

## 1. Introduction

Automated Dispensing Cabinets (ADCs) are secure, computerized medication storage units designed to streamline the management, dispensing, and tracking of pharmaceuticals within healthcare settings such as hospitals, clinics, and long-term care facilities. Integrated with hospital information systems, ADCs provide real-time access to patient medication profiles and inventory data, enabling efficient and safe medication administration.

These cabinets are typically located on hospital wards or in clinical units, allowing authorized staff—usually nurses or pharmacists—to retrieve medications near the point of care. Access is controlled through user authentication methods such as passwords, biometric scans, or ID cards, and all transactions are recorded to maintain accountability and traceability.

Key features include:

- Real-time inventory management with automatic updates.
- Controlled access to reduce diversion and ensure compliance with drug regulations
- Integration with electronic health records (EHRs) to ensure accurate and timely medication dispensing.
- Alerts and safeguards to prevent errors such as wrong dose or expired medications.
- By automating many aspects of medication distribution, ADCs help improve patient safety, reduce medication errors, optimize inventory use, and enhance workflow efficiency for healthcare providers.

## 2. Identified Benefits

### 1. Enhanced Patient Safety

ADCs play a pivotal role in minimising medication errors by automating dispensing processes and integrating safety checks.

- Reduction in Dispensing Errors: Studies have shown a significant decrease in dispensing errors post-ADC implementation.
- Controlled Access: ADCs require user authentication, ensuring that only authorized personnel can access medications, thereby reducing unauthorized usage.
- Real-time Alerts: The system provides alerts for potential issues such as incorrect dosages or expired medications, enhancing safety protocols.

### 2. Improved Workflow Efficiency

- By streamlining medication dispensing, ADCs significantly enhance the efficiency of healthcare workflows.
- Reduced Waiting Times: Implementation of ADCs has led to a substantial decrease in medication delivery times. A study noted a reduction from an average of 40 minutes to approximately 3 minutes for standing medications.

- Time Savings for Staff: Nurses and pharmacists experience time savings, allowing them to focus more on patient care. For example, nurses reported saving up to 32 minutes per 8-hour shift.
- Streamlined Communication: ADCs reduce the need for interdepartmental communication for medication requests, thereby minimising delays.

### 3. Enhanced Inventory Management

- ADCs offer real-time tracking and management of medication inventory, leading to better stock control and reduced waste.
- Real-time Inventory Tracking: Pharmacy staff can monitor stock levels in real-time, facilitating timely restocking and reducing the risk of stock outs.
- Expiration Management: The system alerts staff to upcoming medication expirations, ensuring timely usage and minimising waste.
- Data-Driven Decisions: Automated reports on medication usage assist in making informed procurement and stocking decisions.

### 4. Regulatory Compliance and Auditability

- ADCs facilitate compliance with healthcare regulations by maintaining detailed records and providing audit trails.
- Comprehensive Audit Trails: Every access and transaction is logged, providing a clear audit trail for regulatory reviews.
- Controlled Substance Management: ADCs enhance the management of controlled substances by restricting access and monitoring usage, *aiding in* ensuring a non-inferior level of compliance with legal requirements in comparison to paper record keeping.
- Integration with EHR Systems: Seamless integration with Electronic Health Records ensures accurate documentation and compliance with patient care standards.

### 5. Cost Efficiency

- By reducing medication errors and optimizing inventory, ADCs contribute to significant cost savings for healthcare facilities.
- Reduction in Medication Errors: Fewer errors lead to decreased costs associated with adverse drug events and related treatments.
- Optimized Staffing: Time savings allow for better allocation of staff resources, potentially reducing overtime and associated labour costs.

- Minimised Waste: Effective inventory management reduces medication waste due to expirations or overstocking.

## 6. Increased Staff Satisfaction

- The automation and efficiency brought by ADCs lead to higher job satisfaction among healthcare professionals.
- Reduced Workload: Automation of routine tasks allows staff to focus more on patient care, enhancing job satisfaction.
- Enhanced Safety: Knowing that the system reduces errors provides staff with greater confidence in their work.
- User-Friendly Interfaces: Modern ADCs are designed with intuitive interfaces, making them easy to use and reducing training time.

