



DELOITTE MEDICATION MANAGEMENT WEBINAR REPORT

Exploring the Future of Medication Management through Automation and Digitalisation

28 August 2025

Igniting the Conversation: Reimagining Medication Management for a New Era

On 28 August 2025, Deloitte, in partnership with Becton Dickinson, convened a landmark webinar to explore the future of medication management in South Africa. The event, moderated by Wesley Solomon, Director at Deloitte and Life Sciences & Healthcare Industry Leader for Africa, brought together a distinguished panel: Daniele Bellavia, Annelize Wessels, Dr Louis van den Hoven, and Bulelani Kuwane. The session was designed to foster a community of practice, drawing on global trends, local realities, and practical experience to advocate for patient-centered innovation in medication management.



Wesley Solomon

Deloitte Life Science and
Healthcare Industry Lead,
Africa



Daniele Bellavia

Research Fellow and Core
Faculty Lecturer at LIUC,
Carlo Cattaneo University



Annelize Wessels

Clinical Information
Specialist, Deloitte



Dr Louis van den Hoven

Healthcare Consultant &
Medical and Hospital SME



Bulelani Kuwane

Director of Health Systems
Strengthening, Health
Systems Trust

Wesley Solomon opened the session by reflecting on the purpose-driven nature of healthcare careers, noting that each practitioner's mission is to raise the bar on quality and dignity for patients. He emphasised that medication management is a key lever for improving health outcomes, and that better management enables broader service delivery and faster recovery.

Wesley introduced the SRT framework which stands for standards, regulations, and tools, as the three contextual levers that influence the success of digital innovation in healthcare. He explained that global standards such as the WHO Global Patient Safety Action Plan and the Global Strategy for Digital Health drive innovation while ensuring safety. Wesley noted that regulations adapt global standards to local needs, with key bodies in South Africa including the National Department of Health, Office of Health Standards Compliance, SAHPRA, South African Pharmacy Council, Affordable Medicines Directorate and provincial pharmaceutical and therapeutic committees. These organisations collectively oversee governance, compliance, medicine safety, pharmacy practice, access to essential medicines and digital transformation. Wesley pointed out that digital tools promise greater efficiency but require readiness in data quality, privacy, infrastructure, workforce and funding.

Wesley also outlined the South African context, marked by a dual public-private system, regulatory frameworks, and the need for readiness in automation, including data quality, privacy, infrastructure, human resources, and financial constraints.

He recalled how, during the COVID-19 pandemic, South Africa's public and private sectors worked together, using shared standards and flexible regulations to rapidly transform the health system. This collaboration showed what is possible when the right context and tools are in place.

His core message was simple: digital innovation in healthcare succeeds when standards, regulations, and tools work together. With the right alignment, South Africa can create a resilient and patient-focused health system.

“The success of digital innovation in healthcare depends on three contextual levers—standards, regulations, and tools—each working together to ensure that technology not only drives progress but also safeguards patient safety and system integrity.”

— Wesley Solomon

Global Evidence, Local Relevance: The Economic Case for Automation

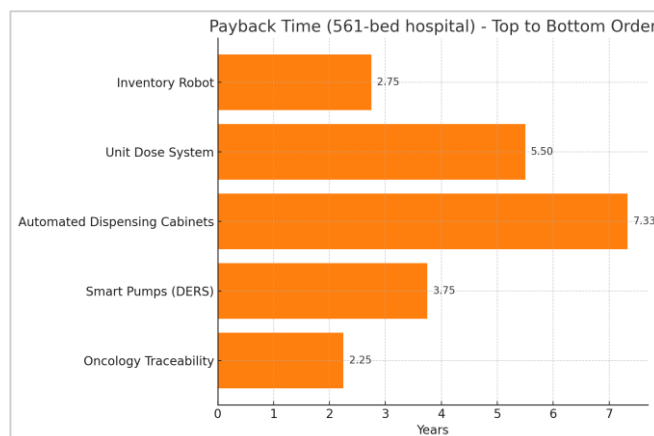
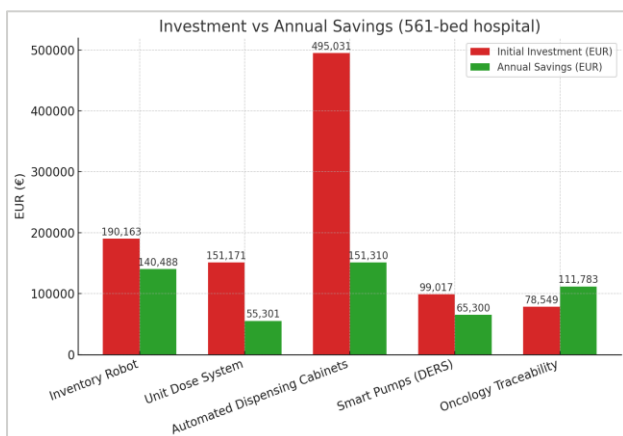
Automation in hospital medication management, when supported by robust economic evidence, significantly reduces errors and costs, delivering a strong return on investment even in resource-constrained settings

