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CONTENTS

SAPJ Author Guidelines

Thank you for choosing SAPJ in which to publish your paper.

Aims, scope and review policy

SAPJ is aimed at the continuing professional development of the South African pharmacist in a variety of practice settings, including clinical pharmaceutical care practitioners in a community or hospital pharmacy environment, and pharmacists in academic and industrial practice.

The journal accepts specific clinical reviews on self-medication topics (symptomatic therapy) and information on prescription medication (therapy in clinical context), and provides pharmacists with essential information for referring customers for early medical attention should it be required. SAPJ further recognises that the role of the pharmacist continually evolves to meet the needs of the population. An example of this is the provision of accessible, basic primary health care services in community pharmacies.

Papers dealing with medicines safety issues, including the safe and appropriate prescription, administration and use of medication as well as pharmacovigilance, are strongly advocated in SAPJ. SAPJ further supports pharmacists in transforming the pharmacy into an accessible, basic primary health care facility for preventing and treating primary health care conditions through diagnosis, screening and treatment.

The journal is currently indexed by Google Scholar via www.sapj.co.za and enjoys wide international exposure. An 'electronic long, paper short' policy will be followed for original papers where abstracts of original papers are featured in the printed copy with the full version available online.

Online submission

All articles must now be submitted online at www.sapj.co.za

The electronic submission process will prompt you to check off the following declarations:

1. This manuscript has currently only been submitted to SAPJ and has not been published previously.
2. This work is original and all third party contributions (images, ideas and results) have been duly attributed to the originator(s).
3. Permission to publish licensed material (tables, figures, graphs) has been obtained and the letter of approval and proof of payment for royalties have been submitted as supplementary files.
4. The submitting/corresponding author is duly authorised to herewith assign copyright to Medical and Pharmaceutical Publications (Pty) Ltd
5. All co-authors have made significant contributions to the manuscript to qualify as co-authors.
6. Ethics committee approval has been obtained for original studies and is clearly stated in the methodology.
7. A conflict of interest statement has been included where appropriate.
8. A title page has been uploaded as a separate supplementary file and the submission adheres to the instructions to authors in terms of all technical aspects of the manuscript.

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Article sections and length

The following contributions are accepted (word counts include abstracts, tables and references):

Original research:	3 200–4 000 words
Evidence- based pharmacy practice:	3 200–4 000 words
Reviews:	2 400–3 200 words
Case studies:	1 800 words
Scientific letters:	1 200–1 800 words
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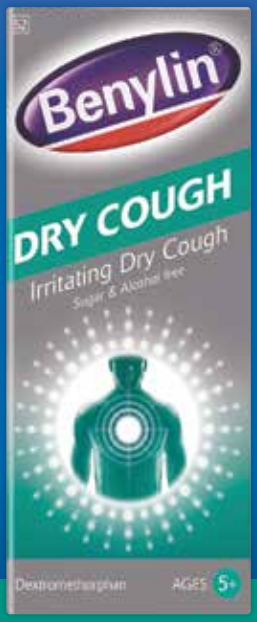

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Editorial

Celebrating progress, facing challenges together

The pharmacy profession stands at a crossroads – one that is both exciting and challenging. We are seeing rapid changes in technology, workforce dynamics, and public expectations, all of which are reshaping the way we serve our patients and communities. This year has already brought both milestones and moments of reflection for our profession, and it's a privilege to share some of these with you as we look ahead together.

First, I am delighted to announce that the *South African Pharmaceutical Journal (SAPJ)* is now officially indexed on Scopus. This is a significant achievement, not only for the journal but for all South African pharmacy researchers, practitioners, and students. Being part of the Scopus International Index means our work is now more visible and accessible globally, opening doors for collaboration and ensuring that the voice of South African pharmacy is heard on the world stage.

Our editorial board has also grown in strength and diversity, reflecting the many disciplines and perspectives that make up our profession. I am honoured to introduce the SAPJ Editorial Team1:

- **Prof. Natalie Schellack** (Editor-in-Chief), University of Pretoria – Clinical pharmacy, pharmacokinetics, pharmacodynamics, infectious diseases, antimicrobial stewardship, One Health
- **Dr Andrew Gray** (Associate Editor), University of KwaZulu-Natal – Pharmaceutical policy, rational medicine use, pharmacoepidemiology
- **Prof. Joe Viljoen** (Section Editor), North-West University – Pharmaceutical chemistry, drug delivery systems, nanotechnology
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- **Prof. Roderick B Walker** (Section Editor), Rhodes University – Pharmaceutical technology, drug formulation, quality control
- **Prof. Moliehi Matlala** (Section Editor), Sefako Makgatho Health Sciences University – Public health, health systems, pharmaceutical services
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- **Dr Carmen Myrna Leonard** (Section Editor), Tshwane University of Technology – Mentorship, pharmacology, toxicology and drug safety
- **Prof. Yahya Choonara** (Section Editor), University of the Witwatersrand – Drug delivery systems, biomaterials, pharmaceutical technology

For more about our editorial board, please visit: SAPJ Editorial Team.

This year, we also celebrate the election of Dr Seshnee Moodley as the new SAAHIP President for 2025/2026. Seshnee is a passionate clinical pharmacist, healthcare change agent, and a true example of "future ready 5.0." Her commitment to leading with excellence, compassion, and vision is exactly what our profession needs at this time of transformation. Congratulations, Seshnee – now, that's the real flex! Your humility, energy, and drive to unite and uplift hospital and institutional pharmacists across South Africa is truly inspiring.

The evolving pharmacy landscape is not without its challenges. Recent media investigations have exposed illegal dispensing and the sale of scheduled medicines without prescriptions, including to underage schoolchildren. These incidents have understandably shaken public trust, but it is important to remember that the overwhelming majority of pharmacists uphold the highest standards of care and ethics. As the PSSA and SAPC have reiterated, we all share the responsibility of restoring and maintaining the public's faith in what we do.

At the same time, the profession is embracing innovation and collaboration. The upcoming SAAHIP Conference, themed *"Operation 3is: Advancing Pharmaceutical Services: Innovate, Integrate, Improve,"* is a call for abstracts that encourages us to share best practices, research, and creative solutions for the future of hospital and institutional pharmacy. This conference will explore everything from access to medicines and digital health solutions to sustainable resource management and legislative readiness, providing a platform for knowledge exchange and professional growth.

Finally, we pause to remember the sad loss of Michéle Coleman, a remarkable pharmacist, mentor, and friend. Michéle's legacy of leadership, kindness, and service will continue to inspire us to lead with compassion and integrity in all that we do.

As we stand at this crossroads, let's move forward together; ready to innovate, ready to lead, and always ready to put patients first.

Warm wishes

Natalie

President's Message

Tshifhiwa Rabali
PSSA President

The Pharmaceutical Society of South Africa (PSSA) held its Unemployment Indaba during SAPHEX 2025. This milestone event was born out of the growing number of concerns raised by our colleagues regarding unemployment in the pharmacy profession—a matter we can no longer afford to ignore.

The Indaba was very well attended, with numerous pharmacists from across the sector showing genuine interest and concern. The aim was clear: to engage in an open, honest conversation with key stakeholders in order to understand the root causes of pharmacist unemployment and begin working collectively towards solutions.

We were honoured to have guests from the NDoH, SAPC, public and private hospital, community, manufacturing, academy and our young pharmacists.

Each stakeholder shared valuable insights, shedding light on the challenges and opportunities within their respective spheres. As the PSSA, we emphasised the urgent need for a coordinated, sustainable approach to tackling unemployment within our profession—starting with honest engagement and ending in action.

The presentation by the Deputy Director-General of Health was particularly insightful, as it provided a comprehensive overview of the situation. At the heart of the issue, it became clear that the primary constraint is a lack of funding. However, this may begin to shift, as the Minister of Finance announced new allocations during the budget speech on 12 March 2025. It remains to be seen whether these allocations are in response to an oversupply of pharmacists or pharmacist's assistants, a topic that has been raised in various forums.

Another important point raised during the Indaba came from the South African Pharmacy Council (SAPC). It was revealed that an error had occurred in a previous briefing to the Department of Health regarding the recommended ratio of pharmacist's assistants to pharmacists. The SAPC is currently working to correct this discrepancy, and we look forward to receiving further clarification on the matter. In line with the ongoing theme of encouraging innovation and "thinking outside the box" when it comes to employment opportunities, the Registrar of the Pharmacy Council shared a noteworthy insight: currently, there are only eight consultant pharmacists practicing in the entire country. This underrepresented area could present new and untapped opportunities for unemployed pharmacists to explore and develop further.

We also had the opportunity to hear from the Local Choice, a franchisor of independent franchisee pharmacies, who shared that they are ready to support pharmacists who aspire to own their own practices by recruiting them into their Local Choice franchise network. From my perspective, it's important that companies like these begin investing in young pharmacists, particularly by establishing pharmacies within the communities these pharmacists come from. This approach not only empowers them to serve their own communities but also gives them the opportunity to take on the role of responsible pharmacists. Furthermore, they should consider entering into shareholding negotiations, as many young pharmacists face significant challenges in accessing the starter funding needed to establish independent practices.

Lastly, I would like to extend my deepest condolences to the families and communities affected by the recent flooding disasters in KwaZulu-Natal and across the country over the past few months. A special tribute goes to the family of one of our own—a dedicated pharmacist and member of the PSSA—who tragically lost her life while crossing a bridge on her way home from work. Her passing is a heartbreaking reminder of the risks many face in their daily lives. May her soul rest in eternal peace and may all those who have suffered loss during this time find comfort and strength in the days ahead.

I thank you.

The Pharmaceutical Society of South Africa (PSSA) hosted its first-ever Pharmaceutical Employment Indaba on 5 March 2025 in Sandton, Gauteng Province. The Indaba brought together a diverse range of voices from across the pharmacy profession to confront the growing crisis of youth unemployment and workforce inequity. Through powerful testimonies and strategic insights, presenters highlighted systemic barriers, proposed actionable reforms, and called for a united commitment to securing the future of pharmacy in South Africa.

Below is the consolidated report on the pharmacy workforce stakeholder presentations.

Dr Percy Mahlathi (Deputy Director-General for Hospital and Tertiary Health Services)

Dr Mahlathi delivered a wide-ranging address on the strategic imperatives facing South Africa's pharmacy sector. Drawing on decades of leadership in health policy and workforce development, he underscored the urgent need for systemic reform, collaborative engagement, and forward-looking regulation to ensure the profession's sustainability within an evolving healthcare landscape.

A central theme of his address was the critical need for comprehensive pharmacy workforce planning. While South Africa has demonstrated a strong capacity to produce technically competent pharmacists, the broader system struggles to absorb and deploy this workforce effectively. He pointed to the mismatch between pharmacy graduate output and actual workforce needs, citing the evolving disease burden, the growing demand for pharmaceutical services across various settings, and the pressing need for pharmacists with broader, more adaptable skill sets. He emphasised that the realignment of the workforce strategy with national health demands was overdue.

Dr Mahlathi also questioned whether the current Continuing Professional Development (CPD) frameworks remain relevant and impactful. Having been involved in their initial design, he called for a sector-wide review, insisting that CPD must not become a tick-box exercise but should actively contribute to professional growth, service quality, and innovation. He encouraged the pharmacy profession to drive this review collaboratively and constructively.

He emphasised that the future of the profession depends on its capacity to build advanced, specialised competencies and that without specialisation, pharmacy risks stagnation. Specialist pharmacists play a vital role in shaping education, improving patient outcomes, and sustaining professional growth. Revised regulations currently underway aim to broaden recognised specialties and simplify the process of formal recognition. These efforts, however, must be monitored to prevent fragmentation and ensure alignment with national priorities.

He also highlighted the inadequacy of current interprofessional cooperation within the health system, arguing that collaborative practice should be embedded early in education and not left to chance in the workplace. Without structured, team-based training at the undergraduate level, healthcare professionals struggle to integrate effectively in multidisciplinary settings. He called for deliberate strategies to foster this cooperation, including clearer role definitions and shared training environments. He also addressed the confusion surrounding the National Health Insurance (NHI), clarifying that it is a funding mechanism rather than a delivery model. He explained that pharmacies must register and be accredited by the Office of Health Standards Compliance to participate in the NHI reimbursement framework. He warned that service providers risk being excluded from government-funded reimbursement without accreditation, a reality that could have severe implications for sustainability. He stressed that pharmaceutical services must meet the accreditation requirements, and that this responsibility cannot be left to provincial offices alone because leadership cannot be outsourced.

Turning to rural pharmaceutical services, Dr Mahlathi acknowledged that the need to update rural placement incentives and reassess how "rurality" is defined, especially where past classifications were more political than geographic. He advocated for structured mentorship, leadership development, and retention strategies to attract experienced professionals to underserved areas. Senior pharmacists are essential to provide the clinical governance that younger practitioners need in high-risk, resource-limited environments.

He asserted that high litigation rates in South Africa's health sector are primarily attributable to poor governance structures and insufficient support for junior staff. Too often, inexperienced professionals are left to make decisions without adequate oversight. To address this, senior leadership must actively mentor, guide, and supervise the next generation on clinical governance. The role of pharmacists in health technology assessment emphasises their contributions to developing cost-effective, evidence-based formularies. He criticised the absence of pharmacotherapeutic committees in some academic hospitals and reaffirmed that pharmacists must lead these structures. He noted that the expansion of pharmacy-initiated therapy is essential and must be supported by regulatory clarity and institutional commitment.

On the regulatory front, Dr Mahlathi emphasised the necessity of revising outdated legislation, particularly the pharmacy regulations from 1990, which are ill-suited to contemporary healthcare demands. He advocated for profession-led processes to update these frameworks, ensuring they align with current realities and support progressive practice. He acknowledged recent regulatory proposals aimed at expanding speciality designations and streamlining recognition processes but cautioned against

fragmentation and duplication. In closing, Dr Mahlathi placed the challenges of pharmacy workforce planning within the broader youth unemployment crisis. He stressed that unemployment is not only a health sector issue but a national emergency, urging the profession to engage meaningfully in forthcoming national dialogues. He said pharmacists must organise collectively through associations and representative structures to exert influence and shape the policy agenda. Individual brilliance, while valuable, cannot substitute for organised professional advocacy.

Mr Simthembile Langa (Acting Chief Director for Pharmaceutical Services and CEO of the Medical Supplies Depot in Gauteng): Reflections on employing pharmacists in the provincial public sector

Mr Langa began by acknowledging the absence of the MEC for Health, who had intended to attend, and clarified that he had been asked to step in on short notice to share institutional perspectives. Drawing on his operational experience, he reaffirmed many of the systemic issues particularly regarding the challenges of human resource planning, the disconnect between central policy and provincial implementation, and the need for decisive, coordinated action to address gaps in the deployment of pharmacists. He acknowledged that while many pharmacists are being trained and qualified, their absorption into the public sector remains inconsistent and often dependent on fluctuating provincial budgets and bureaucratic bottlenecks. He emphasised that structural vacancies exist not because of a lack of need, but because rigid financial ceilings, delayed posts, and fragmented communication between departments often constrain employment processes. This misalignment between training outputs and employment pathways continues to fuel frustration among graduates and places strain on service delivery.

He highlighted their growing responsibilities not only in dispensing and supply chain functions but also in policy implementation, clinical governance, and leadership within pharmaceutical service structures. He reiterated the need for proactive planning and clear directives to ensure qualified professionals are placed in positions where their skills can be fully utilised. Importantly, he stressed that pharmacists must participate in shaping the systems they operate within, not just by raising individual concerns but through organised, sustained engagement with provincial and national authorities. He encouraged attendees to align with representative bodies and policy platforms to influence decisions directly impacting their roles and career progression.

Mr Vincent Tlala (Registrar and CEO of the South African Pharmacy Council [SAPC]): Address on pharmacy human resources and professional advocacy

Drawing from over two decades of experience across multiple pharmacy sectors, Mr Tlala offered both statistical insight and bold challenges to the profession. He outlined the production and attrition rates of pharmacists. South Africa trains approximately 800 to 900 pharmacists annually through nine universities but loses around 400 students during training. Despite this, the pharmacist-to-population ratio remains alarmingly low compared to global benchmarks. In developed countries, the average is about 7 pharmacists per 10,000 population; South Africa lags far behind. He stressed that the real issue is not overproduction, but under-absorption, as universities responded to calls to increase graduate output. Yet the system has failed to expand employment capacity, especially in the public sector. The situation is further complicated by an error in current regulations concerning support personnel ratios. A ratio of 1 pharmacist to 5 post-basic pharmacist's assistants, intended for primary health care, wholesale, and manufacturing environments, has been mistakenly applied to hospital and community pharmacies. This has led to substituting pharmacists with support personnel, creating a hidden threat to patient-facing care. He confirmed that SAPC will work with the Department of Health to correct this misapplication and restore the intended ratios in hospital and community settings.

He also highlighted structural inequalities in sectoral and geographical distribution. Most pharmacists and pharmacies are located in urban, private-sector settings, while rural and public healthcare remain underserved. Only 680 public sector hospitals have pharmacy services recorded with SAPC, a shockingly low figure. He underscored the importance of aligning the profession's development with the country's shifting disease burden, particularly the need to expand access to antiretroviral therapy and medicines for chronic diseases. He addressed SAPC's role in developing the Pharmacist-Initiated Management of Antiretroviral Therapy (PIMART) course, a crucial tool for expanding HIV care access. Despite this being a public health priority, SAPC has faced legal resistance from some medical groups, especially since the interprofessional conflict has escalated to litigation rather than cooperation. He noted that the Council would continue defending this program in the courts, including at the Constitutional Court if necessary. For him, the issue is not about professional boundaries, but about equitable access to life-saving medicines.

He further called for multidisciplinary education at the undergraduate level to counteract siloed professional identities, which he views as a root cause of interprofessional conflict. He warned that if doctors and pharmacists continue to compete rather than collaborate, nurses, who are increasingly cross-trained, may continue assuming roles vacated by other professions. He strongly appealed to young professionals by addressing the issue of pharmacist migration. He revealed that SAPC processes a high number of certificates of good standing for pharmacists emigrating to countries like Australia, Canada, and New Zealand. Meanwhile, many foreign-trained pharmacy graduates in South Africa are not permitted to complete community service due to citizenship limitations, despite occupying scarce university seats. He raised the ethical and financial implications of this policy gap, urging a re-evaluation of training resource allocation.

Highlighting underutilised opportunities he promoted "consultant pharmacy" as an entrepreneurial avenue. Regulation 18 of the Practice Regulations allows pharmacists to establish consultancy-based practices with minimal infrastructure requirements. Yet only eight such licenses exist. He encouraged young, unemployed

pharmacists to apply for consultant licenses and begin offering medication review and advisory services, especially to the elderly and chronically ill, as a viable and sustainable career path.

He also urged pharmacists to think beyond traditional dispensing roles. With the rise of remote and automated dispensing, pharmacists must leverage technology to enhance, not diminish, their relevance. While automation may reduce manual tasks, it creates opportunities for pharmacists to deliver value through clinical services, pharmacovigilance, and personalised care. Mr Tlala concluded his address with a strong call for professional unity and advocacy. He emphasised that the SAPC, as a regulator, cannot and will not speak on behalf of pharmacists. Its mandate is to protect patients and uphold standards, not to lobby for professional interests. He argued that this responsibility lies with professional associations like the PSSA. He encouraged all pharmacists to join representative bodies and actively participate in shaping their future. He said, "You do not owe the Department of Health anything, you owe your profession everything."

