



The future of pharmacy in South Africa: embracing the digital revolution

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South Africa's healthcare landscape is complex, marked by disparities in access, a high burden of disease, changing healthcare policies, and a growing and shifting demand for quality care. Against this backdrop is the proposed National Health Insurance (NHI), the rise of the Fifth Industrial Revolution (5IR), and the increasing role of artificial intelligence (AI) in healthcare and how pharmacy needs to play its part.

The pharmacy profession plays a crucial role, serving as an essential link between patients and healthcare services. It must embrace the transformative potential of digital technologies and IT infrastructure. This article examines the current state of pharmacy in South Africa, highlighting existing digital tools and outlining a vision for a technologically advanced future that enhances pharmacy practice and improves patient outcomes. To meet the current demand, substantial investment and recognition are necessary, especially for the introduction and rollout of technologies that will enhance efficiency.

Current State: A Mixed Bag of Progress and Gaps

Existing technologies include Pharmacy Management Systems (PMS) for dispensing, inventory management, and patient record keeping. The world is swiftly moving toward building infrastructure, knowledge, and practice systems driven by AI robotics and technologies that assist with online ordering, prescription refills, and patient convenience.

Here are four things that describe the current trends:

- AI-driven solutions, including automated dispensing, predictive stock management, and clinical decision support tools, are revolutionising medication management, improving efficiency, and reducing errors. However, the integration of clinical decision support systems, AI, and other advanced technologies into pharmacy practice is still in its infancy.
- Advanced technologies in patient care, including the integration of tele-pharmacy, wearable health devices, and personalised medicine, are expanding the pharmacist's role in chronic disease management, precision medicine, and remote patient care. In South Africa and many low- to middle-income countries, pharmacies still rely on manual processes, which takes time to handle, limiting efficiency and hindering data-driven decision-making. Another challenge is that the interoperability between different PMS systems is often lacking, making it difficult to share crucial patient information between healthcare providers and may impact patient safety.

- Access to digital tools and reliable internet connectivity remains a significant challenge, particularly in rural and underserved communities.
- Expansion of the role of pharmacists. Pharmacists worldwide are transitioning into clinical specialists in areas such as oncology, antimicrobial stewardship, and pharmacogenomics, ensuring optimal medication use and improving patient outcomes.

The vision for the future of pharmacy

Looking into the future, let us look into the pharmacy's role and considerations in NHI, strengthening hospital pharmacy, and digital transformation.

Pharmacy's role in NHI

Hospital pharmacists face unique challenges, including medicine shortages, underfunding, and heavy workloads. Addressing these issues requires:

- Increased investment in pharmaceutical supply chain optimisation to prevent stockouts.
- Strengthened digital health integration, including electronic prescribing and AI-driven inventory management.
- Expansion of clinical pharmacy services in public hospitals to reduce patient complications and hospital readmissions.

Strengthening Hospital Pharmacy

Pharmacists should present data-driven business cases showing how pharmacy innovations:

- Reduce medication errors, lowering legal and financial risks.
- Optimise medicine stock, minimising waste and improving cost-efficiency.
- Improve hospital accreditation and regulatory compliance, ensuring smooth operations.
- Decision makers should look at increasing funding for the provision of pharmaceutical care in terms of technologies, human resources, and infrastructure development.
- Secure funding for the implementation of new pharmacy reforms and procurement of new technologies.
- Pharmacists should take charge of developing and implementing data-driven business cases that positively impact both financial

(contingent liabilities and related financial risks) and clinical value through innovation.

Digital transformation: Imagine a digitally empowered pharmacy landscape

In the foreword of the National Digital Health Strategy for South Africa (2019-2024), Minister of Health, Dr Aaron Motsoaledi wrote "South Africa has fully embraced the potential of digital health technologies to improve the quality and coverage of healthcare, increase access to services and skills, and promote positive changes in health behaviours to prevent the onset of acute and chronic diseases. This, combined with emerging technological advances, sets the scene for digital health to have a larger contribution to our health and well-being more than ever before." This vision remains partially realised; it was loaded with five strategic principles of a person-centred focus, expanded access, innovation for sustainable impact, digital health workforce for economic development, and a whole-of-government approach. To fully realise the potential of pharmacy in South Africa, we need a comprehensive and ambitious vision for its digital future underpinned by patient-centred care and system efficiency and capacity building. Here, we present a 10-point digital pharmacy concept to realise this vision:

1. Universal Access to PMS and Interoperability

Every pharmacy, regardless of size or location, should have access to a good, reliable, and user-friendly PMS. These systems must be interoperable, allowing for the seamless exchange of patient information between pharmacies, hospitals, clinics, and other healthcare providers.

