, transcription mistakes, similar drug names, interruptions, poor communication, missing allergy information, or inaccurate patient identification.

An electronic medication administration record, commonly called an eMAR, replaces or supplements paper medication charts with a current digital record. Barcode medication administration adds a bedside check by scanning the patient’s identification band and the medication package. (Agency for Healthcare Research and Quality, 2019) The system compares the scan with the active electronic order and warns the nurse when key elements do not match. The goal is not to replace professional judgment but to provide an additional defense against predictable human error.

Scope and Objectives of the Change

The proposed change should begin in a defined clinical unit before wider implementation. A pilot allows the organization to identify workflow problems, technical failures, and training needs without exposing the entire hospital to an immature process. The main objective is to reduce wrong-patient, wrong-medication, wrong-dose, wrong-route, and wrong-time errors. Additional objectives include improving access to current orders, strengthening allergy checks, reducing transcription, supporting pharmacy-nursing communication, and producing reliable audit data.

Success should be defined through measurable outcomes. Examples include a reduction in preventable medication-administration incidents, a high percentage of medicines and patient bands scanned, fewer omitted doses, improved documentation timeliness, and acceptable user satisfaction. Measures must be balanced so that improvement in one area does not conceal harm in another. For example, scan compliance should not be increased by workflows that delay urgent medicine or encourage unsafe workarounds.

Stakeholder and Workflow Assessment

Planning should involve bedside nurses, pharmacists, physicians, information-technology staff, clinical informaticists, patient-safety specialists, biomedical engineers, educators, managers, and patient representatives where appropriate. Each group sees different risks. Nurses understand interruptions and bedside constraints; pharmacists understand packaging and verification; IT teams understand integration and reliability; safety staff understand incident patterns.

The team should map the current medication process from prescribing to monitoring. This includes how new orders are entered, how changes are communicated, where medicines are stored, how controlled drugs are handled, how patient identity is confirmed, and what happens during emergencies or downtime. Observing actual practice is more useful than relying only on written policy because staff often create informal workarounds to manage delays or poorly designed steps.

Choosing and Configuring the Technology

The eMAR should integrate with computerized provider order entry, pharmacy systems, allergy records, laboratory results, and the electronic health record. Integration reduces duplicate entry and ensures that nurses see verified, current instructions. Barcode scanners and mobile workstations must be reliable, easy to clean, and available in sufficient numbers. Patient wristbands and medication labels require readable barcodes.

Configuration decisions have clinical consequences. The system must distinguish between warnings that require immediate action and informational notices that can be reviewed later. Too many low-

value alerts can produce alert fatigue, leading users to dismiss important warnings. Medication schedules must account for clinically acceptable administration windows, while emergency and as-needed medicines need clear workflows. The design should also support patients who cannot wear a standard wristband and medicines that arrive without a scannable unit dose.

Resistance to Change

Resistance should not be treated as irrational opposition. Staff may worry that the new system will increase workload, slow urgent care, monitor them unfairly, or fail during critical situations. Experienced nurses may feel that scanning questions their competence. Others may have low confidence with digital systems or remember previous unsuccessful implementations. These concerns contain valuable information about risks that planners need to address.

Clear communication should explain the problem, evidence for the intervention, expected benefits, limitations, implementation schedule, and opportunities for staff influence. Leaders should avoid promising that the system will eliminate all errors. Honest discussion builds trust and encourages reporting when design problems emerge. Unit champions can demonstrate the system, gather feedback, and help colleagues during early use.

Training and Readiness

Training should be practical and role-specific. Nurses need hands-on practice with routine doses, late medications, refusals, damaged barcodes, emergency administration, dose changes, isolation rooms, and downtime. Pharmacists require training on barcode quality and order verification, while prescribers need to understand how order changes appear at the bedside. Competency should be demonstrated through realistic scenarios rather than attendance alone.

Training should occur in protected time, not be added casually to an already busy shift. At go-live, super-users and technical support should be available on all shifts. The organization should test network coverage, battery life, scanner performance, printers, interfaces, user accounts, and backup procedures before implementation. Readiness also includes confirming that policies reflect the new workflow.