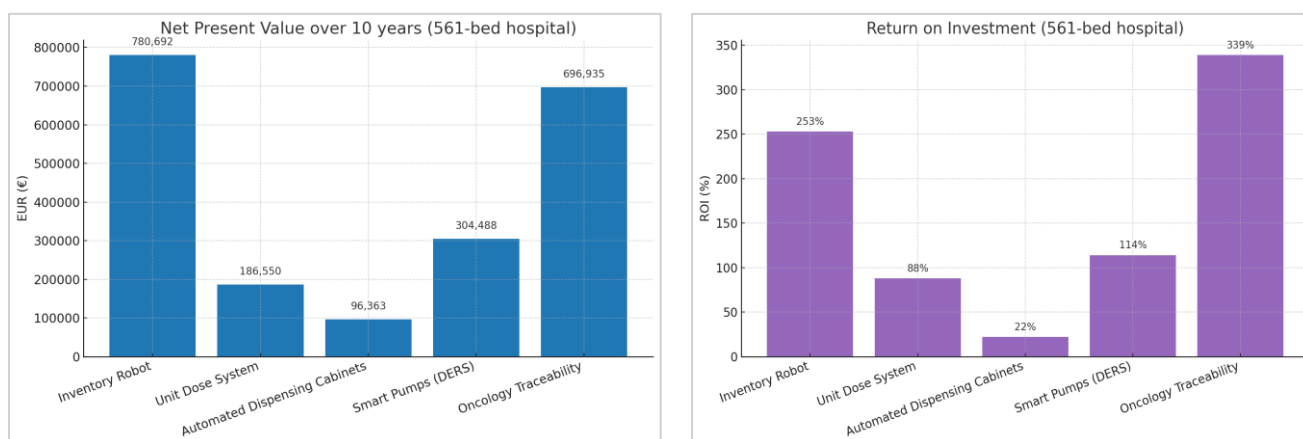
Daniele Bellavia, a research fellow from Università Cattolica del Sacro Cuore in Italy, presented findings from a recent European study on the economic and organisational impact of automation in hospital medication management. He began by contextualising the problem: in European hospitals, up to 0.1% of all medication doses are affected by medication errors. While this may seem small, it translates to nearly 1,000 errors per year in a medium-sized hospital, with potentially serious clinical and economic consequences. Daniele cited *“Literature says that the implementation of automation technologies can reduce such errors by fifty up to one hundred percent, depending on the solution and the context of application.”* Despite these benefits, adoption in Europe is constrained by high investment costs, IT integration challenges and a lack of large-scale economic evidence to support return on investment. He noted that new EU regulations, effective from January 2025, now require robust economic data to justify health technology investments.

Daniele and his team sought to fill these gaps by evaluating five key automation technologies: inventory robots (for automating storage and retrieval in central pharmacies), unit dose systems (for preparing patient-specific doses), automated dispensing cabinets (for secure access to drugs in wards), smart infusion pumps (with dose error reduction systems), and oncology traceability platforms (for tracking chemotherapy from prescription to administration).

The analysis was based on a standardised model of a 561-bed hospital, representative of the European average, with data from 27 European countries and the United Kingdom. For each technology, the study estimated initial investment, operational savings, and four main cost drivers: reduction in staff hours for manual logistics, reduction in wastage from expired drugs, reduction in inventory levels (freeing up capital), and reduction in medication errors (and their associated adverse events and costs).