Professor Sandile Khamanga (Dean of the Faculty of Pharmacy at Rhodes University and Chair of the Heads of Schools of Pharmacy): Address on higher education and pharmacy workforce

Professor Khamanga began by contextualising the role of universities under the Higher Education Act, which mandates quality assurance, equitable access, and the promotion of transformation. He noted that pharmacy education in South Africa is not new; some pharmacy schools are over 80 years old, highlighting the long-standing foundation and institutional commitment to developing competent professionals. However, he cautioned that sustainable workforce development must be grounded in more than just historical legacy; it must also respond to current demographic shifts, global health demands, and national development priorities.

Citing the Africa Agenda 2063, WHO's healthcare workforce forecasts, and the Sustainable Development Goals (particularly SDG 3 on health and SDG 4 on quality education), Professor Khamanga argued that Africa is facing a profound health workforce shortage. Rather than scaling back, universities must continue producing pharmacists to meet regional demand and address ongoing disease burdens. South Africa, classified as an upper-middle-income country, remains a regional hub for health education, and its universities attract students from across the continent, further underscoring its responsibility to maintain strong educational output.

He addressed national policy influences, including the 2013 White Paper on Post-School Education and Training and the National Development Plan 2030, which support expanded access to higher education, infrastructure investment, and the equitable growth of professional faculties like pharmacy. He emphasised that enrolment targets at universities are not arbitrarily set but are informed by this policy environment and by SAPC's own historic calls to increase graduate output. The average pharmacy school enrols about 120 students per year, contributing to a total output of roughly 10 000 pharmacists over the past decade.

He critically noted that only around 10% of pharmacy graduates pursue further studies. This low conversion rate raises concerns about the future of academic staff and pharmacy educators. Without proactive investment in postgraduate development today, there will be too few qualified academics to train tomorrow's pharmacists. He challenged the audience to think intergenerationally: if we want pharmacy professors in 2035, we must cultivate and support postgraduates now. He also highlighted the need for strategic alignment between universities and industry, broadly defined as the public and private healthcare sectors, regulatory bodies, and pharmaceutical manufacturers. A more harmonised, evidence-informed approach to workforce planning is required, based on robust environmental scanning, market trend analysis, and data-driven forecasting. He encouraged a shift towards dynamic skills architecture, anticipating what pharmacists should be trained to do, not only for today's challenges but for future health system needs shaped by digital transformation, artificial intelligence, and evolving scopes of practice.

He acknowledged the importance of internships and community service but also emphasised the need for mental health support and structural clarity for young professionals transitioning into the workforce. Planning must also consider quality, not just the number of graduates, but the teaching environment, support systems, and post-training opportunities available to them. He reinforced that health systems are only as strong as their workforce planning models. If stakeholders fail to plan today, they risk failing the profession tomorrow. He reiterated the importance of pharmacy education as a foundation for all other health goals, underscoring that SDG 4 (quality education) is essential for achieving SDG 3 (health and well-being) and every other goal within the sustainable development framework. In closing, Prof Khamanga affirmed that the university sector remains committed to producing competent, adaptable pharmacists for yesterday, today, and tomorrow. He called on government departments, funders, and all pharmacy stakeholders to engage with universities not only as training institutions but as strategic partners in shaping South Africa's health future.

Ms Vishala Gokool-Sewram (General- Manager for Pharmacy in the Netcare Hospital Group): Address on innovation and workforce development in private hospital pharmacy

Ms Gokool-Sewram focused her address on the private sector's current workforce realities, which were informed by her work within Netcare's national network. She noted that the private hospital pharmacy landscape is characterised by intense clinical service demands, including oncology, transplant care, and critical care, all requiring advanced pharmaceutical expertise. With 6,800 pharmacists currently registered in private practice and around 40% of the workforce comprising pharmacist's assistants,

service delivery in this environment remains highly dependent on efficient, well-structured teams.

Among the foremost challenges she identified was a significant workforce shortage. In some high-volume settings, the ratio stands at one pharmacist to over 2 000 patients. This shortage is compounded by limited training in specialised fields, rising attrition driven by high patient volumes, hiring delays, and economic constraints. Salary disparities between the public and private sectors also contribute to talent migration, weakening retention. Moreover, the stagnation of the medically insured population has limited market growth, putting additional strain on workforce resources.

Despite these challenges, she emphasised several emerging opportunities. Foremost among them was the expansion of roles for pharmacy support personnel. Netcare, she explained, has restructured its workforce to adopt task-shifting models, enabling pharmacist's assistants to take on inventory and basic dispensing responsibilities. A 2024 KwaZulu-Natal pilot project cited a 30% efficiency gain following training in stock management. She urged industry stakeholders to support the new Occupational Certificate for pharmacist's assistants, noting its higher training costs but vital long-term contribution to sustaining pharmacy operations.

Ms Gokool-Sewram advocated greater specialisation and leadership training investment through partnerships with academic institutions. These initiatives would empower pharmacists to assume expanded roles in hospital governance and clinical decision-making. In tandem, she stressed the importance of staff well-being, calling for structured mental health support to address burnout. Technology integration was the third pillar of her strategy. She detailed several AI-driven and digital tools currently being explored or implemented across Netcare facilities, including automated dispensing units, electronic schedule medicine registers, e-scripts, medication reconciliation systems, and remote consultation platforms. Such innovations, she argued, are not only reshaping pharmacy practice but also freeing pharmacists to focus on more clinical, patient-centred tasks. Notably, electronic counselling tools enhance patient engagement, enabling pharmacists to offer care and education through secure digital portals.

She concluded by offering concrete recommendations for strengthening the sector. These included regulatory modernization to support expanded scopes for support personnel, continued investment in training and education, improvements to work environments, enhanced access to resources, and robust mentorship and peer support systems. She also encouraged the development of digital platforms and apps to aid in medication management and patient education, emphasising that the future of hospital pharmacy must be technology-enabled and patient-focused. She echoed an earlier sentiment: pharmacists are no longer "ordinary" professionals. Hospital pharmacy, in particular, now demands multifaceted expertise in clinical care, leadership, and technology. Quoting Nelson Mandela, she closed with a call to action: "It always seems impossible until it is done." She urged the profession to redefine its roles, embrace innovation, and pursue deep collaboration to build a resilient and responsive workforce.

Mr Jaco du Plessis (General Manager at The Local Choice pharmacy group): Address on entrepreneurship and independent pharmacy models

Mr du Plessis began by revisiting the motivations that led many in his generation to study pharmacy: the dream of owning a business, serving a community, and achieving personal and professional success. Decades later, he affirmed that the dream remains valid. Independent pharmacies, he argued, are still thriving and represent a vital pillar of healthcare delivery, especially in underserved or rural areas. Yet, he challenged the definition of "independent pharmacy", proposing instead a shift toward "interdependent pharmacy" a model in which individual practices maintain autonomy but operate within a collaborative ecosystem that supports professional and business growth.

He introduced The Local Choice model as an example of this approach. As a franchise platform, it offers pharmacists the opportunity to own and manage their businesses while receiving strategic, operational, and infrastructural support from the group. This model allows pharmacists to focus on delivering patient-centred care without the isolation or resource limitations often accompanying true independence. Rather than viewing each pharmacy as a uniform franchise replica, The Local Choice embraces the notion of "individual pharmacy", recognising that each practice serves a unique community with distinct needs while sharing the same core purpose: improving patient health.

Highlighting data gathered from over 240 pharmacy Facebook pages, he emphasised the consistent values patients associate with community pharmacists' compassion, reliability, and trust. He lamented the profession's gradual loss of its historic role as a community cornerstone and called for a renewal of that position. Pharmacists, he said, once held the same esteem as doctors, religious leaders, and town mayors. With the right model, they can reclaim that influence.

He presented The Local Choice's business development offerings as a solution to many barriers that inhibit young pharmacists from pursuing ownership, namely, access to funding, business acumen, and support systems. The group currently employs approximately 700 pharmacists and 15,000 staff in total, operating across diverse South African communities. Its expansion into rural areas is supported by financial models designed to empower emerging entrepreneurs, especially those committed to clinical care and community impact.

He concluded with a call to young pharmacists and graduates to embrace entrepreneurship not just as a career pathway, but as a calling to improve access, equity, and quality of care. Independent pharmacy, he affirmed, is not only financially viable it is socially meaningful. With robust systems, committed mentorship, and the right partners, pharmacists can reclaim their place as trusted, visible, and transformative figures in their communities. His final message was simple but resonant: opportunity still exists.

Pharmacy is not only a profession of clinical precision, but of entrepreneurial courage. Through collaborative independence, pharmacists can build businesses that serve their patients and their dreams.

Dr Stavros Nicolaou (*Group Senior Executive for Strategic Trade at Aspen Pharmacare Holdings):* Address on industrial pharmacy, innovation, and professional empowerment

Dr Nicolaou delivered a moving and unscripted address that blended personal with a powerful vision for the pharmacy profession. Speaking with heartfelt conviction, he sought to reignite a sense of pride and purpose among young pharmacists, reminding them of the profession's global relevance, transformative potential, and the critical importance of personal agency in forging a meaningful career. Reflecting on his decision to choose pharmacy over medicine, he emphasised that pharmacy is not a fallback option but a high-impact vocation blending scientific rigour with patient-centred care. He recounted his pivotal role in negotiating the 2003 deal with Gilead Sciences to distribute Tenofovir, an antiretroviral that saved millions of lives, as an example of how pharmacists can drive change on a global scale. He challenged students and professionals to embrace the full power of their training, reject feelings of inferiority within the health system, and carve out their leadership roles. He offered a sweeping overview of industrial pharmacy's vast scope, portraying it as a $1.8 trillion global enterprise, more than four times South Africa's GDP. He highlighted Aspen's global footprint across 150 countries and identified key career pathways in the sector: research and development (especially clinical trials and biologics), regulatory affairs, manufacturing, quality control, supply chain, sales and marketing, business development, and strategic trade. He underscored the critical contributions pharmacists make in producing advanced therapies such as monoclonal antibodies, biosimilars, radiopharmaceuticals, and CAR-T therapies, with South Africa now emerging as a global producer of insulin and other cutting-edge treatments. In light of these advancements, he urged pharmacists to assert their role in precision medicine and biopharmaceutical innovation and called on universities to align curricula with the fast-evolving demands of the global pharmaceutical industry.

Turning to the paradox of pharmacist unemployment in South Africa, despite global shortages, Dr Nicolaou addressed both systemic challenges and personal responsibility. He pointed to policy debates, such as the potential redirection of medical scheme tax rebates to fund public sector posts but warned against passive reliance on government interventions. Instead, he advocated for personal empowerment, urging pharmacists to take charge of their development through further study, specialisation, and entrepreneurial initiative. Whether pursuing MBAs, MScs, PhDs, or niche skills within the industry, he stressed that pharmacists must remain agile, passionate, and proactive to stay relevant in a competitive field. He emphasised that the profession is a platform for legacy-building through public health impact, from HIV to COVID-19, his career has been shaped by a commitment to responding to national and global health crises. He closed with an emphatic call to action: "You are the master of your destiny. Don't wait for government or industry to open the door, kick it open, skill yourself up, and pursue your passion with purpose."

Ntombizodwa Luwaca (*Chairperson of the Young Pharmacists' Group [YPG] of the Pharmaceutical Society of South Africa [PSSA]*): "Indaba: The Real Issue Facing Young Pharmacists"

Ms Luwaca delivered a compelling presentation titled *"Yin'indaba – What's the Real Issue?"* Her address unpacked the structural challenges confronting young pharmacists and called for coordinated, system-wide reform to combat youth unemployment, enhance career preparedness, and secure the future of the pharmacy profession. She began by describing the arduous journey from graduation through internship and community service, highlighting how, despite completing both these rigorous requirements, unlike some other health professionals, young pharmacists are still expected to secure permanent posts without systemic support. Drawing on personal and peer experiences, she described how internship placements are highly competitive, with limited posts and no guaranteed absorption, making the post-community service phase especially precarious.

She presented findings from a national YPG unemployment survey conducted in February 2025, which revealed deep systemic barriers. Of the 216 pharmacist respondents (mostly PSSA members), over 120 had applied for over 10 jobs without success. These barriers included the recurring "experience paradox" where internship and community service are not recognised as valid work experience, frozen public sector posts due to budget constraints, hiring malpractices like nepotism and bias, inaccessible rural placements, outdated applicant tracking systems, and employer mistrust of early-career pharmacists. These challenges mirror broader trends in South African youth unemployment, which has increased from 36.8% in 2014 to 45.5% in 2024. She emphasised the value of professional networks such as the PSSA, encouraging young professionals to engage actively in mentorship, continuing professional development, and branch structures rather than waiting passively for opportunities. She raised critical policy questions, asking whether internship and community service are officially recognised as professional experience, whether pharmacy support personnel ratios are enforced, and whether universities and the SAPC are sufficiently aligned to support equitable graduate outcomes.

Further, she highlighted a major preparedness gap between academic training and workplace demands, noting her disorientation on her first day of internship as evidence of inconsistent implementation of experiential learning across institutions. She urged the SAPC and universities to rigorously enforce the provisions of Board Notice 477 of 2023 to standardise and improve work-integrated learning. While acknowledging strengths such as a robust four-year honours-level curriculum and increasing specialisation opportunities, she lamented the absence

of strategic career planning, limited funding for postgraduate study, and mentorship fatigue among seasoned professionals. Addressing the so-called rural reluctance, Ms Luwaca revealed that only 14% of survey respondents were unwilling to relocate, though real concerns around isolation, cultural or religious needs, and limited postgraduate access remain valid.

She concluded with a firm and urgent appeal: the pharmacy sector is producing well-qualified professionals but failing to absorb them. To prevent talent waste and ensure the profession's sustainability, she called for collaborative action across academia, regulators, employers, and policymakers. "Young pharmacists need jobs," she declared a deceptively simple statement that encapsulates a deeply complex issue requiring structural reform, transparent policy alignment, and sustained investment across the pharmacy ecosystem.

Mr Kevin Phehla (President of the South African Pharmaceutical Students Federation [SAPSF])

Mr Kevin Phehla (President of the South African Pharmaceutical Students Federation (SAPSF)), delivered a compelling address titled "A Student Perspective on Employment and Equity in Pharmacy", offering a candid and impassioned account of the challenges facing pharmacy students in South Africa. He raised concerns about the unequal treatment of young speakers at the Indaba, arguing that student voices must be afforded the same respect and consideration as senior professionals. This, he asserted, is essential for creating inclusive platforms that empower rather than marginalise those most affected by the sector's issues. Central to his address was the burden of financial exclusion, where he highlighted how many students are barred from graduating or securing employment due to unresolved university debt, often exceeding R300,000. He noted that some were forced into alternative BSc programmes due to capacity constraints in pharmacy schools, further compounding their financial challenges. He urged universities and funding bodies, including NSFAS, to urgently intervene by settling debts and releasing academic records to facilitate employment and future repayment.

He then turned to the issue of experience as a barrier to employment, critiquing its rigid use in private sector recruitment. Kevin questioned why 2–3 years of experience are required for entry-level posts when graduates have completed internships and community service. He proposed that private sector employers, embed formal training programmes into onboarding processes, allowing young pharmacists to gain experience while employed. He called on the Department of Health to increase pharmacy posts by adopting day and night shift models seen in other healthcare disciplines, and to extend pharmacists' presence across all hospital wards to both improve care and create jobs. He stressed the urgency of defined implementation timeframes rather than open-ended consultations. In a forward-looking appeal, he also advocated for early student engagement, urging professional bodies and employers to support pharmacy students from their first year through mentorship, orientation, and exposure to career pathways to strengthen sector identity and improve retention.

He challenged universities to reflect on the low uptake of postgraduate studies, attributing this in part to insufficient stipends that pale in comparison to public and private sector salaries. He also criticised withholding qualifications due to unpaid fees, arguing that this only entrenches unemployment and delays economic contribution. In closing, he called for systemic change, insisting that symbolic sympathy is no longer enough. He urged all stakeholders, government, academia, professional bodies, and the private sector, to collaborate on structural, coordinated, and time-bound solutions to the crises of youth unemployment, financial exclusion, and systemic inequity. "We are not just asking for help," he concluded. "We are asking to participate in shaping our future, with dignity, accountability, and urgency."

Mr Tshifhiwa Rabali (PSSA President): Address on collective action and strategic workforce solutions

Mr Rabali reflected on the collective efforts that led to the inaugural Indaba, emphasising that the gathering was a direct response to the growing unemployment crisis among young pharmacists. Acknowledging the extensive collaboration with stakeholders, including academia, the private sector, SAPC, and the Department of Health, he affirmed that the PSSA was committed to leading from the front in finding sustainable solutions.

He contextualised the unemployment crisis as multi-layered, driven by budget constraints, limited public sector vacancies, and structural barriers such as unrealistic experience requirements for entry-level posts, inconsistent regulatory interpretation, and limited exposure to non-traditional sectors. He cited a recent job advertisement in rural Eastern Cape that received over 20 applications as evidence that young pharmacists were increasingly willing to work in underserved areas, challenging assumptions about geographic reluctance.

A critical point raised was the need to rethink attitudinal barriers and expand the professional imagination of young pharmacists. The PSSA committed to deepening its policy engagement, advocating for increased public sector employment, and proposing strategic interventions to align workforce supply with actual healthcare needs. He outlined a multi-pronged approach to workforce reform, including reviewing the outdated 2030 Human Resources for Health policy, aligning graduate output with job market realities, and reimagining pharmacist roles beyond traditional dispensing. This would involve strengthening specialist practice areas, supporting collaborative care models, and ensuring the full integration of mid-level workers. A key theme was "thinking outside the box," encouraging young pharmacists to consider entrepreneurial routes, such as community pharmacy ownership through franchise partnerships with groups like The Local Choice, and to push for expanded practice scopes aligned with global standards.

The PSSA also plans to intensify its efforts around ongoing professional development, mentorship, and collaborative policy

formulation. Importantly, Mr Rabali highlighted the urgent need to re-evaluate the accessibility and affordability of becoming a consultant pharmacist, with a commitment to engage the SAPC on cost-related barriers. The address concluded with a powerful call to action. The Indaba was not a one-time event, but the beginning of a sustained engagement process. Future phases will build on the momentum generated, with the PSSA planning to track, convene, and advocate until tangible, inclusive workforce solutions are realised. In conclusion, he stated, "Being a spectator changes nothing. Leadership requires active engagement, integrated thinking, and repeated action. Let us not just shout, let us build."

Upholding Professional Integrity: PSSA Condemns Illegal Activities in Pharmacies

A recent investigative report by the television program *Vimba* on Moja Love channel 157, aired on Sunday, 23 March 2025, brought serious violations in certain pharmacies to light. The program revealed that some pharmacies illegally sell Schedule 4 and 5 medicines without prescriptions. Even more concerning, codeine-containing products are being sold to underage schoolchildren without the required documentation, as mandated by regulations. The Pharmaceutical Society of South Africa (PSSA) unequivocally condemns these unlawful practices and reaffirms its commitment to maintaining ethical and legal pharmacy operations.

These revelations have led to the unfortunate misconception that all pharmacists engage in such misconduct. PSSA strongly rejects this generalisation and underscores the fact that the overwhelming majority of pharmacists in South Africa uphold the highest standards of professionalism. They work diligently to ensure the safe and responsible use of medicines. The unethical actions of a few should not tarnish the integrity of the entire profession.

Pharmacists are trusted healthcare professionals, and any individual found participating in illegal dispensing practices must be held accountable. One of the fundamental objectives of the pharmacy sector is to promote and maintain the health and well-being of the South African public through ethical community pharmacy practice. The Good Pharmacy Practice (GPP) manual and associated SAPC regulations explicitly outline the professional responsibilities of pharmacists under the *Code of Conduct for Pharmacists and Other Registered Persons in Terms of the Pharmacy Act*. The principles state:

1.1 Well-Being of the Patient Principle: A pharmacist's primary concern in performing professional duties must be the well-being of both the patient and the broader public. In upholding this principle, pharmacists must consider:

- Ensuring that medicine therapy leads to appropriate therapeutic outcomes that contribute to patient health and quality of life.
- Adopting attitudes, behaviours, and ethical practices that prioritise patient welfare.
- Demonstrating knowledge, commitment, and professionalism in a manner that benefits both patients and the public.

