

E-PRESCRIPTION TECHNOLOGIES AND AUTOMATED DISPENSING MODELS: GLOBAL ADVANCES AND NIGERIAN PERSPECTIVES

Pharm. Samira Abubakar Umar, FPCPharm, MAW, DCPHarm

BACKGROUND

E-prescription technologies and automated dispensing systems are transforming pharmacy practice globally by improving medication safety, operational efficiency, and patient-centred care. E-prescribing systems reduce errors associated with illegible handwriting, inappropriate dosing, and poor documentation, while integration with clinical decision support enhances rational drug use. Automated dispensing technologies—including robotic systems and automated dispensing cabinets—further improve accuracy, workflow efficiency, and inventory management.

Recent advancements in artificial intelligence, telepharmacy, and the Internet of Things (IoT) have accelerated the digital transformation of pharmacy services. In Nigeria, emerging policy frameworks led by the Pharmacy Council of Nigeria, including the Electronic Pharmacy Regulations (2026) and the National Electronic Pharmacy Policy (2025), have created an enabling environment for adoption. Early implementation of e-pharmacy platforms and digital inventory systems, particularly in urban settings, demonstrates growing acceptance despite infrastructural and cost challenges.

With global developments and situating Nigeria within this evolving landscape, this review highlights implications for community pharmacy practice and the need for strategic adaptation.

Keywords

E-prescription; Automated dispensing systems; Digital health; Telepharmacy; Medication safety; Nigeria

1. INTRODUCTION

The integration of digital technologies into healthcare has significantly transformed pharmacy practice. E-prescription systems and automated dispensing models are at the forefront of this transformation, addressing long-standing challenges such as medication errors, inefficient workflows, and poor documentation.

Globally, these technologies have become integral to healthcare systems. In Nigeria, their relevance is increasingly recognized as the healthcare system evolves toward digitalization, with regulatory support and emerging innovations in practice shaping their adoption.

2. E-Prescription Technologies

2.1 Concept and Components

E-prescription refers to the electronic generation and transmission of prescriptions using integrated digital systems. Core components include:

- Electronic Health Records (EHRs)
- Clinical decision support systems
- Secure transmission platforms
- Medication history databases

These components ensure accuracy, improve communication, and support continuity of care.

2.2 Benefits of E-Prescription

E-prescribing offers several advantages:

- Reduction in medication errors
- Improved prescription accuracy and legibility
- Enhanced documentation and audit trails
- Better communication between prescribers and pharmacists

In Nigeria, where handwritten prescriptions remain common, adoption of e-prescribing has the potential to significantly reduce dispensing errors and improve patient safety.

2.3 Recent Technological Advances

Recent innovations include:

- Artificial intelligence for clinical decision-making
- Cloud-based systems for remote access
- Blockchain for data security
- Telepharmacy integration

These technologies enable remote prescribing and support healthcare delivery in underserved areas—an important consideration for Nigeria's rural populations.

3. Automated Dispensing Models

3.1 Overview

Automated dispensing systems are designed to store, track, and dispense medications with minimal human intervention, improving accuracy and efficiency.

3.2 Types of Systems

- Automated dispensing cabinets (ADCs)
- Robotic dispensing systems
- Unit-dose packaging systems
- Hybrid centralized/decentralized models

3.3 Benefits

- Automated dispensing systems:
- Reduce dispensing errors
- Improve workflow efficiency
- Enhance inventory management
- Increase patient safety

While these systems are widely adopted globally, in Nigeria, they are still emerging, mainly in tertiary hospitals and large urban pharmacies.

3.4 Technological Innovations

Modern systems incorporate:

Robotics
Artificial intelligence
Internet of Things for real-time monitoring
Barcode and RFID technologies

These innovations improve traceability and operational efficiency.

4. Integration of E-Prescription and Automated Dispensing

The integration of e-prescription systems with automated dispensing technologies creates a seamless medication-use process. This integration:

- ✓ Reduces human error
- ✓ Improves workflow efficiency
- ✓ Enhances medication traceability
- ✓ Supports pharmacovigilance

In Nigeria, this integration is gradually emerging through e-pharmacy platforms and digital inventory systems.

5. Nigerian Context and Policy Environment

Nigeria is actively transitioning toward digital pharmacy practice through policy and regulatory reforms led by the Pharmacy Council of Nigeria.

The Electronic Pharmacy Regulations (2026) provide a structured framework for:

- ✓ Licensing and regulation of e-pharmacy platforms
- ✓ Electronic prescription management
- ✓ Data protection and patient safety
- ✓ Monitoring and compliance

Similarly, the National Electronic Pharmacy Policy (2025) aims to:

- Digitize pharmaceutical services
- Improve access to medicines
- Strengthen supply chain transparency
- Combat substandard and falsified medicines

Recent practical experiences in Nigeria include:

- Growth of e-pharmacy platforms offering online prescription services
- Adoption of digital inventory management systems
- Expansion of telepharmacy services

These developments are more prominent in urban areas, highlighting disparities in access between urban and rural settings.

6. Challenges and Opportunities in Nigeria

Challenges

- Limited digital infrastructure and internet connectivity
- Erratic power supply
- High cost of technology implementation
- Limited technical capacity and training

Opportunities

- Improved access to medicines in underserved areas
- Enhanced patient safety and medication monitoring
- New business models through digital pharmacy services
- Better data collection for public health planning.

7. Implications for Community Pharmacy Practice

The adoption of these technologies has important implications:

- Shift toward patient-centered pharmaceutical care
- Expansion of clinical roles for pharmacists
- Improved workflow and operational efficiency
- Integration into telemedicine and digital health services

Community pharmacists in Nigeria must adapt to these changes to remain relevant and competitive.

8. Future Directions

Future developments are expected to include:

- Increased use of artificial intelligence
- Expansion of telepharmacy services
- Improved interoperability of healthcare systems
- Wider adoption of automated dispensing technologies

With sustained policy support and investment, Nigeria can align with global best practices.

9. CONCLUSION

E-prescription technologies and automated dispensing models are redefining pharmacy practice globally. In Nigeria, recent policy reforms and emerging digital health initiatives demonstrate significant progress toward adoption.

Although challenges persist, strategic investment in infrastructure, capacity building, and regulatory enforcement will enable successful implementation. Embracing these innovations is essential for improving patient outcomes, enhancing medication safety, and advancing community pharmacy practice.

REFERENCES

1. Amirthalingam, P., et al. (2024). Patient satisfaction with automated drug dispensing systems. *Patient Preference and Adherence*.
2. Ogundipe, A., Sim, T. F., & Emmerton, L. (2024). Prescription for digital evolution in pharmacy. *Journal of Pharmacy Practice*.
3. Research and Markets. (2025). *Global pharmacy automation market report 2025–2030*.
4. Federal Ministry of Health Nigeria. (2026). *Digital health and e-pharmacy regulation framework*.
5. Pharmacy Council of Nigeria. (2026). *Electronic pharmacy regulations and guidelines*.
6. Pharmaceutical Society of Nigeria. (2026). *Electronic pharmacy regulation: Implications for practice*.
7. Vanguard News. (2025). *E-pharmacy and universal health coverage in Lagos*.

8. F. Osmani, M. Arab-Zozani, Z. Shahali, F. Lotfi, Evaluation of the effectiveness of electronic prescription in reducing medical and medical errors (systematic review study), *Annales Pharmaceutiques Françaises*, Volume 81, Issue 3, 2023, Pages 433-445, ISSN 0003-4509, <https://doi.org/10.1016/j.pharma.2022.12.002>.
(<https://www.sciencedirect.com/science/article/pii/S0003450922001602>)