Daniele explained that the study calculated three financial indices: net present value, return on investment, and payback time, over a 10-year horizon, with sensitivity analysis for hospital size and discount rates, using country-specific data for labour costs, drug prices, and hospitalisation rates. The results showed that *“Each technology requires important initial investment, but they also generate constant annual savings. The key point is that these recurring savings allow hospitals to recover the initial cost relatively quickly.”* The average payback time across all technologies was about 4.5 years, which is consistent with what is reported in literature in other similar studies. The strongest returns were from inventory robots (due to their impact on high-volume medicines) and oncology traceability systems (due to the excessive cost and risk of oncology drugs). Automated dispensing cabinets required the highest investment but still delivered a positive return.



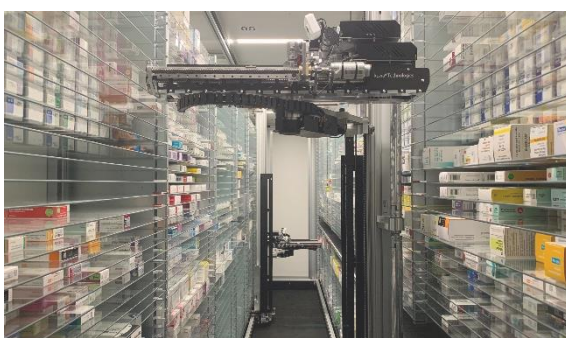


Daniele acknowledged limitations, such as the use of average hospital sizes and country-level data, but sensitivity analyses confirmed the robustness of the findings.

This study provides structured evidence to guide investment decisions, ensuring that limited resources are directed toward technologies that are both clinically effective and economically sustainable.

Wesley Solomon responded by noting that South African error rates are higher than those in Europe, suggesting that the value and payback of automation could be even greater locally. He also appreciated the study's sensitivity analysis, which accounted for differences in hospital size and economic context, noting that such real-world evidence is essential for guiding investment decisions and ensuring that limited resources are directed towards technologies that are both clinically effective and economically sustainable.

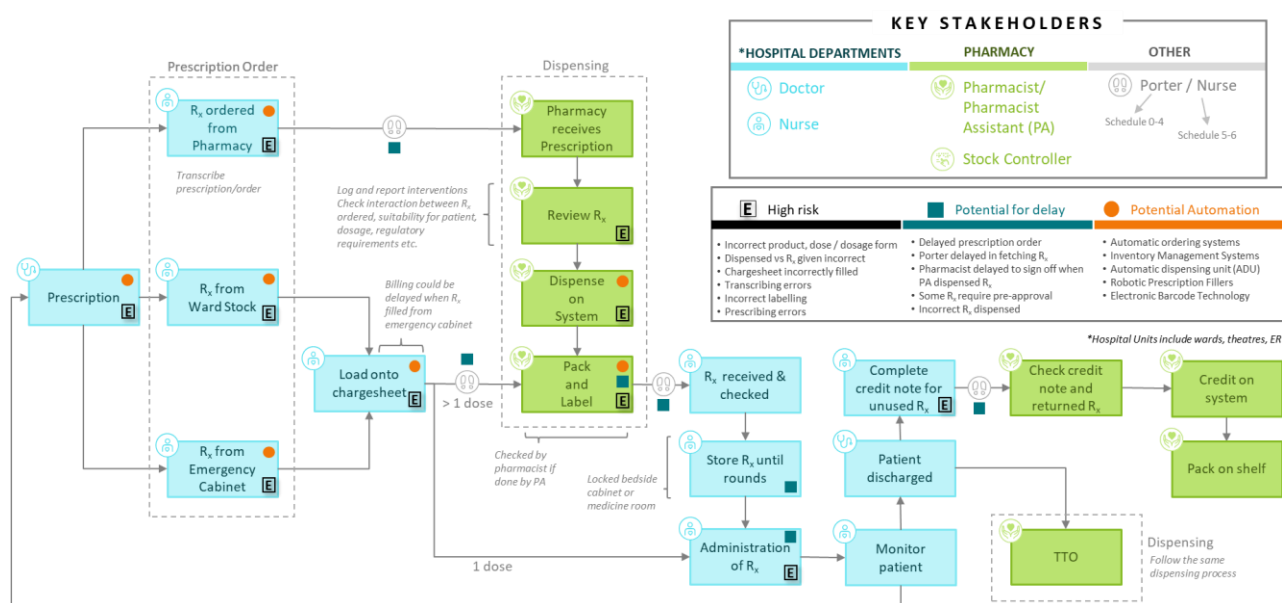
“Automation in hospital medication management is both clinically valuable and financially sustainable in the long term. The investments have a quick payback time, with an average of less than 5 years, and the model can be adapted to different contexts by adjusting local parameters.”