The unethical activities exposed in the investigative report directly contradict these fundamental principles and the values we uphold in the pharmacy sector. These activities not only compromise patient safety but also erode public trust in the profession. PSSA urges all members of the pharmacy community to remain vigilant, refrain from engaging in unlawful activities, and actively protect the well-being of the communities they serve and report any unethical conduct to the South African Pharmacy Council (SAPC).

PSSA stands firmly in support of pharmacists who uphold professional standards and will continue advocating for the integrity of the profession. It is imperative that we collectively safeguard public health, uphold our ethical responsibilities, and ensure that pharmacy remains the trusted and credible cornerstone of healthcare excellence in South Africa.

The PSSA wants to remind pharmacists that they are competent healthcare professionals and are allowed to refuse to sell medication to patients where they feel that the medication is not in the best interest of patients. Pharmacists also have the right to refuse to dispense a prescription should they either feel that the prescription is not in the patient's best interest or that the prescription's authenticity cannot be verified.

If the pharmacist suspects that the patient is misusing or abusing the medication, they should refer the patient for potential substance abuse. The Department of Social Development (DSD) has a Substance Abuse Helpline that can be contacted on 0800 12 13 14. The DSD in partnership with the South African Depression and Anxiety Group (SADAG) has also launched a WhatsApp chatline specifically targeted at the youth. Ke Moja WhatsApp Chat Platform - 087 163 2025. The Ke Moja WhatsApp Chat Platform is available seven days a week, from 8am to 5pm, for a live chat with a counsellor.

The SAPC published an article in the October 2023 Pharmaciae on the pharmacists' role in the misuse of codeine-containing medicines that can be accessed here: https://pharmaciae.org.za/medicine-misuse-codeine/

If pharmacists become aware of colleagues that sell prescription medication without valid prescriptions, sell codeine-containing products for misuse or bulk sale of codeine-containing products,

they are requested to report these colleagues to the SAPC. The SAPC does have an online complaint form (https://interns.pharma.mm3.co.za/LodgeComplaint) and you can remain anonymous during the complaint process. Alternatively, you can email the SAPC at professionalconduct@sapc.za.org. The complaint must be comprehensive, containing all the relevant dates and facts and supported by relevant documentation and other evidence, where possible. The following information must at least be supplied in order for the SAPC to investigate:

- Complainant's name, contact telephone number and email address;
- Name of the person(s) against whom the complaint is lodged;
- Name of the pharmacy;
- Nature of the complaint;
- Date and time of the incident(s).

If these actions occur in non-SAPC-registered facilities or by persons not registered with the SAPC, the complaint must be lodged with SAHPRA and not the SAPC.

The PSSA has also assisted members before to lodge anonymous complaints with both the SAPC and SAHPRA if the member feels there is a risk to them in reporting.

Remember that the SAPC needs to follow a legal process whereby the complaint is investigated and the person against whom the complaint was lodged has the right to respond to the complaint and appear before a committee of their peers before a final ruling can be made. This process can take a few months, and therefore, the outcome will not be immediate.

The PSSA/Alpha Pharm distance learning programme 2025

The PSSA/Alpha Pharm distance learning programme continues to offer pharmacists useful, practical, up-to-date information that enables them to provide optimal pharmaceutical care to their patients.

Module 2, 2025 – Asthma management – an update for the pharmacist

The number of people living with asthma is increasing in many countries, including South Africa. According to the 2022 Global Asthma Report, South Africa remains one of the countries with the highest prevalence of childhood asthma in Africa.

Surveys indicate that most people with asthma, even those in developed countries and despite the availability of effective medicines, do not receive optimal care and are therefore not well controlled. Asthma management guidelines are important in managing asthma optimally.

- The Global Initiative for Asthma (GINA) was established to increase awareness about asthma, to improve management of asthma, and to help prevent asthma. Every year GINA publishes a strategy report based on the latest medical evidence on asthma.
- The South African Thoracic Society first published a guideline for the management of asthma in 1992, which has been revised several times. The latest update is the 2021 position statement for the management of asthma in adults and adolescents. An update on the management of paediatric asthma in children 6–11 years was published in 2022.

This module provides an update on asthma prevention and management and incorporates the latest recommendations from the 2024 GINA report. Since global asthma management guidelines need to be adapted to the situation in any specific country, this module also provides an update on the suggested management of asthma in South Africa in adults, adolescents and children 6 to 11 years of age.

For more information about this programme, contact Gill or Glynis at Insight Medicine Information on 011 706 6939 or email: cpdalphapharm@insightmed.co.za.

The PSSA/Alpha Pharm clinical education programme 2025 for pharmacy staff

The PSSA/Alpha Pharm pharmacy staff clinical education programme continues to offer front-shop assistants or pharmacists' assistants up-to-date information that enables them to provide optimal pharmaceutical care to their patients. All pharmacy staff need to be familiar with the use of unscheduled medicines and should be reminded of when it is necessary to refer the patient to the pharmacist.

Module 2, 2025 – Colds and flu

Colds and flu have similar symptoms, and it can sometimes be difficult to tell the difference between them based on symptoms alone. In general, symptoms of the common cold are milder than symptoms of flu and people with colds are more likely to have symptoms of a blocked or runny nose, while people with flu are more likely to have a fever and muscle aches and pains. Colds generally do not lead to serious health problems, while flu can result in complications such as pneumonia and even death.

Flu is relatively uncommon compared with the large number of cold- and flu-like illnesses that occur in the community, particularly during winter. Many customers presenting in the pharmacy will report having 'flu' when it is far more likely that the person has a cold. Nonetheless, it is important for front shop staff in the pharmacy to be able to identify the differences between colds and flu so that:

- People at high risk of complications from flu are referred to the doctor
- Appropriate treatment may be recommended for symptom relief

This Module reviews the causes, symptoms, prevention, and treatment of colds and flu, paying careful attention to what the front shop staff member in the pharmacy needs to know before helping a customer select an appropriate treatment, if indicated.

If you would like to participate in the PSSA/Alpha Pharm pharmacy staff clinical education programme, please contact Gill or Glynis for further information on 011 706 6939 or email: cpdalphapharm@insightmed.co.za.

Influenza 2025: WHO Guidelines for South Africa's season

Dr CC Schoeman

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Introduction

This is a summary of the Clinical practice guidelines for influenza that was published by the World Health Organization and is referenced in full at the end of this article.

The updated 2024 guidelines provide recommendations on the management of both severe and non-severe influenza, including recommendations on the use of antiviral medications to prevent influenza virus infection in individuals exposed to the virus within the previous 48 hours. This update applies to patients with seasonal influenza viruses, pandemic influenza viruses, and novel influenza A viruses known to cause severe illness in infected humans.

This update also includes baseline risk estimates for hospitalisation and death, as well as proposed definitions of patients at high or extremely high risk of developing severe influenza, to enable the recommendations to be targeted appropriately.

Influenza is an acute respiratory infection caused by the influenza virus.

There are two types of influenza viruses:

1. **Seasonal and pandemic influenza** are caused by influenza A, B, and C viruses. Influenza viruses are single-stranded RNA viruses. Influenza A is further subdivided into subtypes based on their main antigenic determinants, the haemagglutinin (H or HA) and neuraminidase (N or NA) transmembrane glycoproteins. The B type is in lineages, currently circulating either B/Yamagata or B/Victoria. The influenza C virus is not captured by surveillance and thus not of importance. Influenza D is found in cattle and never in humans.

Only influenza A and B viruses cause epidemics in humans. Influenza A viruses are further subdivided into 18 H (H1–H18) and 11 N (N1–N11) subtypes, but only three haemagglutinin subtypes, H1, H2, and H3, and two neuraminidase subtypes, N1 and N2, have circulated consistently in the human population and are responsible for annual epidemics.

Only Influenza A causes pandemics. The A(H1N1) is also classified as A(H1N1)pdm09, as it caused the pandemic in 2009 and replaced the previous A(H1N1) virus, which had circulated prior to 2009. The A(H3N2) virus caused the 1968 pandemic and has continued to circulate as a seasonal influenza A virus, with the influenza B viruses currently circulating either the B/Yamagata or B/Victoria lineages.

2. **Zoonotic Influenza**: Humans can sporadically be infected with novel Influenza A viruses of animal origin, such as avian influenza A virus subtypes A(H5N1), A(H5N6), A(H7N9), A(H7N7) and A(H9N2) and swine influenza A virus subtypes A(H1N1), A(H1N2) and A(H3N2).

Antigenic drift occurs when the influenza virus undergoes small changes, often allowing us to retain some level of immunity. In contrast, antigenic shift involves a major change in the virus, resulting in a completely new strain - also known as a novel virus - to which the population has little or no immunity. This can lead to widespread outbreaks or even pandemics, often causing more severe illness, increased hospitalisations, and higher death rates.

The South African influenza season ranges from May to September.

Worldwide, the influenza season causes approximately 3 billion cases, of which 3–5 million are severe cases, resulting in 290 000-650 000 deaths.

In 2018, there were 109.5 million cases of influenza, 870 000 admissions, and 34 800 deaths due to influenza in children under the age of 5 years.

In South Africa during the 2013–2015 seasons, 10.7 million people had influenza, of which 98.7% were mild, 1.2% were severe, and 0.1% were fatal. The highest rate of admissions to hospitals was in the age groups less than 5 years and older than 65 years, and in people living with HIV (PLWH). In the severe and fatal category, most were younger than 1 year and older than 65 years. In the age group older than 5 years, 30% of deaths were due to PLWH. Pregnant women are also at high risk, especially if HIV positive.

The highest number of mild cases was between the ages of 5 and 24 years.

Viruses are transmitted either by **airborne transmission** when the virus is deposited into the air and inhaled by another person or by **direct deposition** when virus particles are deposited on the facial surface, nose, mouth, and conjunctiva and so enter the respiratory tract. It can also be spread by **direct contact** via the hands from certain surfaces, such as counters and doorknobs. The incubation period is 1–4 days, and viruses are shed a few days before and 5–7 days after onset. This can be longer in severely hospitalised persons.

Diagnosis of influenza

Signs and symptoms of influenza vary from person to person and are very non-specific, making the diagnosis difficult and often based solely on clinical grounds.

PCR testing remains the gold standard for diagnosing influenza; however, its turnaround time is often too slow to guide timely clinical decisions. Rapid tests, such as Nucleic Acid Amplification Tests (NAATs), offer results within 30 minutes, making them more useful in acute care settings. However, their accuracy is highly sample-dependent - factors such as the timing of sample collection during the illness, the site of collection, and how the sample is transported and processed can all affect the results. It is recommended that samples be collected from both the nose and throat in patients who are not in respiratory failure. The nasopharyngeal swab - familiar to many from the COVID-19 pandemic - remains the preferred method for sample collection. It's important to consult with your laboratory regarding the appropriate swab type, transport medium, and correct procedures for sample transport. For severely ill patients, if upper respiratory tract samples test negative, samples should be collected from the lower respiratory tract. This can include sputum, endotracheal aspirates, or bronchoalveolar lavage specimens.

Management of Influenza

Non-severe or uncomplicated influenza presents with the sudden onset of cough, rhinitis, sore throat, headache, myalgia and arthralgia with or without fever. This normally resolves within 3–7 days, but the cough can persist for up to 14 days without requiring medical attention and can be managed with symptomatic treatment.

Severe or complicated influenza refers to patients who require hospital admission due to conditions such as pneumonia, sepsis, septic shock, acute respiratory distress syndrome (ARDS), multiorgan failure, or worsening of existing chronic medical conditions. Additionally, novel influenza strains with known high mortality rates – or those with unknown mortality – are also classified as severe, even if they do not meet the criteria listed above.

Risk stratification is necessary to identify individuals with non-severe influenza who may progress to severe illness. These individuals are categorised into high-risk and extremely high-risk groups, as outlined in Tables I, II, and III.

Additionally, the South African Guidelines identify the individuals listed in Table II as high risk.

Clinical Management

The influenza vaccine remains the cornerstone of management to prevent the complications of influenza, and all high-risk individuals should receive it.

Pregnant women who are vaccinated reduce their own risk of influenza by half, as well as the risk to their infants during the first 24 weeks of life. It is critically important to identify individuals at risk of developing severe influenza in advance. These individuals should be informed to seek medical attention promptly - within 48 hours of symptom onset - to allow for timely initiation of antiviral treatment. Those classified as extremely high risk should also consult a healthcare provider about prophylactic treatment if they have been exposed to the virus, even before symptoms appear.

Table I: Classification of high-risk groups

Age	≥ 65 years
Chronic respiratory disease	Asthma Tuberculosis COPD
Cardiovascular disease	Congestive cardiac failure Ischemic heart disease Congenital heart disease
Neurological disease	Stroke Mental retardation, developmental delay Cerebral palsy Spinal cord injury Peripheral nerve disease Epilepsy
Renal disease	
Metabolic disease	Diabetes
Immunocompromised patients	Malignancy HIV Patients receiving chemotherapy
Pregnancy	Up to 6 weeks postpartum
Novel Influenza virus	

Table II: High-risk groups according to South African guidelines

Age	< 5 years and especially < 1 year
Hepatic disease	
Sickle cell anaemia	
Obesity	BMI > 40
Persons < 18 years old on Aspirin therapy	To prevent Reye's syndrome

Table III: Classification of extremely high-risk groups

Extremely high risk	
Age	≥ 85 years
Comorbidities	Multiple comorbidities at any age

Influenza is detected in approximately 7% of children under 5 years of age admitted with pneumonia, and in about 9% of those older than 5 years. Among adults admitted with pneumonia during influenza season, 20–40% test positive for influenza. These findings highlight the importance of testing hospitalised pneumonia patients for influenza and initiating antiviral treatment, such as Oseltamivir, when indicated.

Available antiviral treatment options for Influenza in South Africa:

There are three groups of antiviral therapy available:

1. Neuraminidase inhibitors
   - Oseltamivir (Tamiflu)
   - Zanamivir (Relenza)
2. Cap-snatching endonuclease inhibitor
   - Baloxavir marboxil (Xofluza)

3. M2 ion channel inhibitors
   - Amantadine. Due to the high incidence of resistance, they are no longer advised.

Neuraminidase inhibitors

Prevent the release and spread of viruses from the cell. They may also prevent attachment and entry into the cell. They are active against influenza A and B viruses.

1. Oseltamivir

Oseltamivir is administered orally, twice daily for treatment and once daily for prophylaxis. In critically ill patients, it can also be administered via a nasogastric tube. While resistance was high during the 2008–2009 seasons, current circulating strains show significantly reduced resistance. It is considered safe for use in pregnancy and can be used in children, although resistance tends to be higher among young children.

Routine use in non-severe influenza is not recommended, as it offers minimal benefit, typically reducing symptom duration by only one day, and does not impact hospitalisation rates or mortality. Additionally, widespread use may contribute to the development of resistance.

However, Oseltamivir is recommended for severe influenza, particularly when initiated within 48 hours of symptom onset. It should also be used in cases of novel influenza A strains with high or uncertain mortality risk, even in patients who are not considered high risk.

Table IV: Dosage recommendations for patients with normal renal function

Age	Weight	Dose	Duration
Adults	> 40 kg	75 mg bd	5 days
Children 1–12 years	≤ 15 kg	30 mg bd	5 days
	> 15–23 kg	45 mg bd	5 days
	> 23–40 kg	60 mg bd	5 days
	> 40 kg	75 mg bd	5 days
Children < 12 months		3 mg/kg/dose bd (If ≥ 9 months can increase dose to 3.5 mg/kg/dose bd)	5 days

bd = Twice Daily

That said, the overall benefits in reducing ICU admissions, length of hospital stay, or mortality are limited.

The standard duration of therapy is 5 days; however, in hospitalised or severely ill patients, treatment may be extended, up to 10 days, depending on individual clinical factors.

Table V: Oseltamivir dose adjustments in adults with altered kidney function

CrCl	If the usual indication-specific dose is 75 mg once daily (e.g. seasonal influenza prophylaxis)	If the usual indication-specific dose is 75 mg twice daily (e.g. seasonal influenza treatment)
≥ 60 mL/minute	No dosage adjustment necessary	No dosage adjustment necessary
> 30 to < 60 mL/minute	30 mg once daily	75 mg × 1 dose, then 30 mg twice daily
> 10 to 30 mL/minute	30 mg every other day	30 mg once daily
≤ 10 mL/minute	30 mg once weekly	30 mg every other day

Prophylactic dose

Oseltamivir may be used as prophylaxis in asymptomatic individuals who are at extremely high risk of developing severe influenza and have been exposed to the virus within the previous 48 hours. In such cases, the dosing is the same as the therapeutic dose but given once daily for 10 days (Table VI). Prophylactic use is not recommended for individuals who are not considered extremely high risk.

For zoonotic influenza infections associated with high or uncertain mortality, Oseltamivir is also recommended as prophylaxis in exposed individuals. In these cases, the treatment dose (twice daily) is used for an extended duration of 14 days.

2. Zanamivir

Zanamivir is administered as a powder for inhalation using a specific inhalation device. It cannot be nebulised. This route of administration may be unsuitable for young children, the elderly, or severely ill patients who are unable to use the device effectively.

Dosage

Treatment dose: 10 mg (two inhalations) every 12 hours for 5 days.

Table VI: Prophylactic dosage recommendations for patients with normal renal function

	Weight	Dosage in severe influenza	Duration of severe influenza	Dosage in Zoonotic influenza	Duration of Zoonotic influenza
Adults	> 40 kg	75 mg daily	10 days	75 mg bd	14 days
Children 1-13yrs	10–15 kg	30 mg daily	10 days	30 mg bd	14 days
	> 15–23 kg	45 mg daily	10 days	45 mg bd	14 days
	> 23–40 kg	60 mg daily	10 days	60 mg bd	14 days
	> 40 kg	75 mg daily	10 days	75 mg bd	14 days
Children < 12 months		3 mg/kg/dose bd (If ≥ 9 months can increase dose to 3.5 mg/kg/dose daily)	10 days	3 mg/kg bd (If ≥ 9 months can increase dose to 3.5 mg/kg/dose daily)	14 days

Prophylaxis in extremely high-risk individuals (post-exposure): Same dose, administered once daily for 10 days, starting within 48 hours of exposure.

Prophylaxis for zoonotic influenza (high or unknown mortality risk): Same dose and duration as treatment (10 mg twice daily for 5 days).

Precautions & contraindications

Not recommended for individuals with chronic respiratory conditions such as asthma or COPD, due to the risk of bronchospasm.

Safe for use during pregnancy.

Approved for use in children older than 7 years.

No serious adverse effects have been reported.

Efficacy Considerations

Not recommended for non-severe influenza, as it has minimal impact on symptom duration, hospitalisation rates, or mortality.

Not recommended for severe influenza, as clinical studies have shown no significant benefit in reducing ICU admissions, hospital stays, or mortality.

Endonuclease cap-snatching inhibitor

Baloxavir marboxil *(Registered with SAHPRA but currently not listed at suppliers)*

Baloxavir is a cap-snatching inhibitor that targets the viral endonuclease enzyme. This enzyme allows the virus to "steal" short 5' capped RNA primers from the host's mRNA, which are essential for viral replication. By inhibiting this function, Baloxavir effectively blocks viral replication.