## References

### Benefits of Dispensary Automation

<b>Staff time</b>	
Literature reports a 20%-80% (or 0.4-4.0 full-time equivalent -FTE-) time reduction for labelling, dispensing and stocking activities	Carins, C. Hospital Prescriber Europe. Spring 2002 Garagiola E et al. Automated Drugs Dispensing Systems in Hospital Pharmacies and Wards: A Systematic Literature Review (LIUC) 2023 James KL. Int J Pharm Pract 2013; 21:92-104. Beard RJ. SpringerPlus. 2013; 2:295
<b>Inventory, resource consumption and space</b>	
Literature reports 2 weeks reduction in drug stock holding	Beard RJ. SpringerPlus. 2013;2:295 <i>(specifically looking at integrating electronic prescribing with BD Rowa)</i> Brinklow N.King's College Hospital NHS Trust Report. 2006
Literature reports a 40%-80% reduction of expired drugs	Fitzpatrick R. Pharm J 2005; 274:763-5 Garagiola E et al. Automated Drugs Dispensing Systems in Hospital Pharmacies and Wards: A Systematic Literature Review (LIUC) 2023
<b>Medication errors and safety</b>	

Literature reports up to a 100% reduction of dispensing errors	Perras C. CADTH Report, 2009 James KL. Int J Pharm Pract 2013; 21:92-104 Franklin BD. Int J Pharm Pract 2008; 16:47-53 Beard RJ. SpringerPlus. 2013; 2:295 Garagiola E et al. Automated Drugs Dispensing Systems in Hospital Pharmacies and Wards: A Systematic Literature Review (LIUC) 2023
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### Benefits of Automation in Ward or Department Settings

<b>Staff Time</b>	
Literature reports a 18%-94% (or 22-59 hours per month per ward) nurse time reduction for medication activities	<ul style="list-style-type: none"> <li>- Michelon, H. Hospital Pharmacy Europe 2011 (open access)</li> <li>- Portelli G. Hospital Pharmacy 1-8; 2018 (open access)</li> <li>- Systematic review into ADCs (<a href="https://pubmed.ncbi.nlm.nih.gov/32434785/">https://pubmed.ncbi.nlm.nih.gov/32434785/</a>)</li> <li>- Foglia E et al. Automated Drugs Dispensing Systems in Hospitals: a Health Technology Assessment (HTA) Study Across Six European Countries</li> </ul>
Literature reports a 11%-83% pharmacist time reduction for formulary activities	
Literature reports a 37%-90% pharmacist time reduction for urgent ad-hoc medicines requests	
<b>Inventory and resource consumption</b>	
Literature reports a 6%-56% (or £11,200-£36,800) reduction in drug inventory	
Literature reports a 14%-76% reduction of drug consumption	<ul style="list-style-type: none"> <li>- Bonnabry P. ejhpharm-2018-001733</li> <li>- Poveda Andrés JL. Farm Hosp. 2003 Jan-Feb;27(1):4-11.</li> <li>- Chapuis C. Critical Care. 2015;19(1):318</li> </ul>
Literature reports up to 100% reduction of expired drugs	
<b>Medication errors and safety</b>	

Staff Time	
Literature reports a 29%-83% reduction of dispensing errors	<ul style="list-style-type: none"> <li>- Cheung K-C, British J of Clinical Pharmacology. 2009;67(6):676-680</li> <li>- Francois O et al. Integrating automated dispensing cabinets into the medication dispensing process: feedback from the practice in European hospitals <a href="https://ejhp.bmj.com/content/early/2024/11/05/ejhp pharm-2024-004195.long">https://ejhp.bmj.com/content/early/2024/11/05/ejhp pharm-2024-004195.long</a> (This one particularly discusses interfacing CPOE systems)</li> <li>- Foglia E et al. Automated Drugs Dispensing Systems in Hospitals: a HTA Study Across Six European Countries</li> <li>- Cheung K-C, British J of Clinical Pharmacology. 2009;67(6):676-680 (for % prevented errors)</li> <li>- Garagiola E et al. Automated Drugs Dispensing Systems in Hospital Pharmacies and Wards: A Systematic Literature Review (LIUC) 2023</li> </ul>

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