Inside South African Hospitals: Complexity, Challenge, And Opportunity

South African hospitals face persistent inefficiencies and risks due to fragmented, manual medication processes, and that integrated digital solutions, if planned and implemented holistically, transform safety, efficiency, and staff empowerment

Annelize Wessels, Clinical Information Lead at Deloitte, provided a detailed exploration of medication management in South African hospitals, drawing on desk research, stakeholder interviews, and direct process observations in both public and private settings. She and her team mapped the entire medication value chain, highlighting the complexity of the process and the numerous touchpoints involved. Medication is issued from pharmacies, wards, and emergency cupboards, with a combination of manual and electronic billing and stock capturing. The process encompasses multiple steps, including picking, packing, labelling, administering, monitoring, and managing take-home medication, and involves a wide range of stakeholders such as pharmacy managers, nursing unit managers, pharmacists, assistants, clinical pharmacists, and stock controllers.



Throughout the research, three main lenses were applied: efficiency, quality, and risk, with a particular focus on the role of technology and automation. Annelize identified three main areas where technology could have a tangible impact: prescribing and transcribing, dispensing, and ward stock management.

Prescribing and Transcribing:

Both public and private hospitals still rely heavily on handwritten prescriptions, leading to frequent transcription errors, incomplete information, and constant queries for clarification. These issues increase patient safety risks and create significant administrative burdens for staff. While some electronic prescribing systems exist, they are often poorly integrated, resulting in persistent inefficiencies and limited effectiveness. The outcome is constant interruptions for clinicians, excessive administration for pharmacy staff, and potential delays for patients.

“There is a clear need for fully integrated electronic systems to improve prescription accuracy, reduce manual clarification, and allow healthcare professionals to focus more on patient care.”

Dispensing:

Dispensing processes are also largely manual, with frequent delays and bottlenecks during peak hours. Physical space constraints and manual picking and labelling increase the risk of errors. Staffing limitations, especially

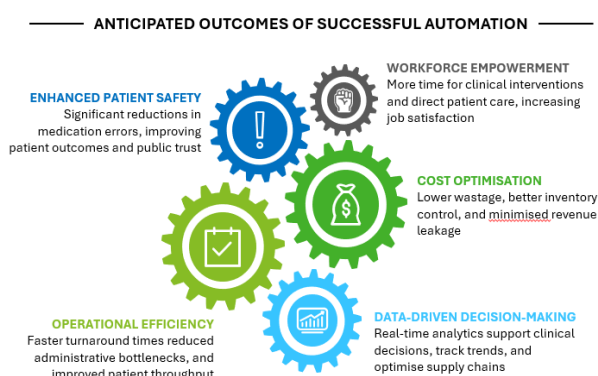
during busy discharge periods, compound the issue. Not all pharmacies have dedicated retail and in-hospital teams, and pharmacists often multitask between stock management and dispensing, leading to interruptions and delays. While some larger facilities have adopted barcode scanning and electronic prescription submissions, digital tools are not fully integrated with prescribing, billing, or inventory systems, so manual workarounds persist. There's a clear need for wider adoption of integrated solutions to improve safety and efficiency in dispensing.

Ward Stock Management:

Ward stock management is another labour-intensive area, especially in specialised units like ICUs, where stock values can reach R300,000. Managing this inventory is time-consuming and increases the risk of stock losses and discrepancies. Although e-billing and barcode scanning have been implemented in some areas, manual backup processes such as paper-based checking and manual labelling are still common, especially during system downtime.

“Moving towards a more controlled and integrated system for ward stock management not only enhances governance and accountability but also eliminates the need for paper-based checking systems.”

Annelize emphasised that automation has the potential to fundamentally transform hospital operations. Technologies such as automated dispensing cabinets, integrated dispensing systems, electronic prescribing, smart infusion pumps, and advanced data analytics all contribute to reducing errors, streamlining workflows, and enabling more informed clinical and operational decisions.