Baloxavir is administered as a carboxyl prodrug, which is hydrolysed into its active form in the body. It has a long half-life with a prolonged tail lasting several weeks, raising concerns about potential development of viral resistance. Therefore, its use is not recommended in immunocompromised patients.

Safety profile

- Pregnancy: Not considered safe, despite animal studies showing no adverse effects at doses five times higher than normal.
- Lactation: No reported adverse effects during breastfeeding.
- Children: Limited data available for use in children younger than 5 years.

Indications for use

Baloxavir is recommended for the treatment of non-severe influenza in individuals at risk of progression to severe illness, including:

- Adults older than 65 years
- Individuals of any age with significant risk factors

Prophylaxis

- Recommended for asymptomatic, high-risk individuals exposed to influenza within the previous 48 hours, specifically those at extremely high risk (e.g. over 85 years old or younger patients with multiple risk factors).
- Also advised for prophylaxis against zoonotic influenza strains with known or uncertain high mortality risks.
- Prophylactic dosing is the same as treatment — a single dose (See Table VII).

Treatment considerations

- Treatment should begin within 48 hours of symptom onset.
- Baloxavir can reduce the duration of illness by approximately one day and may help reduce hospital admissions, although it has not been shown to decrease mortality.
- It is generally well tolerated and not associated with serious adverse events.
- Viral testing before treatment is recommended.

Table VII: Dosage of Baloxavir

Weight	Dose
< 20 kg	2 mg/kg as a single dose (Max: 40 mg)
20–79 kg	40 mg as a single dose
≥ 80 kg	80 mg as a single dose

Adjuvant treatment for Influenza

1. Antibiotic use

In patients with non-severe influenza without secondary bacterial infection, antibiotics are not recommended. The use of Macrolide antibiotics for their anti-inflammatory effects is discouraged, as it can promote antibiotic resistance without reducing symptoms or preventing progression to severe complications like pneumonia.

2. Oxygen therapy

Should be given to keep the SpO2 > 90% and 92–95% in pregnant patients.

3. Use of corticosteroids in severe influenza

Its use is not recommended except for ARDS.

4. Use of NSAIDs in influenza

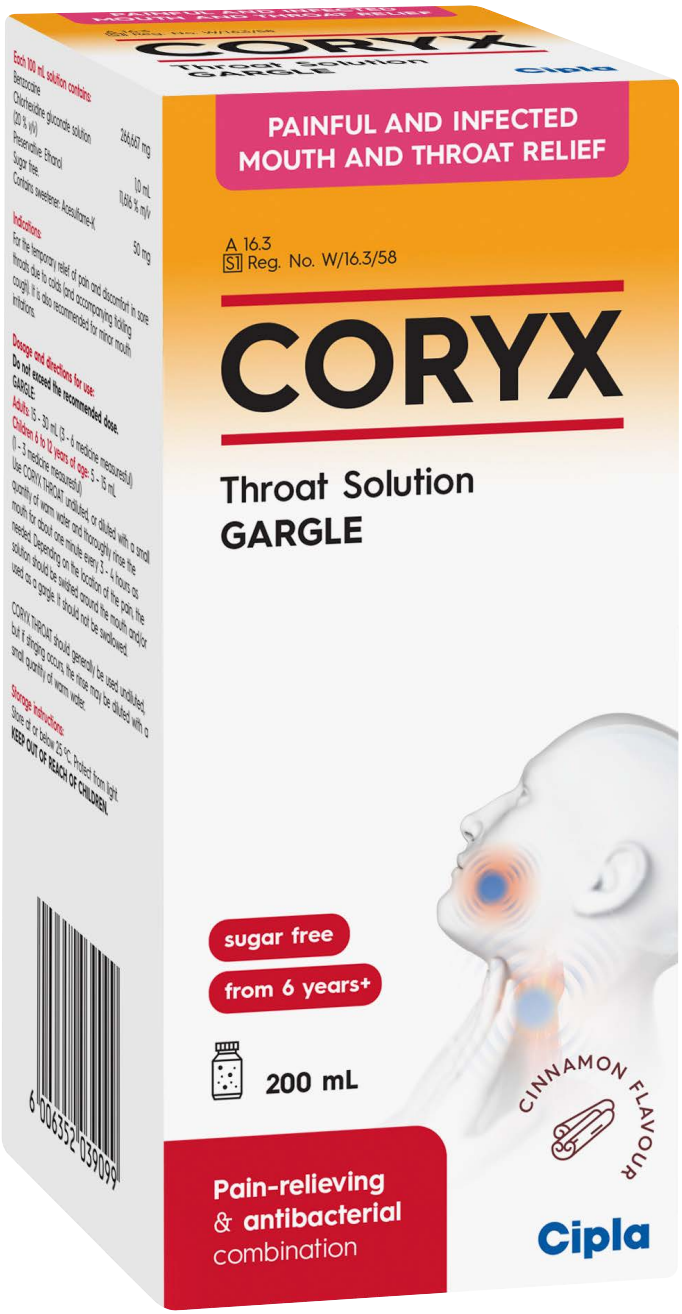
In non-severe influenza the use of NSAIDs is useful for its symptomatic effect of reducing fever and myalgia. In severe influenza, it is not recommended due to its potential adverse effects on renal function in cases of sepsis and septic shock.

5. Passive immunotherapy

Gamma-globulins are not advised.

CORYX

Cipla



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Pain-relieving & antibacterial combination[1]

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200 mL

S1 W/16.3/58. Coryx Throat (Solution). Each 100 mL of solution contains: benzocaine 266,667 mg, chlorhexidine gluconate solution (20 % *v/v*) 1,0 mL. For full prescribing information, refer to the Professional Information approved by the medicines regulatory authority.

References: 1. Professional Information: Coryx Throat (Solution). CIPLA MEDPRO (PTY) LTD. Co. Reg. No. 1995/004182/07. Building 9, Parc du Cap, Mispel Street, Bellville, 7530, RSA. Website: www.cipla.co.za Customer Care: 080 222 6662. [1630358304]

Diagnostic strategies for testing for Influenza A.

The following tests are available

Polymerase Chain Reaction **(PCR)** amplifies specific gene sequences and offers high sensitivity and specificity; however, its main limitation is the turnaround time.

Nucleic Acid Amplification Tests **(NAATs)** also provide high sensitivity and specificity for detecting influenza virus nucleic acids, especially when samples are collected within 3–4 days of symptom onset.

Direct Immunoassays **(DIAs)** detect influenza virus antigens with moderate to moderately high sensitivity and high specificity, requiring sample collection within the same 3–4-day window. These tests tend to be less costly. It is advisable to consult with your laboratory regarding the expected turnaround time for test results.

The following management strategies are considered

1. **Treat none** - No test, and do not treat patients with suspected influenza with an antiviral.

2. **Treat all** - No test and treat patients with suspected influenza with an antiviral.

3. **Rapid test and treat** - Test all suspected influenza cases using a rapid point-of-care test (such as NAAT, which has high sensitivity and specificity for detecting influenza viral nucleic acids) and treat only those who test positive.

4. **Test and Treat** - Test all suspected cases with a molecular assay (PCR) and start antiviral treatment immediately while awaiting results (typically within 24 hours). Discontinue treatment if the test result is negative.

5. **Test and Wait** - Test all suspected cases with a molecular assay (PCR) but withhold antiviral treatment until results are available.

How to test

Thanks to the COVID-19 pandemic, most doctors are now skilled at collecting quality nasopharyngeal swabs. Ideally, samples should be taken within the first 3–4 days of symptom onset. When symptoms mainly involve the lower respiratory tract and influenza is suspected, sputum, endotracheal aspirates, or bronchoalveolar lavage specimens can be submitted for NAAT testing.

For patients with non-severe influenza who are at risk of developing severe illness, the recommended approach is to test using NAAT and treat all positive cases with a single dose of Baloxavir (40–80 mg). Oseltamivir and Zanamivir are not indicated for this group.

For patients with severe influenza requiring hospital admission, the recommendation is to test with NAAT and treat only those who test positive with Oseltamivir for 5 days. If PCR testing is available with results within 24 hours, this strategy should be followed: treat only PCR-positive patients with Oseltamivir. If results are delayed beyond 24 hours, a test-and-treat approach may be used initially, but treatment should be stopped if the test result is negative.

In cases where lower respiratory symptoms dominate, the virus may have cleared from the upper respiratory tract, leading to negative swab results. In such situations, testing of lower respiratory specimens with NAAT or PCR is appropriate.

Table VIII: Symptomatic treatment for Influenza

Cough	Dextromethorphan hydrobromide, ammonium chloride and panthenol containing medication as a cough suppressant and an expectorant. Mucolytics – Acetylcysteine containing medication.
Sore Throat	Benzocaine plus Chlorhexidine Gluconate containing solution to gargle, spray or lozenges.
Fever and Myalgia	Paracetamol, Aspirin and Ibuprofen.
Rhinitis	Pseudoephedrine-containing medication.

Summary

Seasonal influenza is upon us, and effective management is essential. Antiviral treatment is not recommended for individuals at low risk of developing severe influenza. Those at risk should receive antivirals, specifically Baloxavir, within 48 hours of symptom onset. In cases of novel influenza A with known or uncertain high mortality, antiviral treatment is also advised, using Baloxavir, Oseltamivir, or Zanamivir.

For patients hospitalised with severe influenza, Oseltamivir is the recommended antiviral. In all situations where treatment is indicated, it is best to test for the virus first and only treat those with a positive result.

Prophylactic antiviral therapy (Baloxavir, Oseltamivir, or Zanamivir) is recommended for individuals at extremely high risk of severe influenza and should be initiated within 48 hours of exposure.

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- World Health Organization. Clinical practice guidelines for influenza. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO. Available from: https://www.who.int/publications/i/item/9789240097759.

In my personal view, these guidelines place a significant responsibility on healthcare professionals to identify patients who are at risk or extremely high risk of contracting severe influenza within their practices. It is important that these individuals are informed about their risk status, made aware of the availability of prophylactic treatment, and encouraged to seek medical attention within 48 hours of exposure or symptom onset, since many patients tend to present after this critical window.

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Musculoskeletal pain

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Abstract

Musculoskeletal pain affects different parts of the body (neck pain, limb pain, low back pain, joint pain, chronic widespread pain) and is a major reason for patient consultation. It mainly affects the elderly but can also affect other population groups regardless of age, gender, or economic status. It affects approximately 47% of the general population. It is mostly accompanied by emotional stress and a decline in physical function which affects the quality of life. Musculoskeletal pain can also lead to disability, decline in cognitive activity, falls and poor sleep. As much as musculoskeletal pain is associated with musculoskeletal conditions, healthcare practitioners should be aware that pain should be treated as a condition on its own and not only treat the underlying musculoskeletal conditions. Management includes both pharmacological and non-pharmacological approaches and it is important for healthcare practitioners to note that either approach might not be effective alone and a combination of approaches should be considered.

Keywords: musculoskeletal pain, muscle pain, bone and joint pain

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Introduction

Musculoskeletal pain is defined as pain affecting the muscles, joints, bones or related soft tissues.[1] The most common types of musculoskeletal pain include chronic low back pain, neck pain and pain linked to osteoarthritis and rheumatoid arthritis. However, it also includes muscle sprains, pain from fractures, shoulder pain and other.[2] According to the World Health Organization (WHO), 20–33% of the world's population has some form of chronic musculoskeletal pain, translating to 1.75 billion people globally.[3] Lehti et al.[4] reported 57–61% of patients that indicated having intermittent or daily musculoskeletal pain. Musculoskeletal pain can be acute or chronic, with chronic pain classified as primary or secondary.[5] Chronic musculoskeletal pain is long-term and accompanied by significant emotional distress or disability, without a clear disease-related cause. In contrast, chronic secondary musculoskeletal pain results from an underlying disease and may be associated with chronic inflammation due to infection, autoimmune processes and crystal deposition, musculoskeletal structural changes and neurological conditions like Parkinson's disease.[6] Inadequately managed musculoskeletal pain can adversely affect the quality of life of the patients and impose significant socioeconomic problems.[2]

Pathophysiology

Musculoskeletal pain is a multidimensional condition arising from dynamic interactions between peripheral and central nervous system mechanisms.[7] Peripheral sensitisation occurs following tissue injury, wherein damaged cells release pro-inflammatory cytokines—such as interleukin-1β (IL-1β) and tumour necrosis factor-alpha (TNF-α)—alongside chemical mediators like prostaglandins (PGs) and bradykinin.[8] These substances activate the sensitising sensory afferent fibres (Aδ, C-fibres), which act as high threshold mechanoreceptors, responding to high intensity mechanical stimuli.[9] This further awakens the silent nociceptors located in muscles, joints, ligaments, and tendons.[10] Activation of the silent nociceptors results in hyperalgesia (increased pain from noxious stimuli) and allodynia (pain from non-noxious stimuli).[11]

Prolonged nociceptive input can lead to central sensitisation, a phenomenon characterised by heightened excitability of neurons in the spinal cord's dorsal horn and altered pain processing in higher brain centres. This state amplifies pain perception, even after the initial injury has resolved. Dysfunctional descending pain modulation, involving structures like the periaqueductal grey (PAG) and rostral ventromedial medulla (RVM), further exacerbates pain. Normally, these systems suppress pain signals, but their dysregulation results in prolonged and exaggerated pain responses.[12]

Neurotransmitters such as substance P, CGRP and purinergic receptors, P2X3 amplify pain signals.

In skeletal system, adenosine triphosphate (ATP) released during trauma or other pathological processes binds purinergic receptors to excite nociceptive fibres. ATP is pain transducer in skeletal system.[13] In an acid-induced model of muscular pain, ASIC3 channels have also been shown to contribute to the development of mechanical hypersensitivity in this manner.[14]

In chronic pain states (pain occurring over three months), the immune system maintains ongoing pain through autoimmune mechanisms. Peripheral and central mast cells likely play a crucial role in the shift of acute to chronic pain by interacting with other immune cells and somatosensory nerve terminals.

Persistent peripheral inflammation and central plasticity lead to maladaptive changes, such as ectopic sympathetic nerve

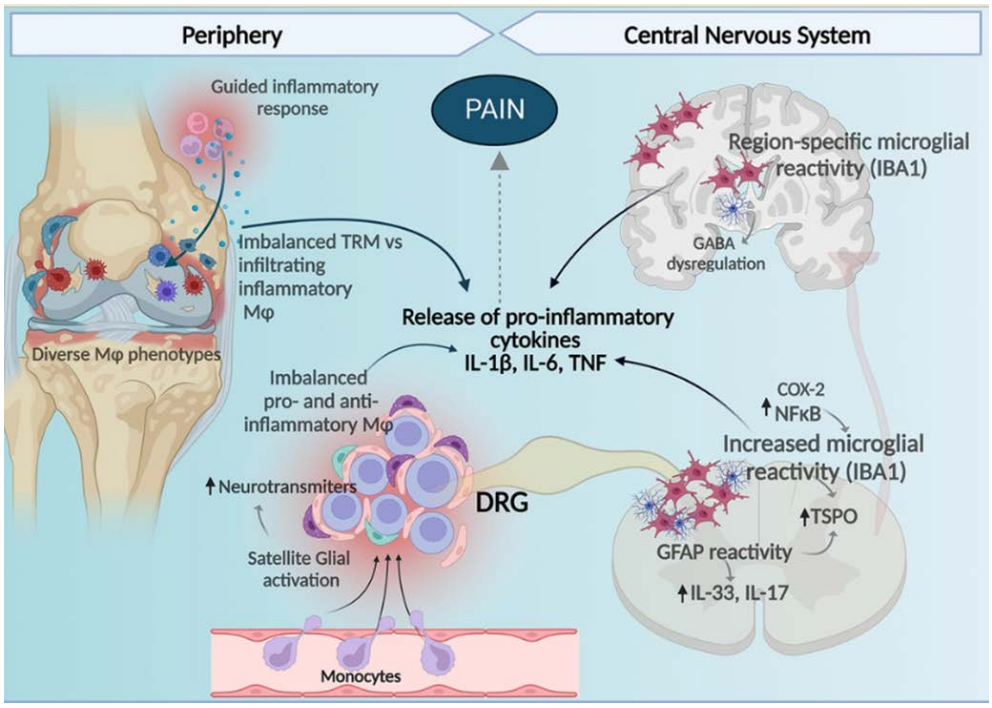

Figure: Interaction between the peripheral and central nervous system mechanisms during inflammation[15]

sprouting in joints contributing to prolonged pain and disability. Moreover, psychosocial factors such as anxiety, depression, catastrophising, and social context have been shown to influence pain perception and recovery trajectories.

Clinical manifestation

Musculoskeletal pain manifests as a tight, radiating, diffuse and drilling sensation.[16] It is usually nociceptive in nature but can be neuropathic, especially in the elderly.[17] Pain arising from the joints is more localised than that affecting the muscles (myalgia) and is known to worsen at night. Both myalgia and joint pain are greatly affected by movement as compared to bone pain, and bone pain worsens at night. Deep-tissue hyperalgesia is often widespread and difficult to differentiate from pain from other tissues.[16]

The pain can be acute or chronic, diffuse or focal (even multifocal), in musculoskeletal or associated neural tissues.

Clinical symptoms include:

- Local symptoms of pain or widespread and persistent pain or peripheral nerve irritation which may eventually lead to decreased nerve conduction velocity.
- Weakness, such as reduced finger or grip strength.
- Limited motion and stiffness.

Symptoms progressively increase with greater tissue injury and inflammation in affected anatomical sites. Symptoms are exacerbated by work-related or personal stress, for example, poor control over one's work, difficult relationships and time pressure. Symptoms have diurnal fluctuation. At first, symptoms subside with cessation of work (i.e. between shifts, overnight, over weekends, and during vacations). As exposure persists and tissue injury progresses, symptoms may be insufficiently alleviated by rest.[18]

Management

Management of musculoskeletal pain can be divided into two types, pharmacological and non-pharmacological. The non-pharmacological treatment option has home exercises for mild pain and transcutaneous electrical nerve stimulation, acupuncture and ultrasound for severe pain. Aerobic training and muscle strengthening are reported to improve pain and physical activity.[19] Cryotherapy, also known as cold therapy, is applied directly to an injured area to reduce haemorrhage and vasodilation, decreases the local inflammatory response, oedema production, and pain perception.[20] Therapeutic heat is often applied alongside prolonged stretching to help alleviate musculoskeletal contractures, joint stiffness, and chronic inflammatory conditions, ultimately reducing pain and improving mobility and function. In cases of subacute and chronic pain, heat therapy enhances collagen flexibility, boosts blood circulation and metabolic activity, and supports the resolution of inflammation.[21] Transcutaneous electrical nerve stimulation therapy (TENS) works by delivering low-voltage electrical impulses through electrodes placed on the skin. These impulses help block pain signals from reaching the brain and stimulate the release of endorphins, the body's natural painkillers.[22]

Acupuncture is an ancient Chinese therapy practised for more than 2 500 years to cure disease and relieve pain. It depends on the use of thin metal needles that are inserted into specific body sites and stimulated manually or electrically. Acupuncture is considered an invasive procedure and needs a professional physician or practitioner to perform it.[21]

Table I: Musculoskeletal pain types and their management

Musculoskeletal pain	Types or associated conditions	Manifestation	Non-pharmacological management	Pharmacological management
Muscle pain	Cramps Lower back pain Neck pain	Pain, soreness and swelling	Stretching the affected muscle	Vitamin E
Bone pain	Fractures	Severe pain	Bone stabilisation and minimal bed rest	NSAIDs and COX-inhibitors
Joint pain	Gout	Extreme pain, swelling, tenderness, redness and local heat	Hydration, avoid excessive alcohol consumption and purine containing food such as liver, rest and immobilisation	Allopurinol, Colchicine, NSAIDs and glucocorticoids
	Rheumatoid arthritis	Symmetric pain, swelling, joint tenderness, muscle weakness	Physiotherapy, occupational therapy	NSAIDs and corticosteroids
	Osteoarthritis	Stiffness, pain and motion limitation	Physical therapy, joint protection and splinting, and weight reduction	Paracetamol and aspirin
Tendon/ligament pain	Sprains and strains	Pain, immobilisation	Cryotherapy and early ambulation	NSAIDs
	Tendinitis	Pain and swelling	RICE	NSAIDs

Patient's education about their condition helps in non-pharmacological treatment strategies, such as physical activity, rest and exercise.[21] A comprehensive patient assessments including detailed history taking with neuroimaging may be necessary to treat well.