Implementation Strategy

A phased rollout is safer than an immediate hospital-wide launch. The pilot unit should have stable leadership, engaged staff, and a workload representative of future units. During the first days, staffing may need temporary adjustment because learning slows work. Issues should be logged, prioritized, and resolved quickly. Serious safety concerns may require pausing a feature or changing the workflow.

Daily briefings during early implementation can identify recurring problems such as unreadable labels, duplicate alerts, weak wireless coverage, missing medications, or confusion over administration windows. Data should be interpreted with staff input. A sudden rise in reported incidents may reflect improved reporting rather than worsening safety, while high scan rates may conceal repeated overrides.

How the Change Promotes Patient Safety

The system supports safety by making the active medication order available at the point of care and by checking patient and product identity. (Institute for Safe Medication Practices, n.d.) It can alert the nurse when the scanned medication does not match the order, when an order is discontinued, or when a dose has already been documented. Electronic documentation improves visibility for other clinicians and reduces uncertainty about whether a medicine was given.

Integration can also support clinical decision-making. Allergy information, relevant laboratory results, and dose limits may be presented during review. The technology can identify overdue medications and help managers study patterns of delay or omission. These functions strengthen defenses, but the nurse remains responsible for assessing the patient and determining whether administration is clinically appropriate.

New Risks and Workarounds

Technology can introduce new hazards. Users may scan one patient’s wristband from a printed copy, scan several medicines away from the bedside, override warnings without review, or borrow another user’s login. Devices may fail, interfaces may delay order updates, and barcodes may be damaged. Automation bias may lead staff to trust the system even when clinical evidence suggests an error.

The response should not be punishment alone. Workarounds often indicate that the official process is difficult or incompatible with care. Investigators should ask why the behavior occurred and redesign contributing conditions. Intentional unsafe conduct still requires accountability, but a just culture distinguishes reckless action from mistakes and system-driven adaptation.

Downtime and Business Continuity

A hospital must be able to administer medicines safely when the network, server, electricity, scanner, or interface is unavailable. Downtime procedures should define how current orders are obtained, documented, verified, and reconciled when systems return. Printed reports must be secured and updated, and staff should know who can authorize emergency access.

Downtime drills are necessary because a written policy may fail under pressure. The organization

should test prolonged outages, cyber incidents, and partial failures in which some systems work while others do not. Recovery must include checking for duplicate or omitted documentation created during the transition.

Evaluation

Evaluation should compare a pre-implementation baseline with results during and after the pilot. Measures may include medication errors and near misses by type, harm level, scan compliance, overrides, omitted doses, administration timeliness, alert frequency, downtime, and technical incidents. Staff surveys and interviews can reveal usability problems not visible in numerical data.

Outcome interpretation requires caution. Voluntary incident reports underestimate total error and are influenced by safety culture. Direct observation, chart review, pharmacy data, and automated logs can provide additional evidence. The team should review disparities in system performance, such as whether certain units, shifts, patient populations, or medication types experience more failures.

Sustainability and Continuous Improvement

After implementation, the system requires governance. A multidisciplinary committee should review alerts, new medicines, software changes, user feedback, barcode performance, and safety events. New employees need training, and existing staff require refreshers when workflows change. Hardware replacement, cybersecurity updates, and vendor support must be planned financially.

Patient-safety improvement is continuous. Data should be used to redesign processes, not only to judge individual performance. When the organization shows that reports lead to visible improvements, staff are more likely to identify hazards early.

Conclusion

An eMAR and barcode medication-administration system can strengthen patient safety by connecting current orders, pharmacy verification, patient identification, bedside checks, and documentation. Its effectiveness depends on careful workflow analysis, stakeholder participation, realistic training, reliable infrastructure, management of alerts, and preparation for downtime. The system should support rather than replace clinical judgment. Evaluation must consider both reductions in medication errors and new risks such as workarounds, automation bias, and technical failure. When implemented through a phased, learning-oriented process, technology can become an important part of a safer medication system and a more reliable patient-care environment.

References

Agency for Healthcare Research and Quality. (2019). *Bar-coded medication administration*. Patient Safety Network. https://psnet.ahrq.gov/primer/bar-coded-medication-administration

Institute for Safe Medication Practices. (n.d.). *Medication safety tools and resources*. https://www.ismp.org

World Health Organization. (2017). *Medication without harm: Global patient safety challenge*. https://www.who.int/initiatives/medication-without-harm