She identified several key benefits of automation include enhanced patient safety through a reduction in medication errors, improved operational efficiency with faster turnaround times and fewer administrative bottlenecks, and greater workforce empowerment by freeing staff from repetitive tasks so they can focus on direct patient care. Cost optimisation is achieved through better inventory control, reduced wastage, and minimised revenue leakage, while data-driven decision making is enabled by real-time analytics that support clinical decisions, track trends, and optimise supply chains.

Annelize stressed that successful automation relies on several critical enablers: supportive national health policies and updated regulations, robust digital infrastructure and integrated health records, and innovative funding models such as leasing, payment plans, or public-private partnerships to address upfront costs. Continuous tracking of outcomes, error rates, and productivity is essential for ongoing improvement and demonstrating value. She also underscored the importance of ongoing training and support to ensure staff can use new systems effectively, and the need for active engagement of all stakeholders—from pharmacy staff and clinicians to leadership and administration—throughout planning, implementation, and ongoing operations to ensure lasting impact.

“Automation in medication management is not just about implementing new technology in the hospital. It’s about building the right environment, investing in people and systems, and working together to create a safer, more efficient, and more sustainable hospital environment.”

Wesley Solomon stressed the need to plan integration from the start and involve people throughout. He noted that improvements in one area can benefit the whole health system and warned against over-engineering. He also highlighted the importance of stakeholder alignment, continuous learning, and the role of AI and data in hospitals’ digital transformation.

From Science Fiction to South African Wards: The Reality of Digital Transformation

While cutting-edge technologies like AI and robotics are already reshaping hospital care, true transformation depends on user-friendly systems, seamless integration, and innovative funding models that align clinical and operational realities

Dr Louis van den Hoven, healthcare consultant and medical expert, painted a compelling picture of digital transformation in South African hospitals, moving from science fiction to reality. He invited the audience to imagine walking into a hospital in 2030—not a sterile institution, but a vibrant ecosystem where technology anticipates needs like a vigilant guardian. This future is already emerging, with AI, robotics, and data-driven systems revolutionising care delivery.

Dr Louis described how AI is now acting as a virtual assistant, automating diagnostics and generating instant reports on chest X-rays, identifying pneumonia, grading risk, and even interpreting changes faster than any human. In ICUs, AI scribes handle notes, medicine reconciliations, and billing, freeing doctors to focus on patient care. Wearables and remote monitoring are expanding rapidly, with smart devices predicting disease outbreaks and models being tested in Netcare hospitals to detect sepsis up to 12 hours before onset, enabling life-saving early intervention. Telehealth is evolving into hospital-at-home models, where sensors and virtual wards deliver proactive care directly to patients' homes.

Dr Louis also described the use of robotics, such as AI-powered nurse bots that patrol corridors and reduce workloads by 30%, delivering medication via ceiling tracks, and even coaching ultrasound probes. He cited the example of this type of robot used during COVID-19 in a neonatal ICU in Blouberg Hospital. The Da Vinci robot, which has been used in South Africa for a decade, has transformed prostate cancer surgery by reducing hospital stays, minimising the need for blood transfusions, and improving outcomes. Dr Louis also described the promise of digital twins, where patient data is used to simulate and optimise treatment, and smart hospitals with CPUs in every room, connecting teams, monitoring safety, and amplifying clinical expertise.



However, Dr Louis cautioned that transformation is not a smooth ride. In the private sector, doctors are not hospital employees, so adoption of new systems is voluntary and sometimes difficult. Usability is critical: systems must be intuitive and not add to clinicians' administrative burden. He noted that doctors are often resistant to administrative tasks and may avoid systems that are too complex or time-consuming and systems must accommodate telephonic prescriptions and standing orders, which are far more common than many realise.

"It's very difficult to regain lost credibility, so you need to get this right up front," Louise advised.

Integration with billing and clinical systems is essential particularly with platforms like SAP, which are widely used in South African hospitals, as is careful attention to data privacy and cybersecurity. Failure to do so results in manual processes persisting alongside digital ones, undermining the benefits of automation. He also highlighted the complexity of data privacy and cybersecurity, noting that even seemingly simple elements like digital signatures can be challenging and require specialist expertise.