The types of musculoskeletal pain, their presentations, and management strategies are shown in Table I.[23-28]

Pharmacological treatment is the mainstay for the management of pain. A wide range of analgesics have been used in the treatment of musculoskeletal pain. The WHO analgesic ladder has guided the treatment in these patients.[29]

Non-opioid analgesics

Paracetamol

Paracetamol is thought to act both centrally and peripherally. It reduces prostaglandin synthesis from arachidonic acid via inhibition of the cyclooxygenase isoenzymes COX-1 and COX-2.[30] It is used in combination with nonsteroidal anti-inflammatory drugs (NSAIDs). Paracetamol is relatively effective in many pain conditions, and it has minimal adverse effects. However, regular monitoring for hepatotoxicity is required for patients who receive this drug for longer periods at high doses.

Nonsteroidal anti-inflammatory drugs

NSAIDs are widely used for the treatment of musculoskeletal pain.[31] They have analgesic and anti-inflammatory properties and may be used for the treatment of mild-to-moderate pain. These drugs work by blocking cyclooxygenase (COX), an enzyme responsible for the production of prostaglandins (PGs), which are strong inflammatory mediators. Traditional NSAIDs, however, inhibit both COX-1 and COX-2 isoforms and have been linked to serious gastrointestinal adverse effects such as ulcers and an increased risk of bleeding.[32] Prolonged use of NSAID treatment is also associated with other adverse effects including inhibition of platelet function and increased bleeding time, as well as bronchospasm following the administration of aspirin and other NSAIDs in some patients with asthma.

Topical NSAIDs, like topical diclofenac, are effective for reducing musculoskeletal pain and should be considered in the treatment of patients with musculoskeletal pain, particularly for those who cannot tolerate oral NSAIDs.

COX-2 selective inhibitors (COX-2)

COX-2 selective inhibitors refer to a class of analgesic and anti-inflammatory drugs. COX-2 is found in inflammatory cells, tissue damage, synovia of joints, endothelium, and the CNS.[21] These drugs have the same effectiveness as the other NSAIDs with fewer side effects on the gastrointestinal tract. However, long-term use has been associated with increased risk of cardiovascular side effects and this should be taken into account especially in cardiac and susceptible patients.[33]

Opioids

Opioids produce their effect by acting as agonists at opioid receptors, which are found in the brain, spinal cord, and sites outside the CNS. There are three types of opioid receptors: mu (l), delta (d), and kappa (j).[34] It is important to know that opioids are not the first-line therapy for musculoskeletal pain because of the side effect profile and dependence. The side effects range from respiratory depression, sedation, nausea/vomiting, and constipation.[21] The overuse and overdose can also lead to coma and death. A study by Tlali et al.[35] examined the diagnosis and treatment of opioid-related disorders in a South African private sector medical insurance scheme. Their findings showed that the incidence of people diagnosed with or treated for an opioid-related disorder in the private sector is increasing rapidly.

Table II shows pharmacological agents used in the management of musculoskeletal pain and common side effects.[36,37]

S3

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INDICATIONS[1]

ALLOPURINOL CIPLA is indicated for the treatment of gout and hyperuricaemia associated with other conditions.

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Table II: Pharmacological agents used in the management of musculoskeletal pain

Class	Examples	Drug interactions	Common side effects
Non-opioid analgesics	Paracetamol	Warfarin, anticonvulsants, rifampicin, probenecid and chloramphenicol	Rash, hypersensitivity reactions such as urticaria, nausea and hepatotoxicity
NSAIDs	Aspirin Ibuprofen Diclofenac	Warfarin, probenecid, beta-blockers, diuretics and corticosteroids	Gastric effects ranging from mild irritation to erosion, peptic ulceration and bleeding
COX2 inhibitors	Celecoxib Etoricoxib	Diuretics, aspirin, oral contraceptives and ciclosporin	Risk of cardiovascular events and low incidence of diarrhoea, dyspepsia and abdominal pain
Opioids	Tramadol Morphine	Alcohol, antidepressants, antipsychotics and warfarin	Respiratory depression, sedation, nausea/vomiting and constipation
Anticonvulsants	Carbamazepine Gabapentin	Oral contraceptives, isoniazid, alcohol and diuretics	Drowsiness, ataxia, CNS depression and dizziness
Antidepressants	Amitriptyline Nortriptyline	MAOIs, SSRIs, anticholinergics, alcohol and other CNS depressants	Sedation
Muscle relaxants	Baclofen	Levodopa, CNS depressants, morphine, lithium and antihypertensives	Dizziness, fatigue and weakness

Adjuncts analgesics

Anticonvulsants

These drugs are used to treat seizures, however they can be used for neuropathic pain in musculoskeletal pain. Gabapentin and pregabalin are effective for the treatment of patients with neuropathic pain and work by inhibiting neurotransmitters within the cerebral cortex, which maintains the inhibitory tone necessary for counterbalancing neuronal excitation and decreasing the pain.[38] They bind to the a2-d-subunit of neuronal voltage-gated calcium channels and thus reduce the influx of calcium ions in hyperexcitable neuronal states. Although the side effect profile is tolerable at recommended doses, there is recent concern of respiratory depression when this medication is used in conjunction with CNS depressants, including opioids, and in patients with baseline respiratory impairment.[21]

Carbamazepine has also been used in musculoskeletal pain. However, the FDA approved indication is for neuropathic pain and trigeminal neuralgia. Carbamazepine blocks voltage-gated sodium channels that are mainly expressed in peripheral C and Aδ nerve fibres. Dysfunction of these small, un- or thinly myelinated fibres is associated with several chronic pain disorders, including small fibre neuropathies and fibromyalgia. However, muscle pain is nociceptive and the mechanism of this drug in management of this pain is not completely unknown.[39]

Antidepressants

Tricyclic antidepressants (TCAs), such as amitriptyline and nortriptyline, provide pain-relieving effects that are separate from their mood-enhancing properties. Their analgesic action is associated with their ability to block calcium channels, inhibit sodium channels, and antagonise NMDA receptors.[40] More specifically, the analgesic effect is believed to be due to the presynaptic reuptake inhibition of monoamines such as serotonin and norepinephrine.[21]

Musculoskeletal drugs

The most commonly used muscle relaxant drug is baclofen. Baclofen is an agonist for gamma-aminobutyric acid (GABA) B receptors on pre- and postsynaptic neurons in the CNS and peripheral nervous system. Agonism of GABAB receptors found on type Ia presynaptic neurons arising from extrafusal muscle spindles causes an efflux of potassium (K+) leading to hyperpolarisation of the neuronal membrane, as well as decreased calcium (Ca2+) influx at presynaptic nerve terminals.[41] Baclofen therapy is associated with potential complications, including life-threatening toxicity and withdrawal syndrome.[21]

Conclusion

Musculoskeletal pain is a collective term for a variety of conditions which can also be secondary to other conditions. It can cause a burden on the quality of life of the patients and needs to be attended to. There are several non-pharmacological methods that can be used, however most patients end up taking medication to help reduce and manage the pain. NSAIDs are the drugs of choice but every patient needs to be treated as an individual to optimise therapy and ensure that they are getting the best help. Then the patients should be monitored for any potential side effects to the drugs.

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Full list of references available on request

Oral nutritional supplementation in paediatric feeding difficulties: a South African pharmacist's evidence-based review

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Abstract

Objective: This narrative review evaluates the evidence for oral nutritional supplementation (ONS) in paediatric patients with feeding difficulties, commonly known as picky eating, and emphasises the pharmacist's role in identifying risk factors, guiding supplementation, and optimising nutritional outcomes.

Methodology: A comprehensive literature search was conducted using PubMed, Scopus, and the Cochrane Library through 2024, focusing on studies addressing the prevalence, causes, and consequences of picky eating in children and the clinical impact of ONS and pharmacist-led interventions.

Key findings: Picky eating is a prevalent issue in children and may contribute to nutritional deficiencies and growth concerns, particularly in low- to middle-income countries (LMICs), such as South Africa, where food insecurity and limited dietary diversity exacerbate the nutritional risk. Evidence suggests that, when used appropriately in at-risk populations, ONS can support catch-up growth, improve micronutrient status, and enhance appetite.

Key conclusions: Pharmacist-driven nutritional screening and ONS support, when targeted to high-risk populations, can be pivotal in mitigating paediatric malnutrition in LMICs like South Africa.

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The global burden of malnutrition

Malnutrition continues to be a leading public health concern, particularly in ow- to middle-income countries (LMICs) across Asia and sub-Saharan Africa. According to the United Nations Children's Fund (UNICEF), approximately 45 million children under the age of five were wasted (low weight-for-height) in 2022, and 148 million were stunted (low height-for-age), both of which reflect chronic undernutrition during critical growth periods.[1]

The COVID-19 pandemic further exacerbated global food insecurity, pushing an additional 150 million people into hunger between 2019 and 2021. By the end of 2021, 828 million people were affected globally—425 million in Asia and 278 million in Africa—casting serious doubt on the world's ability to meet the Zero Hunger target set for 2030.[2]

South Africa's nutritional landscape

In South Africa, undernutrition remains widespread despite numerous public health interventions. The link between food insecurity and poor nutritional outcomes is well established; recent Human Sciences Research Council (HSRC) data found that 63.5% of households experience food insecurity, and 17.5% face severe levels.[3]

In households where at least one child under five is stunted, the rate of food insecurity soars to 83.3%. Each year, an estimated 1 000 children in South Africa die from preventable acute malnutrition. In comparison, around 2.7 million children under six live in poverty-stricken homes unable to meet their basic nutritional needs.[3]

The COVID-19 pandemic has intensified this crisis, with rising food prices and worsening food inflation compounding the issue. Recent figures indicate that 28.8% of children under five are stunted—a strong indicator of chronic nutritional deprivation.[3]

Stunting hampers both physical and cognitive development and contributes to a cycle of poverty and poor health outcomes.[3]

Provinces like KwaZulu-Natal, Gauteng and the Western Cape report some of the highest childhood hunger rates. The 2024 South African Early Childhood Review echoes these concerns, noting a significant increase in severe acute malnutrition between 2020 and 2023. In the 2022/23 period alone, over 15 000 children required hospital treatment for severe malnutrition.[4]

Understanding picky eating in context

Picky eating is a behavioural feeding difficulty most often observed in toddlers and preschoolers, generally emerging between one and three years of age. Up to 62% of healthy children in this age group show some form of feeding difficulty, with food refusal and selective eating being the most common.[5]

Although research from high-income countries has generally concluded that picky eating rarely leads to significant malnutrition, these findings may not be generalisable to LMICs.

In countries like South Africa, where dietary diversity is often poor, food security is fragile, and access to supplements or fortified foods is limited, the impact of picky eating may be more severe.[5,6] For instance, Wright et al.[7] found that 11% of picky eaters were under the 5th percentile for weight, while earlier studies linked early feeding difficulties with later diagnoses of failure to thrive.[5]

A cross-sectional study of preschoolers in Cape Town demonstrated that picky eating was associated with lower intakes of iron and vitamin A—micronutrients already identified as commonly deficient in national dietary studies.[8] Data from the South African National Health and Nutrition Examination Survey (SANHANES) show widespread micronutrient deficiencies among children, particularly iron (17–28%), vitamin A, and zinc, especially in rural and peri-urban communities reliant on maize-heavy diets, which impair zinc absorption due to phytate content.[10] Additionally, Nogueira-de-Almeida et al.[5] found that picky eaters consume fewer key micronutrients such as Vitamin D, C, folate, iron, zinc, and calcium.

Reviewing and weighing the evidence

While Huynh et al.[10] and other studies demonstrated growth improvements with oral nutritional supplementation (ONS) plus dietary counselling in picky eaters, recent evidence suggests benefits may be limited to children with more severe deficiencies or malnutrition risk.

Mixed findings from recent trials

- A 2023 randomised controlled trial conducted in Brazil reported that supplementation in picky eaters led to weight gain through increased height rather than fat accumulation, as indicated by stable BMI z-scores and body fat percentage. Micronutrient inadequacies declined during the 180-day intervention, and appetite improved over time, highlighting a distinct advantage of using ONS with counselling compared to counselling alone.[5]
- In India, a 2021 study observed improved weight outcomes in children whose weight-for-height fell between the 3rd and 15th percentiles. However, no significant increase in height was seen during the 90-day intervention period. The study concluded that ONS, alongside dietary counselling, was more effective than counselling alone in supporting catch-up growth in children with picky eating and nutritional risk.[11]
- Conversely, Yackobovitch-Gavan et al.[12] found that children who were consistent consumers of ONS over one year experienced increases in height without corresponding changes in BMI, suggesting linear growth rather than weight gain.

Benefits and limitations of supplementation in picky eaters

Effective management of picky eating requires a holistic, multi-pronged approach. This includes nutrition education, tailored dietary counselling, and—in selected cases—the addition of ONS or multivitamin/mineral supplements (MVMs).[11]

Table I: Pharmacist-guided approach to paediatric nutritional supplementation

Step	Approach	Action
1	Identify the clinical need	Initiate supplementation only when a child is at risk of nutrient insufficiency or deficiency due to:[11] Picky eating and food refusal Allergies and food intolerances Restrictive dietary patterns Formula- or breastmilk-only feeding > 6 months without appropriate complementary foods Documented micronutrient deficiencies or faltering growth
2	Match supplement choice to risk profile	Tailor supplement recommendations to the child's specific dietary gaps, cultural context, and identified nutrient risk factors. See Table II for common nutrient avoidance patterns and recommended supplements.
3	Promote safe supplement use	Pharmacists support safe and effective supplementation through caregiver education and individualised guidance: Recommend age-appropriate products, avoiding nutrient duplication or megadosing Guide correct dosing, timing, and monitor for side effects Reinforce a "food-first" philosophy and promote dietary diversity Refer to dietitians, paediatricians, or specialists when growth concerns persist Consider taste, texture, and formulation (liquid vs. chewable) to improve adherence
4	Encourage ongoing monitoring	While pharmacists may not conduct clinical assessments, they play a critical role in caregiver education and follow-up recommendations: **Growth monitoring**: Encourage caregivers and healthcare providers to plot weight-for-age, height-for-age, and BMI-for-age on WHO growth charts to track progress. **Anthropometrics**: When indicated, advise on the role of mid-upper arm circumference (MUAC) and skinfold measurements in assessing nutritional status. **Biochemical markers**: Educate caregivers to consult with clinicians about lab tests like haemoglobin (Hb), serum 25(OH) D, zinc, and ferritin levels before starting or adjusting supplements. **Adherence checks**: Counsel caregivers to observe for taste preferences, gastrointestinal tolerance, and adherence patterns. **Duration and reassessment**: Recommend follow-up after 3 months to evaluate benefits and identify any side effects. **Total nutrient intake**: Help caregivers understand the importance of tracking cumulative nutrient intake when using multiple fortified products (e.g. formula + cereal + multivitamin) to prevent accidental overdosing.

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Table II: Common nutrient deficiencies in picky eaters – food avoidance patterns, South African risk factors, and suggested supplements[5]

Nutrient deficiency	Associated avoidance	SA-specific risk factors	Suggested supplement
Iron	Red meat, green veg	Low meat intake, helminth burden	Iron drops/syrup
Vitamin A	Orange/yellow fruits, liver	Low veg diversity, maize-heavy diets	Vitamin A capsules or multivitamins
Zinc	Animal protein	A maize-based diet, stunting	Zinc syrup/tablet
Vitamin C	Citrus, berries, and tomatoes	Seasonal availability, poverty	Chewable Vitamin C
Calcium & Vitamin D	Dairy, sun exposure	Lactose intolerance, limited outdoor time	Combined Ca/Vit D syrup or chewable
B-complex	Whole grains, meats	Highly refined diets	B-complex multivitamin

Although not recommended for routine use in all picky eaters, several studies confirm ONS's safety and benefit as part of a broader nutrition strategy, particularly in undernourished children.[10]

ONS formulae with balanced energy, vitamins, and minerals have also been shown to correct specific nutrient deficiencies and maintain nutritional status during periods of increased risk.[5]

However, a 2020 *Paediatrics* review emphasised that food-first strategies remain the preferred approach for managing picky eating in otherwise healthy children.[6]

Globally, the research landscape is still heavily skewed toward high-income settings, often featuring small, homogenous samples and short-term interventions. This limits generalisability to diverse, resource-constrained populations. There is a critical need for longitudinal, context-specific studies in low-income and rural South African communities. These should examine how feeding behaviours, cultural food practices, and socioeconomic factors shape child nutrition outcomes.

Types of nutritional supplements

Oral Nutritional Supplements (ONS): Sterile liquids, powders, or semi-solids that provide energy, protein, and essential vitamins and minerals. Used to support growth in children with poor appetite or feeding difficulties. Examples: Pediasure®, Nutridrink®, Lifegain Junior.

Multivitamin-Mineral Supplements (MVMs): Products containing essential vitamins (like A, D, C, B-complex) and minerals to support immunity, growth, and brain development.

Navigating paediatric supplements: A clinical decision-making approach

Pharmacists are uniquely positioned to guide parents toward evidence-based, individualised supplementation strategies, especially given the growing market for child-targeted supplements, including powders, shakes, chewables, and gummies.

While these products are widely accessible, their use should not be routine or indiscriminate. Instead, supplementation should be based on clinical need, dietary context, and growth patterns.

The following structured approach (Table I) outlines how pharmacists can proactively ensure safe, effective, and appropriate supplement use in children. It provides a stepwise framework to identify need, match supplement type to risk, educate caregivers, and support ongoing monitoring and follow-up.

Conclusion

Picky eating in children is often perceived as a benign phase of development. Still, in settings with high food insecurity and limited access to nutrient-dense foods, it can seriously threaten growth and health. Emerging evidence supports using ONS, particularly in children at nutritional risk, to address growth faltering and micronutrient deficiencies. While international research provides promising findings, it must be interpreted cautiously in South Africa due to differing socioeconomic, dietary, and healthcare realities. Pharmacists, as accessible healthcare providers, play a pivotal role in the early identification of feeding difficulties, risk stratification, and tailored supplementation. By leveraging their clinical knowledge and communication skills, pharmacists can bridge gaps in paediatric nutrition care, support caregivers, and contribute meaningfully to national efforts in reducing childhood malnutrition.

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Lemborexant: mechanism, efficacy, and clinical implications

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Abstract

Lemborexant, a dual orexin receptor antagonist (DORA), has emerged as an effective treatment for insomnia by modulating the orexin signalling pathway, which is critical in maintaining wakefulness. This review explores lemborexant's mechanism of action, clinical efficacy, pharmacokinetic profile, safety, and tolerability in treating sleep disorders, with a focus on insomnia. Through a synthesis of recent clinical trials and comparative studies, this article provides a comprehensive view of lemborexant's therapeutic role and potential in addressing the unmet needs of patients with sleep disturbances.

