

Automated Dispensing Cabinets: Enhancing Medication Management in Perioperative and Surgical Care Settings

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Hospitals who have adopted Automated Dispensing Cabinet (ADCs) technology have shown a reduction in medication errors ^(1,2,3,4), improved operational efficiency ^(2,5,6), and reduced costs ^(3,4,5,7,8). Accordingly, ADC's have become a standard practice in U.S. hospitals as demonstrated by a 2023 AJHP survey of 324 hospitals in which 86.1% indicated they are their primary method of maintenance dose distribution ⁽⁹⁾. However, adoption within surgical and perioperative settings where workflows are notably different (non-maintenance doses are administered) has not experienced the same degree of adoption despite having similar risks ^(10,11). Looking closer at the benefits of implementing ADC technology in surgical and perioperative settings, a literature review was recently published in the Journal of the American Pharmacist Association ⁽¹²⁾. It identified nine studies whose key findings include:

- **Improved Controlled Substance Inventory Management:** Six studies reported reductions in controlled-substance discrepancies ranging from 16% to 62.5%.
- **Reduction in Medication Errors:** Two studies showed a reduction in medication errors, with one study reporting a 23% decrease and another achieving up to 100% error reduction post-ADC implementation.
- **Improved User Experience:** Three studies indicated high satisfaction rates among healthcare providers ranging from 81% to 100%.

The same report also summarized the following safety and professional organization recommendations for the adoption of ADCs in Ambulatory Surgical Centers (ASCs) and perioperative settings:

- **American Society of Health-System Pharmacists (ASHP) Guidelines on Perioperative Pharmacy Services** recommends automated dispensing using electronic tracking over manual dispensing with paper records for controlled substance management and surveillance ⁽¹³⁾.
- **ASHP Guidelines on Preventing Diversion of Controlled Substances** identifies surgery and anesthesia care units as high-risk diversion areas and state that “automation and technology should be utilized in all high-risk areas to facilitate security controls” and that “ADC technology should be utilized in high-volume controlled substance areas, including (...) surgery locations” ⁽¹⁴⁾.
- **Institute for Safe Medication Practices (ISMP) Guidelines for Safe Medication Use in Perioperative and Procedural Settings** recommend that access to perioperative medications be restricted and controlled and to “prioritize the use of profiled ADCs in preoperative/preprocedural and post operative/postprocedural settings” ⁽¹⁰⁾.
- **The Joint Commission (TJC)** recommends using ADCs for storage of high-risk medications in ambulatory healthcare settings, including ASCs, to achieve safe medication practices ⁽¹⁵⁾.

In conclusion, healthcare facilities who are able to overcome implementation barriers (e.g., costs, operational considerations) and implement ADC technology in surgical and perioperative settings may be able to more effectively address key safety and operational components of managing medications (e.g., controlled-substance inventory management, medication errors, overall user experience) and comply with recommendations from industry leading safety and professional organizations (e.g., ASHP, ISMP, TJC).

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³ Risør BW, Lisby M, Sørensen J. An automated medication system reduces errors in the medication administration process: results from a Danish hospital study. Eur J Hosp Pharm. 2016;23(4):189e196.

⁴ Risør BW, Lisby M, Sørensen J. Complex automated medication systems reduce medication administration errors in a Danish acute medical unit. Int J Qual Health Care. 2018;30(6):457e465.

⁵ Chapuis C, Bedouch P, Detavernier M, et al. Automated drug dispensing systems in the intensive care unit: a financial analysis. Crit Care. 2015;19(1):318.

⁶ Cottney A. Improving the safety and efficiency of nurse medication rounds through the introduction of an automated dispensing cabinet. BMJ Qual Improv Rep. 2014;3(1):u204237.

⁷ Dib JG, Abdulmohsin SA, Farooki MU, Mohammed K, Iqbal M, Khan JA. Effects of an automated drug dispensing system on medication adverse event occurrences and cost containment at SAMSO. Hosp Pharm. 2006;41(12):1180e1185.

⁸ Temple J, Ludwig B. Implementation and evaluation of carousel dispensing technology in a university medical center pharmacy. Am J Health Syst Pharm. 2010;67(10):821e829.

⁹ Schneider PJ, Pedersen CA, Ganio MC, Scheckelhoff DJ. ASHP National Survey of Pharmacy Practice in Hospital Settings: Operations and Technology - 2023. Am J Health Syst Pharm. 2024 Aug 12;81(16):684-705. doi: 10.1093/ajhp/zxae118.

¹⁰ Institute for Safe Medication Practices. ISMP guidelines for safe medication use in perioperative and procedural settings. Institute for Safe Medication Practices. Available at: <https://www.ismp.org/resources/guidelines-safe-medication-use-perioperative-and-procedural-settings>; 2022. Accessed January 20, 2023.

¹¹ Nanji KC, Patel A, Shaikh S, Seger DL, Bates DW. Evaluation of Perioperative Medication Errors and Adverse Drug Events. *Anesthesiology*. 2016 Jan;124(1):25-34. doi: 10.1097/ALN.0000000000000904. PMID: 26501385; PMCID: PMC4681677.

¹² Borrelli EP, Telinoiu M, Nelkin H, Dumitru D, Lucaci JD. Appraising the clinical, operational, and economic impacts of automated medication dispensing cabinets in perioperative and surgical settings: A systematic literature review. *J Am Pharm Assoc* (2003). 2024 Sep-Oct;64(5):102143. doi: 10.1016/j.japh.2024.102143.

¹³ Bickham P, Golembiewski J, Meyer T, Murray CG, Wagner D. ASHP guidelines on perioperative pharmacy services. *Am J Health Syst Pharm*. 2019;76(12):903.

¹⁴ Clark J, Fera T, Fortier C, et al. ASHP guidelines on preventing diversion of controlled substances. *Am J Health Syst Pharm*. 2022;79(24):2279e2306.

¹⁵ Naddy, M. (2022). Medication Storage and Security Assessment is Key to Patient Medication Safety. *OR Today Magazine*. <https://doi.org/https://ortoday.com/medication-storage-and-security-assessment-is-key-to-patient-medication-safety/>. Accessed March 29, 2025.