2. Integration of Clinical Decision Support Systems (CDSS)

PMS systems should be integrated with CDSS to provide pharmacists with real-time alerts and recommendations regarding drug interactions, contraindications, and appropriate dosages. It will also help identify patients at high risk for specific conditions, such as diabetes or cardiovascular disease, and prompt them to provide targeted and personalised interventions. CDSS can significantly enhance the accuracy and safety of medication dispensing and improve patient outcomes.

3. Expansion of Tele-pharmacy Services

Tele-pharmacy, the delivery of pharmaceutical care through telecommunications technologies, has immense potential to improve access to medication and pharmaceutical services, particularly in remote and underserved areas. Through video consultations, pharmacists can provide medication counselling, monitor adherence, manage chronic conditions remotely, and specialise in medication therapy management.

4. Leveraging AI and Machine Learning

AI and machine learning can revolutionise pharmacy practice in several ways. AI-powered systems can analyse vast amounts of patient data to identify patterns and predict individual responses to medications. This can enable personalised medication therapy and improve treatment outcomes. AI can also be used to automate repetitive tasks, such as

prescription verification and dispensing, freeing up pharmacists' time to focus on direct patient care. Furthermore, AI-powered chatbots can give patients 24/7 access to information about their medications and answer common medicine-related questions.

5. Development of a National Drug Database

A comprehensive national drug database linked to health information exchange (HIE) technologies is essential for ensuring medication safety and preventing drug abuse. Pharmacists can use this database to verify prescriptions, identify potential drug interactions, and track medication use patterns. The database can also be used to monitor drug shortages and identify counterfeit medications.

6. Enhanced Cybersecurity Measures

As pharmacy systems become increasingly digital, robust cybersecurity measures are essential to protect patient data and prevent cyberattacks. Pharmacies must implement strong passwords, encryption, and other security protocols to safeguard sensitive information. Regular security audits and staff training are also crucial to ensure ongoing protection against evolving cyber threats.

7. Investing in Digital Literacy and Training

The successful implementation of digital technologies in pharmacy requires a skilled workforce. Pharmacy personnel need to be trained on how to use new systems and technologies effectively. Digital literacy training should be incorporated into pharmacy education curricula either as a module with generic learning outcomes or as an elective micro-certification module, postgraduate programs, and continuing professional development programs. Furthermore, ongoing support and training should be provided to pharmacy staff to ensure they can keep up with the latest advancements in digital health.

8. Addressing the Digital Divide

Bridging the digital divide is critical to ensuring that all South Africans can benefit from the digital transformation of pharmacy. Government and private sector partnerships are needed to expand access to affordable internet connectivity, particularly in rural and underserved communities. Furthermore, initiatives should be implemented to provide digital literacy training to patients, empowering them to engage with digital health solutions.

9. Regulatory Framework and Data Governance

A clear and supportive regulatory framework is essential to guide the implementation of digital technologies in pharmacy. Regulations should address issues such as data privacy, ethical use, security, and interoperability.

10. Collaboration and Innovation

The digital transformation of pharmacy requires collaboration between various stakeholders, including pharmacists, healthcare providers, technology developers, policymakers, and patients. Open communication and collaboration are essential to identify challenges, develop solutions, and ensure that digital technologies are implemented in a way that meets the needs of all stakeholders.

Conclusion

Fostering a culture of innovation within the pharmacy profession is crucial to driving the development and adoption of new digital health solutions. The future of pharmacy is not just about dispensing medicine—it is about leadership, innovation, and transforming healthcare. Whether in the public or private sector, pharmacists must take the lead in driving innovation, securing investment, and positioning pharmacy as a key component of healthcare delivery. By investing in robust IT infrastructure, promoting interoperability,

integrating advanced technologies, and addressing the digital divide, we can create a digitally empowered pharmacy landscape that enhances patient care and service delivery efficiency. This transformation requires a concerted effort from all stakeholders, guided by a clear vision and a commitment to innovation.

Call to Action

We should create a focused expert Technology Advisory Group to exchange views on current activities, problem areas, best practices, and more in technology.