Keywords: lemborexant, insomnia, orexin receptor antagonist

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Introduction

Insomnia, a prevalent sleep disorder, affects millions globally and is associated with significant impairment in quality of life, mental health, and productivity.[1] Insomnia is frequently treated with benzodiazepine receptor agonists, which include benzodiazepines and non-benzodiazepine "Z-drugs".[1] Short-term (no more than three months) randomised controlled trials have shown that the "Z-drugs", such as zolpidem, zaleplon, and eszopiclone, are effective in improving sleep outcomes for individuals with insomnia.[1] These treatments might not be the best option for long-term care; there are some long-term data (six months or longer) available.[1] Lemborexant, a novel dual orexin receptor antagonist (DORA), represents a new approach to managing insomnia by targeting the orexin system, a key regulator of the sleep-wake cycle.[1]

By encouraging wake drive and arousal, the orexin/hypocretin system contributes significantly to the regulation of the sleep/wake cycle. It has been suggested that insomnia is a hyperarousal disorder.[2] By inhibiting orexin-mediated wake drive, DORAs – a class of agents that target the orexin system – are believed to reduce wakefulness and promote sleep. Furthermore, compared to benzodiazepine receptor agonists, DORAs might have a better safety record.[2]

Mechanism of action

Lemborexant works by selectively antagonising orexin receptors OX_1R and OX_2R, which play essential roles in promoting wakefulness.[3] The orexin signalling pathway is involved in the central nervous system's ability to maintain wakefulness.[3] By blocking the activity of orexin, lemborexant reduces arousal and helps facilitate the onset and maintenance of sleep.[3] This mechanism differs from traditional hypnotics, offering an alternative for patients who may not tolerate or respond well to other sedative-hypnotics.[3]

Pharmacokinetics and pharmacodynamics

Lemborexant has a favourable pharmacokinetic profile, with a half-life of approximately 17–19 hours, supporting its use as a once-daily bedtime medication.[4] It is rapidly absorbed, reaching peak plasma concentrations within 1–3 hours post-administration.[4] Studies indicate that lemborexant is metabolised primarily in the liver by cytochrome P450 enzymes, CYP3A4 being the primary pathway.[4] This drug's pharmacodynamics reflect a significant and sustained antagonism of orexin receptors, contributing to improved sleep duration and quality without substantial residual daytime sedation.[4]

Clinical efficacy

Efficacy in treating insomnia

Lemborexant has demonstrated efficacy in treating both sleep onset and sleep maintenance insomnia. Key clinical trials, such as SUNRISE-1 and SUNRISE-2, showed significant improvements in sleep parameters:

- **SUNRISE-1**: A randomised, double-blind, placebo-controlled trial comparing lemborexant to zolpidem.[5] Results indicated that lemborexant significantly improved sleep onset and maintenance, with fewer adverse cognitive effects than zolpidem.[5]
- **SUNRISE-2**: A six-month study assessing long-term efficacy and safety of lemborexant.[6] This trial confirmed the sustained effectiveness of lemborexant in improving sleep quality over a prolonged period.[6]

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Safety and tolerability

Lemborexant has shown a favourable safety profile with minimal risk of residual effects or dependency. Common adverse effects include headache, somnolence, and, less frequently, sleep paralysis.[7] Compared to other sedative-hypnotics, lemborexant poses a lower risk for adverse events related to falls, balance issues, and next-day drowsiness, especially in elderly populations.[7] While lemborexant's profile is generally positive, caution is advised in patients with hepatic impairment due to its hepatic metabolism.[7]

Potential clinical implications

1. Insomnia management in the elderly

The elderly population often experiences sleep disturbances that are difficult to treat due to sensitivity to drug-related adverse events.[7] Lemborexant's reduced cognitive and psychomotor impairment profile makes it an appealing option for insomnia management in this demographic, as it offers symptom relief without significantly increasing fall risk or next-morning grogginess.[7]

2. Addressing comorbid insomnia and mental health disorders

Insomnia frequently coexists with psychiatric disorders such as depression and anxiety, conditions often exacerbated by poor sleep quality.[8] Lemborexant may offer benefits for these patients by providing effective sleep management with lower risk of mood alteration or dependence.[8]

3. Expanding treatment options in patients unresponsive to traditional hypnotics

Patients who experience tolerance, dependence, or adverse effects from traditional sleep medications may benefit from lemborexant due to its novel mechanism.[5] Lemborexant can thus be considered a second-line option in patients for whom other hypnotics are unsuitable or ineffective.[5]

Challenges and future directions

While lemborexant presents numerous benefits, ongoing research is necessary to address some limitations and areas for improvement. Long-term studies exploring the chronic use of lemborexant are needed to fully understand its long-term effects on sleep architecture and dependency potential. Additionally, studies focusing on populations with comorbid conditions and different ethnic groups could provide more comprehensive insights into the drug's efficacy and safety.

Further exploration into combination therapies with lemborexant could also be valuable, particularly for patients with complex sleep and mental health needs. As research progresses, more data on optimal dosing, safety in diverse populations, and comparative effectiveness with emerging sleep aids will help refine lemborexant's place in clinical practice.

Conclusion

Lemborexant represents a significant advancement in the pharmacological management of insomnia, offering effective relief for sleep onset and maintenance issues through its dual orexin receptor antagonism. Its favourable safety and tolerability profile, especially in elderly patients, positions it as a promising alternative to traditional hypnotics. As insomnia remains a challenging condition with broad impacts on health and quality of life, lemborexant offers a new avenue for addressing sleep disturbances in a way that minimises many of the common risks associated with other sleep medications. Future studies will further clarify its role and broaden its application in the treatment of complex and chronic insomnia cases.

Conflict of interest

The author has no conflict of interest.

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Counseling in menopausal women: How to address the benefits and risks of menopause hormone therapy. A FIGO position paper

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Abstract

Menopause marks the end of menstrual cyclicity and, depending on individual vulnerability, has several consequences related to gonadal steroid deprivation, especially if it is premature. Menopause may be more burdensome for some women than for others. Individual factors, such as personal history, socioeconomic status, ethnicity, and current health conditions, affect symptomatology and, thereby, the menopausal experience. In addition, some menopausal symptoms, such as severe hot flashes, sleep disorders, and depression, are markers of future health risks. Counseling is a fundamental part of health care in the peri- and postmenopause periods. It must include an assessment of the patient's symptoms, needs, desires, and risk profile to address the benefits and risks of menopausal hormone therapy (MHT) on an individual basis and promote a healthy lifestyle. Indeed, healthcare practitioners can and must protect the health and lives of mid-life women by increasing awareness of menopausal symptoms and ensuring healthcare options, especially MHT. The type and duration of MHT should be tailored based on the patient's history, menopausal age, physical characteristics, and current health status so that the benefits always outweigh the risks. This FIGO position paper focuses on the benefits and risks of MHT on health domains, target organs, and systems, and on systemic and vaginal MHT regimens, to provide indications that can be used in the clinical practice for menopausal counseling. Moreover, it offers insights into what FIGO considers the mainstay for the healthcare management of women in peri- and postmenopause, worldwide.

Keywords: bioidentical hormones, counseling, hormone therapy, menopausal hormone therapy benefits, menopausal hormone therapy regimens, menopausal hormone therapy risks, menopausal symptoms, menopause

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Background

Menopause represents an opportunity for healthcare practitioners to comprehensively audit a woman's physical and psychological condition and to ensure due attention is given to any symptoms or risks she may present that could harm her future health.

With the increase in longevity and extensive research in recent decades, there has been a greater understanding of the impact and health implications that menopause has on women's lives.

Menopause marks the end of menstrual cyclicity and entails several consequences related to gonadal steroid deprivation. In most women, symptoms of menopause substantially affect their quality of life and arise at a time when they still occupy an essential role in the family and society. Early symptoms, such as hot flashes and sweats, mood swings, disturbed sleep, migraine, and poorer cognitive performance, are disruptive and may occur as early as a few years before the final menstrual period (FMP).[1] Late-onset manifestations, such as central body fat distribution, metabolic and cardiovascular consequences, urogenital atrophy and sexual dysfunction, osteoporosis, and an increased risk of disabling fractures, are frequently insidious.[1] Moreover, menopause accelerates biological aging, especially if severely symptomatic.[2,3]

Natural menopause, secondary to the physiological depletion of ovarian reserve, involves a transition from the reproductive to the post-reproductive phase, termed perimenopause, that may occur over several years.[4] Perimenopause encompasses three stages: early menopausal transition, characterized by persistent cycle irregularity; late menopausal transition, characterized by an interval of amenorrhea of 60 days or more in the prior 12 months; and early postmenopause, the first year after the FMP (Box 1).[4]

Surgical menopause, due to surgical removal of the ovaries, or chemotherapy-/radiotherapy-induced ovarian failure produce much more abrupt changes.[1] These conditions raise the risk of premature death, cardiovascular disease (CVD), dementia,

Box 1: Stages of menopause according to Stages of Reproductive Aging Workshop (STRAW) criteria164

***Menopausal transition*:**

- *Early* menopausal transition (*Stage –2*) lasts a variable number of years and is characterized by a persistent ≥7- day difference in length of consecutive cycles
- *Late* menopausal transition (*Stage –1*) is estimated to last on average 1–3 years before the FMP and is character- ized by an interval of amenorrhea of ≥60 days

***Perimenopause* means the time around the menopause and includes:**

- Early menopausal transition (*Stage –2*)
- Late menopausal transition (*Stage –1*)
- The first year after the FMP (early postmenopause *Stage +1a*)

Postmenopause:

- *Early* postmenopause lasts approximately 5–8 years and includes the following stages:
  - *Stage +1a* lasts 1 year. It marks the end of the 12- month period of amenorrhea required to define that the FMP has occurred and corresponds to the end of the "perimenopause"
  - *Stage +1b* lasts 1 year. It includes the remainder of the
  - period of rapid changes in mean FSH and estradiol levels
  - *Stage +1c* is estimated to last 3–6 years. It represents the period of stabilization of high FSH levels and low estradiol values
- Late postmenopause (Stage +2) includes the remain- ing lifespan. It represents the period in which further changes in the reproductive endocrine function are more limited and processes of somatic aging become of paramount concern.

Abbreviations: FMP, final menstrual period; FSH, follicle- stimulating hormone.

parkinsonism, and Parkinson's disease significantly more than natural menopause.[5–8]

Worldwide, most women experience their FMP between the ages of 45 and 55 years.[9] Late-onset menopause, occurring after the age of 55 years, bears some health risks, such as an increase in estrogen-sensitive tumors such as breast cancer, as well as benefits, mainly a reduced cognitive decline and risk of CVD,[10–12] due to the more prolonged lifetime exposure to ovarian hormones.[11,12] On the other hand, premature ovarian insufficiency occurs before the age of 40 years, implies a short lifetime exposure to ovarian hormones, and has the worst impact in terms of morbidity and mortality, with a significant increase in cognitive deterioration, cardiovascular events, and osteoporosis-related fractures.[11–13]

Menopause may be more burdensome for some women than for others. In addition, individual factors, such as personal history, socioeconomic status, ethnicity, and current health conditions, especially obesity, affect the menopausal experience.[1]

Vasomotor symptoms, the most disrupting manifestations affecting nearly 75% of women, may last an average of 7.4 years.[14,15] The prevalence of vasomotor symptoms is still significant in older women. Indeed, 39% of women aged 65–69 years, 31% 70–74 years, and 24% aged 75–79 years still report hot flashes.[16] Moreover, vasomotor symptoms, especially nocturnal symptoms, may cluster with other disturbances, such as sleep disruption, fatigue, depression, memory loss, and poor concentration.[17–19]

Women transitioning through menopause often experience problems with memory, concentration, and learning,[20] recently termed brain fog,[21] which causes considerable distress. Small but significant declines in processing speed and verbal memory occur over the long-term in postmenopausal women.[22–24] However, most difficulties are limited to perimenopause.[20] Surgical menopause has more severe consequences on cognitive functions than natural menopause[6] and increases the risk of full-blown dementia, mainly if it occurs before the age of 45 years.[25]

Mood disorders, depression, and anxiety may relapse or worsen during perimenopause, especially in vulnerable women.[26–28] In addition, migraine frequency may also increase in susceptible women.[29] Aging-related weight gain combined with the menopause-related central distribution of fat leads to increased visceral fat, responsible for inducing the metabolic syndrome.[30–32] This phenomenon is accelerated in women who have had surgical menopause.[5]

In addition, the loss of anti-atherogenic and vasodilatory effects of estrogen on the endothelium increases hypertension and atherosclerosis after menopause.[33–35] Together, these factors increase the risk of cardiovascular and cerebrovascular events, such as myocardial infarction and stroke, especially in women with premature ovarian insufficiency.[36]

In its early stages, menopause is commonly associated with decreased sexual libido[37] and, later on, vulvovaginal atrophy and dyspareunia, which can lead to sexual dysfunction[38,39] and interfere with social and psychological well-being. Genitourinary syndromes will also include dysuria and recurrent urinary tract infections.[38] Urinary incontinence is probably related to weight gain and an increase in waist-to-hip ratio during this period of life.[40]

Menopause is directly responsible for the never-ending decrease in bone mineral density, which is rapid within the first 3–5 years from the FMP.[41] As a result, osteoporosis, initially in trabecular bone and then in cortical bone, increases the risk of fractures, which occur most frequently in the spine, hip, and wrist.[41] In addition, sarcopenia and the loss of muscle tone that ensue after menopause are facilitating factors for fractures.[42]

Healthcare practitioners should also bear in mind that some symptoms of menopause are markers of future health risks. Severe vasomotor symptomatology and poor sleep quality are associated with an increased risk of CVD[43,44] and depression.[45] Moreover, vasomotor symptoms, sleep disorders, and depression might increase the susceptibility to develop cognitive dysfunction.[46,47] Severe hot flashes have also been associated with an increased risk of osteoporosis and bone fracture.[48]

There may be an individual vulnerability, whereby some women have more symptoms and more significant morbidity related to the loss of exposure to estrogen.

Box 2: Contraindications to menopausal hormone therapy

Personal history of:
- Breast cancer
- Severe active liver disease
- Coronary heart disease
- Stroke
- Venous thromboembolic event

These contraindications do not apply to transvaginal-based estrogen therapies, as the serum concentration of estrogen from this route is extremely low.

FIGO position on the issue

Healthcare practitioners can, and must, protect the health and lives of mid-life women by increasing awareness of the symptoms of menopause, providing healthcare options, namely menopausal hormone therapy (MHT), and promoting healthy lifestyle changes. Modifications made before or during the menopausal transition have the most significant impact, even at an older age.

In women with bothersome symptoms of menopause, namely vasomotor and urogenital, and absence of contraindications (Box 2), MHT is the first line of treatment. However, MHT should be personalized based on the patient's history, chronological and menopausal age, physical characteristics, and current health status so that the benefits always outweigh the risks.

To obtain the most significant benefits, MHT should be started as soon as possible after menopausal symptoms appear and continued while the risk–benefit ratio is favorable.

MHT benefits and risks on health domains, target organs, and systems

Longevity

Overall mortality in estrogen-progestogen users is decreased.[49–51] Women with premature menopause who start MHT before the age of 50 years achieve the most significant benefit in terms of longevity.[50]

Central nervous system

Vasomotor symptoms

MHT effectively alleviates vasomotor symptoms, even at low doses.[52,53] Estrogen-progestogen preparations and the bazedoxifene/conjugated estrogens (BZA/CE) combination are the most successful.[54] Tibolone is also a valid option to provide relief from hot flashes.[55] Whatever the composition, it is advisable to begin any hormone treatment at the lowest effective dose and titrate until control of symptoms is achieved.[52–55]

Sleep

The benefits of estrogen-progestogen therapy (EPT) include improved sleep quality.[56–58] All improvements in sleep domains correlate with a reduction in vasomotor symptoms, except for sleep latency and sleep efficiency,[56,57] demonstrating that the positive effect of EPT on subjective sleep cannot be fully explained by decreased bothersome vasomotor or depressive symptoms.[57] The explanation may lie in additional underlying biological mechanisms for EPT-mediated improvements in self-reported sleep, such as a reduction in the hypothalamus-pituitary–adrenal axis sensitivity and reactivity.[57] Progesterone alone is also beneficial for sleep.[59]

The BZA/CE combination favors sleep in postmenopausal women with moderate to severe vasomotor symptoms.[60]

Cognition and mood

In women aged 75 years or older, a long duration of past MHT exposure, either with estrogen alone or with estrogen-progestogens, is positively associated with cognitive status, especially when MHT is started within 5 years from the FMP.[11]

Indeed, the notion of a "critical window" of MHT has arisen whereby MHT may improve cognition when started in the perimenopausal period but become deleterious if started too far from the FMP.[61]

The evidence suggests that the use of MHT, particularly in women who have had surgical menopause, especially when young, is protective against cognitive impairment.[61,62]

Likewise, MHT is likely to be more efficacious on mood when started at a younger age. Furthermore, MHT and antidepressants seem to have a positive cumulative effect on clinical depression.[61]

In addition, in women who are APOE4 carriers and therefore at high risk for Alzheimer's disease, early MHT may represent an effective targeted strategy to mitigate their higher lifetime risk of Alzheimer's disease.[63,64]

Further investigation in this area is still warranted, as data from the literature are somewhat contradictory. Indeed, recent North European Finnish/Danish case–control studies, based on national registries, have pointed towards a relationship between MHT and the risk of developing Alzheimer's disease and/or late-onset dementia.[65,66]

However, these studies have several essential biases. First, they are not randomized controlled trials. Second, the women were prescribed MHT because of vasomotor symptoms, often associated with sleep and mood disorders, which make them intrinsically more prone to developing cognitive dysfunction.[67,68] Women with a predisposition for dementia may also have been prevalent in the Danish trial population as, during the study years, MHT was prescribed to prevent cognitive deterioration. Finally, in the Danish report, an increase in the risk of dementia was present for a duration of therapy as small as less than 1 year, suggesting the presence of confounding factors (alcohol, smoking, social isolation) that weaken the hypothesis of a direct causation.

Sexuality

In early postmenopause, transdermal estradiol-based treatment significantly improves overall female sexual function, whereas

oral conjugated equine estrogens (CEE)-based treatment has less effect.[69] Tibolone is the most effective therapy for restoring sexual function, including desire, sexual interest, and satisfaction, which may be attributed to its combined estrogenic and androgenic properties.[70]

In women who develop hypoactive sexual desire disorder, transdermal testosterone treatment can be used to restore sexual function, bearing in mind that proper dosing should both attain and maintain total testosterone levels in the premenopausal physiological range and that safety data are not available beyond 2 years of treatment.[71–73] Moreover, it should be stopped if there is no response within 6 months of treatment.[69] Women with premature and early surgically induced menopause are potential candidates for testosterone therapy because of their experience of abrupt loss of ovarian androgen and substantial prevalence of hypoactive sexual desire disorder.[72,74]

Dehydroepiandrosterone (DHEA) oral supplementation may be used in women with low sex drive associated with low levels of circulating dehydroepiandrosterone.[75,76]

Prasterone (vaginal DHEA) may be used efficiently to improve all sexual domains in women with vulvovaginal atrophy and moderate to severe dyspareunia.[76,77]

Osteo-skeletal system

Menopausal EPT significantly reduces the risk of hip, vertebral, and total fractures, with a parallel increase in bone mineral density (BMD),[78] and this benefit persists well after MHT cessation.[79–81] Likewise, tibolone increases BMD and reduces fracture risk, even at low doses (1.25 mg/day).[82]

Cardiovascular system

The effect of MHT differs according to age at initiation of MHT and time since menopause.

