

EVIDENCE FOR MEDICATION DELIVERY SYSTEMS

RELEVANT CADRE RESEARCH:

- Title:** **A MedModel decision-support study to assess the relative impact of nurse servers over central medication rooms on nursing efficiency**
- Period:** 2007
- Collaborator:** Georgia Institute of Technology, College of Architecture (PI)
- Location:** Houston Medical Center Neuro-Ortho unit, Warner Robbins, GA
- Findings:** For tasks related to medications alone, the nurse server alternative reduced walking by 576 feet during a typical 12-hour shift, thereby increasing time at bedside by 30 minutes.

RESEARCH ARTICLES

CADRE Publications

Book Section:

Pati, D., Harvey, T.E., and Barach, P. (2011). The Houston Medical Center Bed Tower: Quality and the Built Environment. Implementing Continuous Quality Improvement in Health Care: A Global Casebook. C. McLaughlin, J. K. Johnson and W. Sollecito, Jones & Bartlett Publishers.

Based on a simulation exercise, this study compared nurse efficiency for medical and surgery patients by studying the walking distances of nurses in a bed tower that was designed with centralized medication rooms and another bed tower with medications in nurse servers and smaller central medication rooms. The average predicted reduction in time spent on retrieving medication was 30 minutes per nurse. Where medication in nurse server was used, controlled drugs were stored in the small central medication rooms.

INDUSTRY PUBLICATIONS

CADRE Publications

Lima, C. and D. Pati (2008). "Time to Spare." Advance for Nurses Online.

As bed units grow in footprint - owing to a larger proportion of private rooms, larger rooms and larger unit size - distances traveled and time spent by nursing staff in clinical and nonclinical activities have similarly increased. What will it take to reduce nurses' walking distance by 576 feet during a typical shift, thereby increasing time at bedside by 30 minutes? The question may seem trivial. However, for caregivers on inpatient units and their managers, 500-plus fewer feet to walk and 30 more minutes with patients could mean a significant improvement in patient care.

RESEARCH ARTICLES

Non-CADRE Publications

At the Bedside:

Hogg, A., et al. (2012). "Do patient bedside medicine lockers result in a safer and faster medicine administration round?" European Journal of Hospital Pharmacy: Science and Practice.

Objective: To determine if the introduction of patient bedside medicine lockers leads to a safer and faster medicine administration round.

Methods: The undisguised observer technique was utilised to observe the medicine administration round on four wards, two medical wards in Antrim Area Hospital (AAH) and two surgical wards in Causeway Hospital (CH), both before and after the introduction of patient bedside medicine lockers. All non-intravenous medicine administrations during the morning medicines administration round were observed and timed before and after the introduction of the lockers. Medicine administration errors (MAEs), time taken and reasons for delays were recorded and analysed.

Results: The MAE rate and the time spent on the medicine administration round both decreased after the introduction of patient bedside medicine lockers. The MAE rate dropped from 8.3% to 1.3% ($p < 0.001$) in the AAH site and from 9.9% to 3.2% ($p = 0.029$) in the CH site; the time spent per patient on medicine administration decreased from 6.80 ± 5.44 min pre-intervention to 3.03 ± 1.87 min post-intervention and from 7.35 ± 6.24 min pre-intervention to 6.95 ± 5.39 min post-intervention in AAH ($p < 0.001$) and CH ($p > 0.05$), respectively.

Conclusions: The introduction of patient bedside medicine lockers resulted in safer and faster medicine administration rounds.

Tham, E., et al. (2011). "Sustaining and Spreading the Reduction of Adverse Drug Events in a Multicenter Collaborative." Pediatrics **128**(2): e438-e445.

OBJECTIVES: Adverse drug events (ADEs) occur more frequently in pediatric patients than adults. ADEs frequently cause serious harm to children and increase the cost of care. The purpose of this study was to decrease ADEs by targeting the entire medication-delivery system for all high-risk medications.

METHODS: Thirteen freestanding children's hospitals participated in this ADE collaborative. An advisory panel developed a change package of interventions that consisted of standardization of medication-ordering (eg, consensus-based protocols and order sets and high-alert medication protocols), reliable medication-dispensing processes (eg, automated dispensing cabinets and redesign of floor stock procedures), reliable medication-administration processes (eg, safe pump use and reducing interruptions), improvement of patient safety culture (eg, safety-culture changes and reduction of staff intimidation), and clinical decision support (eg, increase ADE detection and redesign care systems). ADE rates were compared from the 3-month baseline period to quarters of the 12-month intervention phase. ADE rates were categorized further as opioid related and other medication related.

RESULTS: From baseline to the final quarter, the collaborative resulted in a 42% decrease in total ADEs, a 51% decrease in opioid-related ADEs, and a 41% decrease in other medication ADEs.

CONCLUSION: A pediatric collaborative that targeted the medication-delivery system decreased the rate of ADEs at participating institutions.

Hull, T., et al. (2010). "Impact of Medication Storage Cabinets on Efficient Delivery of Medication and Employee Frustration." Journal of Nursing Care Quality **25**(4): 352-357

This prospective study examined the impact of medication cabinets installed outside patient rooms on nursing and pharmacy workflow. Storing medications and supplies outside patient rooms decreased nursing visits to the automated medication dispensing system, and nurses also reported fewer episodes waiting to access the system when it was busy. Benefits of this study include the ability to demonstrate the impact of medication cabinets on the medication storage and delivery process, prior to housewide implementation.

Controlled Drugs:

Dooley, M., et al. (2012). "Improving the efficiency, safety and security of controlled drugs inventory management with the Pyxis C11 Safe System." *European Journal of Hospital Pharmacy: Science and Practice* **19**(2): 148-149.

Background: Current manual inventory management systems for controlled drugs are time-consuming and error prone. The Pyxis C11Safe is a computerised controlled drugs system. Evaluation of this technology using a structured observational methodology to assess efficiency, safety and security is required to support adoption.

Purpose: To compare the efficiency, safety and security of the Pyxis C11Safe system with the current manual systems for controlled drugs using 'time and motion' observational methods.

Materials and methods: Pre and post-implementation methodology was adopted.► Stage 1: Map the process and quantify existing processes.► Stage 2: Develop 'best practice model' using Pyxis C11Safe; procedures are simulated, documented and implemented.► Stage 3: Conduct a time and motion study of existing and new processes to evaluate aspects of efficiency, safety and security using an independent observer.

Results: Controlled drugs inventory practices were process-mapped and standardised in an acute care government hospital. An independent observer then conducted a time and motion study of the manual system, over a one month period. The time taken to complete a range of transaction types (receipt, distribution, discharge dispensing, returns and destruction) were recorded for 680 transactions. A best practice model for Pyxis C11Safe was developed, simulated and refined. Pharmacy staff were trained and the Pyxis C11Safe procedures implemented with 350 transactions observed and timed. Statistically significant time saving (20%, $p=0.0001$) was identified in the processing of controlled drug prescriptions distributed to patient care areas (5 min 3 s with Pyxis C11Safe vs 7 min 11 s for existing processes). Non-significant time savings were demonstrated in other transaction types.

Conclusions: A structured observational methodology has facilitated the assessment, and demonstrated significant efficiencies, of the Pyxis C11Safe system compared to the current inventory management systems for controlled drugs.

Posey, M. L. (2004). *Drug Distribution: Options for Enhancing Efficiency.*

From tablet counters to robotic cassette fillers, automation is expanding in pharmacies across the country. Consider the impact the new technology is having on the long-term care world of punch cards and complex regimens.