Legacy systems can clash with new technology, and extensive change management and infrastructure upgrades are required. Dr Louis recommended appointing mediators and assistants to support users during the transition and stressed the importance of minimising downtime to maintain trust. He observed that clinical teams are outcome-focused, not process-driven, and technology must serve their needs to avoid resistance and workarounds. He cited a UK example where a cumbersome automated drip system led staff to bypass the

technology, demonstrating that process-driven solutions must not impede patient care. If systems are not designed with clinical realities in mind, staff will find workarounds, undermining the intended benefits of automation.

Despite these challenges, Dr Louis was optimistic about the opportunities digital transformation brings. Automation and digitalisation enable better drug surveillance, antibiotic stewardship, and holistic patient management. For example, electronic systems can provide real-time updates, facilitate immediate medical scheme approvals, and generate comprehensive medication profiles for each patient, supporting advanced analytics and improved outcomes. He noted that *“Netcare reports generating between thirty and forty gigabytes of data every day. With that amount of data, even little trends, little blips, subliminal signals can be identified, and you can literally analyse anything as far as your imagination can spread.”*

Dr Louis also addressed the challenge of funding digital transformation. He discussed innovative models such as pay-per-use, modular rollouts, public-private partnerships, and co-ownership with clinicians. He pointed to international examples, such as the Karnataka hub in India, where blended resources and public-private hybrids have driven innovation. He also noted the rise of participatory health, where patients use apps to manage their health and even influence their care through data-driven incentives.

In closing, Dr Louis urged the sector to see technology not as an invader, but as an enabler of faster, smarter, and fairer healthcare. He encouraged creative approaches to funding and implementation and stressed that the ultimate goal is to turn challenges into scalable, patient-centred triumphs and make the vision of digital hospitals a reality in South Africa.

“Technology isn’t invading hospitals like a Terminator. It’s empowering them to heal faster, smarter, and fairer. We need to build a future where healthcare is as intuitive as breathing.”

Wesley noted that health technology assessments are starting to include information systems, not just medicines and diagnostics. He emphasised that technology must meet the needs of clinicians and staff to avoid resistance to change. He emphasised the importance of keeping this focus when developing use cases.



Bridging the Divide: Policy, Partnerships, and Public Sector Progress

Despite strong digital health policies, South Africa's public sector must overcome implementation barriers by prioritising collaboration, infrastructure investment, and equitable access to digital medication management

Bulelani Kuwane, Director of the Health Systems Trust, offered a frank and insightful perspective on the progress and challenges of digital transformation in South Africa's public health sector. He acknowledged that while South Africa has developed strong policies and strategies, many of which align with international standards such as those recommended by the WHO, implementation remains the country's greatest hurdle. *"We are not short of policies or even strategies... our biggest challenge is always implementation. We always fall short of implementation."*



Bulelani highlighted the fragmented nature of the healthcare system, with significant disparities between public and private sectors and across urban, peri urban, and rural areas. *"Our healthcare system is fragmented... we do not have enough resources to serve all the people who need care in the public sector, so you always have to prioritise these resources, and things like digitisation and automation often take a back seat."* Bulelani noted that the Department of Health's digital health strategy, which was due for renewal in 2024, prioritised digitisation of business processes, including medication

access, and the establishment of a complete electronic health record. However, he observed that many of these goals have not yet been achieved.

Bulelani highlighted the importance of context, noting that South Africa's society is highly unequal, with varying levels of infrastructure and connectivity. Even when digital systems are developed, rolling them out equitably across rural and urban areas remains a challenge. He pointed out that resistance to change is a real barrier, some healthcare professionals prefer manual systems such as handwritten scripts. He also mentioned that infrastructure challenges can hinder the rollout of digital solutions.

Despite these obstacles, Bulelani was optimistic about the opportunities for progress. He pointed to existing digital systems and stressed the importance of making sure they are fully integrated. For example, he highlighted the rollout of the Sync system, which supports the central chronic medication distribution and dispensing programme, allowing patients to access chronic medication outside of congested facilities. This system, initially developed for HIV and TB programmes, now includes medication for other chronic diseases and demonstrates the potential for digital solutions to improve access and efficiency. Bulelani also referenced the rollout of automated dispensing cabinets in KwaZulu Natal and other provinces, supported by partners like HST. He emphasised the importance of integrating these systems, scaling them up, and ensuring they are accessible throughout the country.



Bulelani advocated for cross-sector collaboration, leveraging private sector innovations, and mobilising resources through partnerships. He noted that South Africa's culture of social and economic development and corporate social investment creates opportunities for collaboration between public and private sectors.