Women starting treatment under the age of 60 years and/ or earlier, or at most within 10 years from their FMP, have a lower risk of death from cardiovascular causes and non-fatal myocardial infarction.[83–87] It is noteworthy that those benefits persist years after the cessation of MHT.[77,82] Indeed, the first 10 years from FMP offer a "window of opportunity" due to the anti-atherogenic and vasodilatory effects estrogens have on healthy cardiovascular structures.[83–87]

In the second decade after the FMP, estrogens have a fairly neutral effect, and therefore, women may still enjoy the benefits of MHT without fearing an increase in cardiovascular events.[83] When more than 20 years have passed from the FMP, MHT should not be started as this could significantly increase cardiac thrombo-occlusive events due to a vascular disease that has developed over time.[83] Generally speaking, lifetime cumulative estrogen exposure decreases the risk of ischemic and hemorrhagic stroke.[88] This is in line with the finding that transdermal estrogens[89–92] and oral estradiol[92] tend to decrease the risk of stroke, whereas the use of oral CEE, at intermediate and high doses, increases the risk of ischemic stroke.[89] Time of oral CEE initiation from FMP may play a role, as the longer the time lapse from FMP, the higher the risk.[92]

Transdermal estrogens do not increase the risk of venous thromboembolism (VTE),[93–95] while oral estradiol, and particularly CEE, do.[94]

Another critical determinant of thrombotic risk is the type of progestogens associated with estrogens used by women with an intact uterus. Indeed, micronized progesterone and dydrogesterone do not increase the risk, but norpregnanes, namely nomegestrol acetate and promegestone, norethisterone, as well as MPA, do increase the risk.[89,93–95]

Therefore, the use of transdermal estrogens and, where indicated, micronized progesterone or dydrogesterone should be preferred in women who have an increased baseline thrombotic risk.[96]

Tibolone does not increase the risk of VTE[94] but does increase the risk of stroke in women aged 60–85 years.[97] Therefore, it should not be used in elderly women or those with stroke risk factors, such as hypertension, tobacco smoking, diabetes, and/or atrial fibrillation.[97]

The cardiovascular risk profile is acceptable for the BZD/CE combination.[98]

Endocrine system

Estrogen and EPT improve insulin resistance and lower progression to diabetes in postmenopausal women.[99,100] The tissue-selective estrogen complex (BZD/CE) has neutral effects on glucose metabolism,[101] while tibolone reduces insulin sensitivity and should not be used in women with prediabetes or diabetes.[102]

Female reproductive and genitourinary systems

Breast

According to randomized clinical trials, CEE-only therapy is associated with a lower incidence and mortality of breast cancer incidence,[103] and estradiol-only therapy carries no risk for breast cancer.[104]

EPT in women with an intact uterus has a variable impact on the risk of breast cancer, depending on the type of progestogens used in combination with estrogens: medroxyprogesterone acetate (MPA),[103–107] norethisterone (NETA),[104–106] and levonorgestrel (LNG)[104–106] increase the risk of breast cancer, whereas dydrogesterone[101,104] and especially progesterone,[104,106] do not.

Due to their neutral effect on the risk of breast cancer, natural progesterone or its isomer, dydrogesterone, should be considered the first choice for endometrial protection in women with an intact uterus.[104,106,107]

During CEE + MPA treatment, the risk of breast cancer increases with the duration of use,[105] but it drops substantially in the early post-treatment phase (within 2.7 years), although the relative risk

remains higher than 1 through 5.5 years (median) of additional follow-up.[105,108]

Nevertheless, in the Finnish population, the risk of breast cancer mortality was reported to be reduced not only in women using estradiol-only therapy but also in those using estradiol-progestogen regimens (43% NETA, 30% MPA), especially in the age groups of 50–59 and 60–69 years.[109]

Indeed, neither unopposed estrogen nor estrogen-progestogen regimens used after surgical menopause or premature ovarian insufficiency are associated with an increased risk of young-onset breast cancer before the age of 50 years.[110]

Tibolone has a neutral effect on the risk of breast cancer only with a short duration of use (<5 years). Thereafter, the risk increases.[104,106] However, in the Korean population, tibolone has been shown to lower the risk of breast cancer, both after short and long duration of use.[111]

Although the literature is scant, BZA/CE appears to have a favorable breast-related safety profile as it does not increase mammographic breast density[111] and has been shown to have a neutral effect on the risk of breast cancer over follow-up periods of 5 and 7 years.[112,113]

Uterus

Systemic estrogen-only therapy can cause endometrial hyperplasia or cancer in women with an intact uterus and should, therefore, always be combined with a progestogen.[114] Continuous combined EPT is associated with a decreased risk of endometrial cancer, especially in obese women.[115,116]

Tibolone is associated with an increased risk of endometrial cancer, particularly for type 1 endometrial cancer and especially with a long duration of use (10+ years).[117]

Ovary

Both estrogen-only and estrogen-progestogen hormone therapies are associated with an increased risk of serous and endometrioid ovarian cancer.[118] Likewise, tibolone is associated with an increased risk of epithelial ovarian cancer overall, particularly serous ovarian cancer, especially with a long duration of use (10+ years).[117]

Women with a history of endometriosis must be informed of the possibility of disease recurrence with MHT. In these women, even when subjected to hysterectomy, continuous combined preparations and tibolone should be considered instead of unopposed estrogens.[119] Moreover, recent data suggest that in women with a history of endometriosis or de novo endometriosis, the risk of epithelial ovarian cancer appears to be increased after estrogen-only treatment, whereas EPT and tibolone therapy are neutral.[120]

Vulva, vagina and urinary tract

Estrogen, estrogen-progestogen, and tibolone therapy reduce bothersome symptoms of vulvovaginal atrophy.[121,122]

The effect of MHT on urinary symptoms depends on the type used. Systemic MHT may cause urinary incontinence[123] or worsen existing urinary symptoms, while vaginal estrogens improve dysuria, frequency, urge and stress incontinence, and recurrent urinary tract infections.[124]

Moreover, it is advisable to inform women with pre-existing pelvic organ prolapse that exposure to systemic estrogen-progestogen regimens might negatively affect this problem.[125]

Orally administered ospemifene is an effective non-estrogen systemic treatment specifically for vulvovaginal atrophy with a good cardiovascular safety profile.[126,127]

Gastrointestinal system

Estrogen, estrogen-progestogen. and tibolone therapy lower the risk of colorectal cancer in women.[128,129]

MHT Regimens

When deciding to begin MHT, the route of delivery, dose, and type of estrogens or estrogen-progestogens should be carefully pondered based on a woman's characteristics (Table 1).

Systemic MHT

In healthy, normal-weight early postmenopausal women (approximately 5–8 years from the FMP), the following regimens are generally suitable: oral estrogens or transdermal estradiol at medium doses combined with cyclic or continuous progestogens for endometrial protection;[130] tibolone at low to standard doses;[55] and tissue selective estrogen complex at the standard dose.[101]

In healthy late postmenopausal women, MHT may be continued but seldom begun,[86,87] with the following regimens:[130] low doses of transdermal estradiol[89,91] or low doses of oral estrogens,[89] associated with micronized progesterone or its isomer, dydrogesterone, administered continuously, where there is an indication for endometrial protection;[130] and low-dose tibolone.[55]

In overweight (body mass index [BMI, calculated as weight in kilograms divided by the square of height in meters] >25) early postmenopausal women (approximately 5–8 years from the FMP), the following regimen is generally suitable: transdermal estrogens[87,89] combined with cyclic or continuous progestogens.[130]

In women who have had surgical removal of the ovaries before the age of 50 years, the following regimens are generally suitable: medium to high doses of oral estrogens or transdermal estradiol, in combination with appropriate doses of progestogens, where indicated;[130] transcutaneous testosterone therapy may be necessary when hypoactive sexual desire disorder is diagnosed at a dose that achieves the normal premenopausal range of circulating testosterone levels.[71]

In women with primary ovarian insufficiency (POI) needing contraception, the following regimens are generally suitable for the first few years after diagnosis: low-dose estrogen-progestogen contraceptives; and estrogen associated with a levonorgestrel (LNG) intrauterine system.[75]

Table I: Systemic MHT regimens.

Formulation	Route	Regimen	Dose/day
Early postmenopause (within 5–8 years from the FMP), healthy, normal weight			
Estrogens-progestogens	Oral	Combined sequential[a]	• E2 2 mg + dydrogesterone 10 mg • E2 1 mg + dydrogesterone 10 mg • CEE 0.625 mg + oral/vaginal MP 200 mg
		Combined continuous[b]	• E2 1 mg + oral/vaginal MP 100 mg • E2 1 mg + dydrogesterone 5 mg • E2 1 mg + DRSP 2 mg • E2 1 mg + NETA 1 mg • CEE 0.625 mg + oral/vaginal MP 100 mg
	Transdermal (patch)	Combined sequential[a]	• 17βE2 50 µg + LNG 150 µg • 17βE2 50 µg + NETA 250 µg • 17βE2 25–50 µg + oral/vaginal MP 100–200 mg • 17βE2 25–50 µg + oral dydrogesterone 5–10 mg
		Combined continuous[b]	• 17βE2 25–50 µg + oral/vaginal MP 100–200 mg • 17βE2 25–50 µg + oral dydrogesterone 5–10 mg • 17βE2 25–50 µg + 20 µg LNG-IUS
	Transcutaneous (gel, spray)	Combined sequential[a]	• 17βE2 1–2 mg + oral/vaginal MP 100–200 mg • 17βE2 1–2 mg + oral dydrogesterone 5–10 mg
		Combined continuous[b]	• 17βE2 1–2 mg + oral/vaginal MP 100–200 mg • 17βE2 1–2 mg + oral dydrogesterone 5–10 mg • 17βE2 1–2 mg + 20 µg LNG-IUS
Tissue selective estrogen complex	Oral	Continuous	• Bazedoxifene 20 mg + CEE 0.45 mg
Selective tissue estrogenic activity regulator	Oral	Continuous	• Tibolone 1.25–2.5 mg (low-standard dose)
Androgens	Transdermal (cream)	Continuous	• Testosterone cream 1% 300 µg/day (1/10th standardmale dose)
	Oral	Continuous	• DHEA 10–25 mg
Late postmenopause (after 5–8 years from the FMP), healthy, normal weight			
Estrogens-progestogens	Oral	Combined continuous[b]	• E2 1 mg + oral/vaginal MP 100 mg • E2 1 mg + dydrogesterone 5 mg • E2 1 mg + DRSP 2 mg • CEE 0.3–0.45 mg + oral/vaginal MP 100 mg
	Transdermal (patch)	Combined continuous[b]	• 17βE2 25 µg + oral/vaginal MP 100 mg • 17βE2 25 µg + oral dydrogesterone 5 mg
	Transcutaneous (gel, spray)	Combined continuous[b]	• 17βE2 0.50–1 mg + oral/vaginal MP 100 mg • 17βE2 0.50–1 mg + oral dydrogesterone 5 mg
Selective tissue estrogenic activity regulator	Oral	Continuous	• Tibolone 1.25 mg
Androgens	Oral	Continuous	• DHEA 10–25 mg
Early postmenopause (within 5–8 years from the FMP) and overweight (BMI > 25)			
Estrogens-progestogens	Transdermal (patch)	Combined sequential[a]	• 17βE2 25–50 µg + oral/vaginal MP 200 mg • 17βE2 25–50 µg + oral dydrogesterone 10 mg
		Combined continuous[b]	• 17βE2 25–50 µg + oral/vaginal MP 100–200 mg • 17βE2 25–50 µg + oral dydrogesterone 5–10 mg • 17βE2 25–50 µg + 20 µg LNG-IUS
	Transcutaneous (gel, spray)	Combined sequential[a]	• 17βE2 1–1.5 mg + oral/vaginal MP 200 mg • 17βE2 1–1.5 mg + oral dydrogesterone 10 mg
		Combined continuous[b]	• 17βE2 1–1.5 mg + oral/vaginal MP 100–200 mg • 17βE2 1–1.5 mg + oral dydrogesterone 5–10 mg 20 µg • 17βE2 1–1.5 mg + 20 µg LNG-IUS
Late menopause (after 5–8 years from the FMP) and overweight (BMI > 25)			
Estrogens-progestogens	Transdermal (patch)	Combined continuous[b]	• 17βE2 25 µg + oral/vaginal MP 100 mg • 17βE2 25 µg + oral dydrogesterone 5 mg
	Transcutaneous (gel, spray)	Combined continuous[b]	• 17βE2 0.50–1 mg + oral/vaginal MP 100 mg • 17βE2 0.50–1 mg + oral dydrogesterone 5 mg

Table I: Continued

Formulation	Route	Regimen	Dose/day
Surgical menopause			
Intact uterus			
Estrogens-progestogens	Oral	Combined sequential[a]	• E2 2 mg + dydrogesterone 10 mg • E2 1 mg + dydrogesterone 10 mg • CEE 0.625 mg + oral/vaginal MP 200 mg • E2 1–2 mg + MP 100–200 mg
		Combined continuous[b]	• E2 1 mg + MP 100 mg • E2 1 mg + dydrogesterone 5 mg • E2 1 mg + DRSP 2 mg • E2 1 mg + NETA 1 mg • CEE 0.625 + oral/vaginal MP 100 mg
	Transdermal (patch)	Combined sequential[a]	• 17βE2 50 µg + LNG 150 µg • 17βE2 50 µg + NETA 250 µg • 17βE2 50–100 µg + oral/vaginal MP 200 mg • 17βE2 50–100 µg + oral dydrogesterone 10 mg
		Combined continuous[b]	• 17βE2 50 µg + oral/vaginal MP 200 mg • 17βE2 50 µg + oral dydrogesterone 10 mg • 17βE2 50 µg + 20 µg LNG-IUS
	Transcutaneous (gel, spray)	Combined sequential[a]	• 17βE2 1.5–2 mg + oral/vaginal MP 200 mg • 17βE2 1.5–2 mg + oral dydrogesterone 10 mg
		Combined continuous[b]	• 17βE2 1.5 mg + oral/vaginal MP 200 mg • 17βE2 1.5 mg + oral dydrogesterone 10 mg
Androgens	Transdermal (cream)	Continuous	• Testosterone 1% cream 300 µg (1/10th standard male dose)
	Oral	Continuous	• DHEA 10–25 mg
Hysterectomized			
Estrogens	Oral	Continuous	• E2 1–2 mg • CEE 0.625 mg
	Transdermal (patch)		• 17βE2 50–100 µg
	Transcutaneous (gel, spray)	Continuous	• 17βE2 1.5–2 mg
Androgens	Transdermal (cream)	Continuous	• Testosterone 1% cream 300 µg (1/10th of standard male dose)
	Oral	Continuous	• DHEA 10–25 mg
Premature ovarian insufficiency			
Contraceptive needs			
Estrogens-progestogens	Oral	Continuous	• E2 hemihydrate 1.5 mg + NOMAC 2.5 mg • E2 valerate 1–3 mg + DNG 2–3 mg
Non-contraceptive needs			
Estrogens-progestogens	Oral	Combined sequential[a]	• E2 2 mg + dydrogesterone 10 mg • CEE 0.625 + oral/vaginal MP 200 mg
	Transdermal (patch)	Combined sequential[a]	• 17βE2 50 µg + LNG 150 µg • 17βE2 50 µg + NETA 250 µg • 17βE2 50–100 µg + oral/vaginal MP 200 mg • 17βE2 50–100 µg + oral dydrogesterone 10 mg
		Combined continuous[b]	• 17βE2 50–100 µg + oral/vaginal MP 200 mg • 17βE2 50–100 µg + oral dydrogesterone 10 mg • 17βE2 50–100 µg + 20 µg LNG-IUS
	Transcutaneous (gel, spray)	Combined sequential[a]	• 17 βE2 1.5–2 mg + oral/vaginal MP 200 mg • 17 βE2 1.5–2 mg + oral dydrogesterone 10 mg
		Combined continuous[b]	• 17 βE2 1.5–2 mg + oral MP 100–200 mg • 17 βE2 1.5–2 mg + oral dydrogesterone 10 mg
Androgens	Transdermal	Continuous	• Testosterone 1% cream 300 µg (1/10th standard male dose)
	Oral	Continuous	• DHEA 10–25 mg

Abbreviations: 17βE2, 17 beta-estradiol; CEE, conjugated equine estrogens; E2, estradiol; DHEA, dehydroepiandrosterone; DNG, dienogest; DRSP, drospirenone; FMP, final menstrual period; LNG-IUS, levonorgestrel intrauterine system; MHT, menopausal hormone therapy; MP, micronized progesterone; NETA, norethisterone acetate; NOMAC, nomegestrol acetate.

[a] Progestogen is administered for 12–14 days/cycle.

[b] Progestogen is administered daily.

Box 3: Vaginal menopausal hormone therapy formulations
- E2 10 µg vaginal tablets
- E2 7.5 µg/24 h, vaginal ring
- Estriol 500 µg/day cream
- Estriol 50 µg/day gel
- Promestriene 10 mg vaginal capsules
- Prasterone (DHEA) 6.5 mg vaginal suppositories

Abbreviations: DHEA, dehydroepiandrosterone; E2, estradiol.

Women transitioning through perimenopause with contraceptive needs may also use the abovementioned regimens.

In women with POI without contraceptive needs, the following may be used: medium to high doses of oral or transdermal estradiol, combined with appropriate doses of progestogens, where indicated.[130]

In women with symptoms of fatigue, depression, and/or a reduced sexual desire associated with low endogenous DHEA levels, supplemental DHEA may be considered at a starting dose of 10 mg/ day up to 25 mg/day alone or as an adjunct to systemic MHT.[75,76] Table I lists standard systemic MHT regimes.

Vaginal MHT

Vaginal estrogen therapy is the first-line treatment for the symptoms of vulvovaginal atrophy, such as dryness, dyspareunia, itching, and/ or burning.[131] Moreover, it has been proven efficient in ameliorating dysuria, urinary frequency/urgency, and recurrent lower urinary tract infections.[132,133] Vaginal estrogen therapy is more effective than systemic estrogen therapy in this domain[121] and has an excellent safety profile.[106,134–136] Moreover, it may be used alone, in which case there is no need for endometrial protection or in association with systemic MHT (Box 3).

Prasterone (vaginal DHEA) treatment alleviates vulvovaginal atrophy, difficult lubrication, dyspareunia, and arousal.[76,77]

Because of their neutral effect on the risk of breast cancer and very low systemic absorption, both low-dose vaginal estrogens and prasterone may be considered an off-label treatment in women with breast cancer when symptoms of genitourinary menopausal persist after trials of non-hormonal interventions and quality of life is adversely affected.[137] Box 3 lists standard vaginal MHT formulations.

Compounded bioidentical hormone formulations

Bioidentical hormones have been defined as "substances that have the same chemical and molecular structure as hormones that are produced in the human body".[138] However, this definition does not address the manufacturing, source, or delivery methods of the products and, therefore, may be misleading as it can cover both Food and Drug Administration (FDA)-approved formulations as well as non–FDA-approved custom-compounded products that are prepared for an individual patient by a pharmacist in response to a licensed practitioner's prescription.[139]

Compounded bioidentical hormone products have often been promoted as a "safe"/"safer", "natural", and more effective alternative to manufactured FDA-approved hormone therapies to relieve symptoms of menopause.[138] However, there is little or no scientific evidence to support the marketing myth of such a claim.[140]

Indeed, there are major concerns about compounded bioidentical hormone products that may consist of untested and unapproved combinations of multiple hormones and be used through nonstandard or untested routes of administration, such as subdermal implants, pellets, or troches.[141] Concerns include insufficient randomized trials to assess their efficacy or safety in treating symptoms of menopause, as well as their purity, potency, overall quality, and lack of labeling outlining risks.[140–142]

Moreover, pharmacokinetic studies have reported that their bioavailability, bioactivity, and potency differ from batch to batch.[140] The variable absorption of compounded estrogens and progesterone may lead to under- or overdosing, which could increase the risk of estro- gen-stimulated cancers, especially endometrial cancers.[140] Therefore, although there are some exceptions where compounded bioidentical hormone preparations may be acceptable, such as in cases of allergy to ingredients or dosages not available in FDA-approved products,[140,141] FIGO recommends the use of approved, regulated, and monitored bioidentical systemic and vaginal hormone therapies.