He argued that the move towards National Health Insurance (NHI) presents a unique opportunity to rethink and integrate digital and automated systems for universal coverage. *"We cannot be relying on old systems and manual systems to roll out the National Health Insurance. We need to make sure that for us to achieve the NHI objectives... we really think about how to integrate digital and automated systems to achieve our goals."* However, he cautioned that achieving this vision will require smarter thinking, collective action, and a relentless focus on implementation.

Wesley noted that innovations at the hospital level can have positive downstream effects on primary healthcare. He highlighted the importance of understanding how shifting patients to primary care can improve admission rates and overall system efficiency and suggested that further economic insight would be valuable.

Real Questions, Real Answers: Insights from the Q&A

The session concluded with a dynamic Q&A, where panellists addressed pressing questions from the audience, providing practical insights and actionable advice.

Q: What are the most compelling outcomes of automation for patients and health systems, especially in resource-constrained environments?

[Daniele Bellavia]: Automation delivers a strong return on investment by reducing medication errors and freeing up healthcare professionals to dedicate more time to patient care, rather than administrative tasks. Although the average payback period is around 4.5 years, the long-term benefits such as improved safety, efficiency, and reduced adverse events (which can become costly for hospitals), justify the investment. It is important to view these costs as investments, not just expenses, as automation also increases access to care by freeing up staff for direct patient interaction. While a four-year payback may seem lengthy, it is relatively short in the context of healthcare investments and aligns well with the tenure of many decision-making cycles.

Q: How can cross-sector collaboration ensure equitable benefits from digital health initiatives?

[Bulelani Kuwane]: It is essential to align on shared goals, with a clear focus on improving health outcomes. Effective collaboration should extend beyond the public and private sectors to include civil society and, importantly, the end users themselves. Engaging users ensures that interventions are genuinely responsive to their needs, rather than being designed solely from the perspective of service providers. Transparency throughout the process, the development of a long-term strategy, and active resource mobilisation are all crucial for achieving meaningful and sustainable change. Involving users in both the design and implementation of digital solutions is vital to ensure these interventions deliver real-world impact and are embraced by the communities they are meant to serve.

Q: What funding models and partnerships are suitable for supporting digital transformation in South African hospitals?

[Dr Louis van den Hoven]: Co-ownership models, where clinicians and hospitals jointly invest in technology, are highly effective for encouraging adoption and aligning interests. For example, some major hospital groups in South Africa offer doctors shares in the hospital based on free cash flow, ensuring ethical transparency and compliance with regulatory guidelines. This approach not only helps retain clinicians but also gives them a personal stake in the success of the project. Equipment companies can also be established to house technology, with ownership shared between hospitals and practising doctors, and the equipment leased back to the hospital on a pay-per-use or monthly basis. These models are already being used in the private sector, helping to address capital constraints and margin pressures by spreading risk and investment. Expanding such models, including public-private partnerships, can make change management easier and support the long-term sustainability of digital health initiatives.

Q: What are the next steps for hospitals and health leaders wishing to act on the research findings?

[Annelize Wessels]: Digital solutions alone will not resolve underlying system or workflow challenges. Hospitals must engage all stakeholders from the outset, ensuring that planning and implementation are collaborative and tailored to the specific environment. Integration should be considered from the beginning, with a clear vision for how systems will work together across departments. Change management and ongoing training are essential, as roles and responsibilities will evolve with new technology. While phased implementation is often necessary due to funding constraints, it is crucial to plan for end-to-end integration to achieve the full benefits of automation. Hospitals should focus on identifying the exact problems they aim to solve, involve all relevant staff in the process, and ensure that technology is designed to support and streamline clinical workflows, rather than add complexity.

Conclusion: Charting a Course for Patient-Centred Innovation

The Deloitte Medication Management Webinar highlighted that digital transformation in healthcare is about more than just adopting new technologies. It is fundamentally about context, collaboration, and a commitment to patient centred care. Insights from global evidence, public sector experience, and real-world implementation all reinforced the importance of aligning standards, regulations, and tools to achieve meaningful change. By fostering partnerships across public and private sectors, and focusing on equitable solutions, South Africa can use automation and digitalisation to improve medication management, enhance patient safety, and build a more resilient health system that delivers real benefits for patients and communities.

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