Follow-up and re-assessment

Regular reassessment of the woman's health status is mandatory. Once optimal control of symptoms has been achieved, women should be checked annually, especially if they are on MHT.

Body weight and blood pressure should be monitored. Moreover, menopausal women must undergo timely screening for breast cancer by mammography, which hormone therapy does not interfere with.[143] Ultrasound examination of the endometrium in women on MHT, by any route, that reports bleeding is mandatory and may prompt hysteroscopic endometrial sampling if the thickness is over 4 mm.[144] Recurrent bleeding should always be investigated by endometrial biopsy, whatever the endometrial thickness assessed by ultrasound.[144] The monitoring of endometrial thickness in asymptomatic women is less specific and the ideal cutoff for invasive procedures has not been investigated thoroughly. Therefore, the need for further investigation should be based on the individual risk factors for endometrial cancer.[145,146]

MHT may be continued as long as women maintain their health status and contraindications do not develop. The benefits must always outweigh the risks.[130]

Lifestyle

Well-tailored MHT should not preclude healthy lifestyle changes, which are the mainstay of primary prevention.

Empower her to manage her menopause

Menopause in some women can be life changing but it doesn't have to dictate who they are. Transdermal estradiol is cardio protective[1], does not increase the risk of VTE and stroke[2] and in combination with micronised progesterone further reduces the incidence of new-onset diabetes[3]. As body-identical regulated hormones, **FEMIGEL®** and **UTROGESTAN®** offer safer relief of menopausal symptoms for a range of patient risk profiles with no increase in the risk of breast cancer for up to 5 years[4,5,6].

Product	Nappi Code	Medicine Schedule	Active ingredient	Strength	Dosage Form	Quantity
FEMIGEL	819875-007	S4	17β-oestradiol	1.5mg/2.5g	Gel in pump	80g
UTROGESTAN	851957-005	S4	Micronised progesterone	100 mg	Capsules	30

Reference: 1. Lokkegaard E et al. Eur Heart J 2008;29:2660-8. 2. Renoux C et al. BMJ 2012;340:c2519. 3. de Lauzon-Guillain, Fournier A, et al. Diabetologia 2009;52:2092-100.
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by guidelines
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Moderate-intensity physical activity for 150–300 min per week or vigorous-intensity physical activity for 75–150 min per week is recommended to reduce cardiovascular and cancer morbidity and mortality in all adults.[147] Breaking up prolonged sitting with standing or walking for 5 min every 20 min also has a positive impact on cardiovascular risks.[148] High-intensity exercise increases lumbar spine BMD.[149] Although evidence on the effects of multicomponent exercise programs in postmenopausal and older women remains conflicting, combining resistance training using high-intensity loads and impact-aerobic activities may be the best strategy to enhance muscle and bone mass.[150]

Healthy eating, such as that of the Mediterranean diet, and physical activity are pivotal in containing cardiovascular and cancer risks at mid-life and beyond.[151–155]

Maintaining alcohol consumption that meets public health recommendations and avoiding smoking are also key to reducing such risks.[156,157]

Last but not least, engaging in leisure activities, such as visiting art exhibitions, reading, listening to music, singing, and painting, is positively associated with a lower risk of depression, dementia, and death by any cause. Therefore, it can be considered a health and well-being resource to help middle-aged and older women.[158–163]

Summary of key points

- Post-reproductive health is a global priority as menopause comes at a time when women still occupy an essential role in the family and society. Counseling on the benefits and risks of MHT and lifestyle education is a must.
- Type and duration of MHT should be tailored based on patient history, menopausal age, physical characteristics, and current health status so that the benefits always outweigh the risks.
- Menopausal women should undergo regular reassessment of their health conditions, especially if they are on MHT.

Longevity

- Women on MHT to relieve their symptoms of menopause will benefit from a significant increase in longevity.
- Women who develop POI and start MHT before the age of 50 years achieve the most significant benefit in terms of longevity.

Vasomotor symptoms

- Women experiencing menopausal vasomotor symptoms, with no contraindications for systemic hormone therapy, should be offered MHT to relieve their symptoms.

Sleep

- Women with sleep disorders prescribed MHT to relieve their symptoms of menopause will benefit from a significant improvement in sleep.

Cognition and mood

- Women who have had surgical menopause, especially when young, should be offered MHT to reduce their lifetime risk of cognitive impairment.
- Women who begin MHT close to the FMP to relieve their symptoms of menopause will benefit from a significant reduction in risk of cognitive deterioration.

Sexuality

- Tibolone is the most effective therapy in terms of restoration of sexual function.
- In early postmenopause, transdermal estradiol-based treatment is associated with a significant improvement in overall female sexual function, whereas oral CEE-based therapy is less effective.
- Women with hypoactive sexual desire disorder, whose sexual function does not improve under MHT, can be offered a short trial of transdermal testosterone.

Osteo-skeletal system

- Women on MHT to relieve their symptoms of menopause will benefit from a significant reduction in osteoporosis-related fracture risk, which persists well after the cessation of MHT.

Cardiovascular system

- Women on MHT to relieve their symptoms of menopause will benefit from a significant reduction in the risk of CVD if it is begun within 10 years from the FMP.
- Transdermal estrogens and, where indicated, micronized progesterone or dydrogesterone should be the first choice MHT, especially in women with a baseline increased thromboembolic risk.

Endocrine system

- Women with prediabetes or diabetes on estrogen or estrogen-progestogen MHT to relieve their symptoms of menopause will benefit from a significant improvement in metabolic compensation.
- Women with prediabetes or diabetes should not be offered tibolone to improve their symptoms of menopause.

Breast

- Women with premature ovarian insufficiency on MHT will not increase their risk of young-onset breast cancer before the age of 50 years.
- Women on estrogen-only MHT to alleviate symptoms of menopause will not increase their risk of breast cancer.
- Women with an intact uterus should be offered natural progesterone or dydrogesterone for endometrial protection to avoid increasing their risk of breast cancer.
- Tibolone should be used for a short period of time (<5 years) to avoid increasing the risk of breast cancer.

Uterus

- Women with an intact uterus on continuous combined estrogen-progestogen MHT to relieve their symptoms of menopause will benefit from a significant reduction in the risk of endometrial cancer.

- Women with an increased baseline risk for endometrial cancer due to individual factors should not be offered tibolone to relieve their symptoms of menopause.

Ovary

- Women at risk of ovarian cancer must be informed that both estrogen-only and estrogen-progestogen hormone therapies, as well as tibolone treatment, increase the risk of epithelial ovarian cancer.
- Women with a history of endometriosis can be offered combined estrogen-progestogen or tibolone to relieve their symptoms of menopause.

Gastrointestinal system

- Women on MHT to relieve their symptoms of menopause will benefit from a significant reduction in the risk of colorectal cancer.

Vulva, vagina and urinary tract

- Vaginal estrogen therapy is the first-line treatment for symptoms of vulvovaginal atrophy.
- Prasterone (vaginal DHEA) treatment alleviates vulvovaginal atrophy, difficult lubrication, and/or arousal.
- Women on systemic MHT to relieve their symptoms of menopause will benefit from a significant reduction in vulvovaginal atrophy.
- Orally administered ospemifene is an effective non-estrogen systemic treatment for vulvovaginal atrophy.
- Women experiencing dysuria, frequency, urinary frequency/urgency, and recurrent lower urinary tract infections should be offered vaginal estrogen therapy.

Lifestyle

- Healthy eating and physical activity are pivotal in containing cardiovascular and cancer risks. Maintaining alcohol consumption that meets public health recommendations and avoiding smoking are also key to reducing such risks.
- Leisure activities can reduce the risk of depression, dementia, and death by any cause.

FIGO's commitments

With this position paper, FIGO recognizes the vital role women play well after childbearing age and the need for all physicians working in women's health to further develop the necessary knowledge to sustain women in post-reproductive life.

FIGO commits itself to:

1. Educational interventions in primary care settings for general practitioners and gynecologists aimed at improving physicians' knowledge on menopause so as to be prepared to provide reassurance on symptoms, and counseling on a healthy lifestyle and, where indicated, on hormone therapy to improve women's quality of life;
2. Promoting the study of menopausal medicine in the core curriculum of university medical graduate and postgraduate programs;
3. Interventions to increase social awareness of menopause and its impact on women to promote understanding in the home and work environment;
4. Promote reimbursement policies for officially approved indications of MHT, which may impact healthcare costs for age-related pathologies, including osteoporotic fractures, cardiovascular events, and colorectal cancer.

FIGO supports preventive medicine and the appropriate use of MHT as they have the potential to increase disability-free life expectancy for menopausal women.

Author contributions

All authors made substantial contributions to the conception or design of the work; drafting the work or reviewing it critically for important intellectual content; and gave final approval of the version to be published. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest statement

Andrea R. Genazzani reports consulting fees from Mithra; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Organon, Exeltis, Gedeon Richter, Theramex, and Mithra. Tommaso Simoncini reports consulting fees from Abbott, Intuitive Surgical, Johnson and Johnson, Medtronic, Shionogi, and Astellas; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Abbott, Intuitive Surgery, Applied Medical, Gedeon Richter, Theramex, Shionogi and Vichy. All other authors report no conflicts of interest.

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Full list of references available on request

Haemoglobin A1c (HbA1c): clinical relevance, history, and role in diabetes mellitus management – a South African perspective

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Abstract

Background: Diabetes mellitus (DM) is a growing health challenge in South Africa, with an increasing prevalence driven largely by urbanisation and lifestyle changes. Haemoglobin A1c (HbA1c) has emerged as a pivotal biomarker for diagnosing and monitoring diabetes. Its clinical utility is well established globally, yet its optimal use in the South African healthcare landscape remains an area of interest. This article provides a comprehensive review of HbA1c, outlining its historical discovery, biochemical basis, clinical applications, and interpretation challenges. Emphasis is placed on its role in South Africa, where access to laboratory testing and point-of-care diagnostics influences diabetes care.

Methods: A literature review was conducted using PubMed, Google Scholar, and local healthcare databases to evaluate HbA1c's effectiveness in DM diagnosis and monitoring. International and South African guidelines were analysed to assess the standardisation and applicability of HbA1c testing in diverse populations.

Results: HbA1c is vital in diabetes management, though its accuracy may be affected by haemoglobinopathies, ethnicity, age, and medical conditions. Technological advances, such as point-of-care testing (POCT), have improved accessibility, particularly in underserved areas. Personalised HbA1c targets are increasingly recommended to enhance patient-centred care.

Conclusion: While HbA1c is a valuable diagnostic and monitoring tool, healthcare professionals (HCPs) must be aware of its limitations in specific populations. Expanding access to HbA1c testing and integrating individualised glycaemic targets can improve diabetes management outcomes in South Africa.

Keywords: HbA1c, diabetes management, glycaemic control, point-of-care testing, South Africa, haemoglobinopathies, diagnostic accuracy

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Introduction

Diabetes mellitus (DM) is a growing healthcare challenge, including in South Africa, where it is largely driven by urbanisation and lifestyle shifts.[1] It is currently recognised as one of the top ten leading causes of mortality worldwide, reflecting a substantial 95% increase in death rates since the year 2000.[2] Hird et al.[3] reported a DM prevalence of 12.9% among urban black South Africans in their 2016 Durban Diabetes Study (DDS), which is one of the highest documented rates in sub-Saharan Africa—exceeding the International Diabetes Federation (IDF) estimate in 2021 of 10.8% in all ethnic groups for South Africa[4]—yet comparable to the 13.1% prevalence observed by Peer et al. (2012)[5] in urban black Africans in Cape Town. According to recent statistics from the IDF, 45.4% of people living with DM remain undiagnosed.[4]

Haemoglobin A1c (HbA1c) has emerged as a pivotal biomarker, not only for monitoring glycaemic control but also for diagnosing DM.[6] In the South African context, where healthcare access is often limited in rural and underserved areas, understanding the application, benefits, and limitations of HbA1c testing is crucial.[7] This review provides a comprehensive educational overview of HbA1c, highlighting recent developments, clinical significance, and practical considerations for South African healthcare professionals (HCPs).

HbA1c in historical context

Glycated, or glucose-bound, haemoglobin was first identified in the late 1960s by Dr. Samuel Rahbar, who, through haemoglobin electrophoresis of 1 200 blood samples, discovered an abnormal fast-moving haemoglobin fraction—later termed HbA1c.[8,9]

Early studies identified higher levels of HbA1c in individuals with DM.[8,9] By the 1980s and 1990s, pivotal research including the landmark Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS) established that maintaining lower HbA1c levels significantly reduces the risk of numerous diabetes complications.[10,11]

The DCCT demonstrated that intensive insulin therapy via multiple daily injections or continuous subcutaneous insulin infusion (CSII) lowered HbA1c levels and improved long-term outcomes. Patients achieving an HbA1c of 7% experienced a 50% reduction in microvascular complications over six years.

Closer to home, Mjwara et al.'s[12] more recent (2021) prospective, cross-sectional study of 100 patients with Type 1 and Type 2 DM in KwaZulu-Natal, demonstrated that those with proliferative diabetic retinopathy (PDR) had significantly higher HbA1c levels than those without, underscoring the strong association between

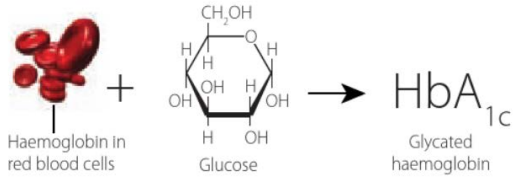

Figure 1: HbA1c Formation (Adapted from: Gough, S. et al.).[16]

poor glycaemic control and advanced diabetes complications. This finding highlights the critical role of routine HbA1c monitoring in identifying high-risk patients and preventing severe visual impairment. Consequently, HbA1c has become a cornerstone in monitoring DM.[6] Major international guidelines, including those of the American Diabetes Association (ADA), incorporate HbA1c as a diagnostic criterion for DM, a practice now common worldwide, including in South Africa as recommended by the most recent Society for Endocrinology, Metabolism and Diabetes of South Africa (SEMDSA) guidelines.[13,14]

What is HbA1c? The biochemical basis

HbA1c is a glycated form of haemoglobin that forms when plasma glucose binds irreversibly to the haemoglobin within red blood cells (RBCs) as seen in Figure 1.[15]

Because RBCs have a lifespan of 120 days, HbA1c reflects blood glucose levels over the past two to three months. This makes it a key marker for long-term glycaemic control, providing a more comprehensive measure than daily glucose readings and offering a broader view compared to daily blood glucose measurements.[15]

Typically, HbA1c is reported as a percentage, with higher percentages indicating poor glycaemic control and a greater risk of diabetes-related complications.[15] In individuals without DM, the typical HbA1c range falls between 4% and 5.6%.

Clinical applications of HbA1c

HbA1c serves two principal roles in clinical practice:

Diagnosis of DM

An HbA1c level of 6.5% or higher, in two tests conducted at least three months apart, is diagnostic for DM. Levels between 5.7% and 6.4% indicate a high risk (prediabetes).[13] This test is particularly valuable because it does not require fasting and is less affected by short-term glucose fluctuations.

Monitoring glycaemic control

For patients with established DM, HbA1c is key for monitoring long-term glycaemic management. According to the SEMDSA guidelines, HbA1c testing should be performed every 6 to 12 months to assess glycaemic control.[13] An HbA1c target of < 7% is generally advised for optimal control, with more lenient targets (7–8%) for certain populations, such as the elderly. Personalised targets are essential, considering patient-specific factors like age, comorbidities, and risk of hypoglycaemia.[17]

The following table outlines the comparative characteristics and clinical considerations for interpreting fasting blood glucose (FBG) and random blood glucose (RBG) monitoring versus HbA1c measurements in diabetes care (Table I).

HbA1c interpretation challenges

The primary advantage of HbA1c is its independence from postprandial and illness-related glucose fluctuations. However, despite its widespread utility, HbA1c interpretation may be affected by several factors (Table II). For instance, research indicates that HbA1c levels may differ between men and women, even when blood glucose levels are similar. A study published in EClinicalMedicine found that erythrocyte properties influencing HbA1c levels may contribute to sex-based differences in diabetes diagnosis and management, potentially affecting mortality outcomes; specifically, the study suggests that HbA1c underestimates glycaemia in men compared to women, which may result in under-treatment and increased mortality risk in men.[18] Another study highlighted that sex hormones, such

Table I: Fasting blood glucose (FBG) and random blood glucose (RBG) monitoring vs. HbA1c measurements in diabetes care[6]

Consideration	FBG/RBG monitoring	HbA1c monitoring
Cost	Generally low-cost	More costly
Availability	Widely available in most laboratories and healthcare facilities.	Less universally available than glucose tests.
Glycaemic timeframe reflected	Reflects current, acute glycaemic status (FBG for fasting status, RBG for random sampling).	Reflects average glucose exposure over approximately 2 to 3 months.
Fasting requirement	FBG: Requires fasting (typically 8 hours). RBG: No fasting required; can be measured anytime.	No fasting required – can be measured irrespective of recent food intake.
Within-person variability	High variability observed between repeated measurements due to daily fluctuations.	Low within-person variability over time.
Impact of acute factors	Influenced by recent food intake, stress, illness, physical activity, and medications.	Largely unaffected by acue fluctuations (e.g. meals, illness, stress).
Patient factors influencing results	Affected by diurnal variation, medications, alcohol, smoking, and bilirubin levels.	Influenced by altered erythrocyte turnover (e.g. anaemia, haemoglobinopathies), renal impairment, liver disease, and pregnancy. *(See also HbA1c interpretation challenges).*
Test interferences	Susceptible to pre-analytical issues: sample handling delays, haemolysis, severe hyperlipidaemia, hyperbilirubinaemia.	May be affected by haemoglobin variants, severe hyperlipidaemia, and hyperbilirubinaemia.

*Table adapted from: Selvin E.[6]

Table II: Non-glycaemic factors influencing HbA1c levels

Category	Specific factor	Effect on HbA1C	Clinical consideration
Haematological	Haemoglobinopathies	Variable impact (possible interference)	Consider alternative glucose biomarkers in patients with known haemoglobinopathies.
	Iron deficiency anaemia	Slight increase in HbA1c	May cause a statistically significant rise; reassess post-iron therapy.
	Vitamin B_{12}/Folate deficiency	Mild increase in HbA1c	Limited clinical impact; interpret with caution.
	Erythropoietin therapy	Decrease in HbA1c	Avoid using HbA1c for DM monitoring in patients receiving erythropoietin.
Demographic	Age	HbA1c increases with age[18,19]	Alternative markers should be considered for individuals > 75 years.[18,19]
	Ethnicity	Higher HbA1c in some ethnic groups[20,21]	May result in overdiagnosis in African and Asian populations.[20,21]
	Biological sex	Higher HbA1c in women (possibly due to shorter RBC life spans, higher Hb and iron levels)	Variable impact on HbA1c depending on biological sex.
Physiological and metabolic	Pregnancy	Altered erythrocyte turnover	HbA1c may not accurately reflect glycaemia in gestational diabetes.
	Chronic Kidney Disease (CKD)	Variable impact, especially in CKD 4–5	Avoid HbA1c in advanced CKD; prefer blood glucose monitoring.
	Liver disease	Potentially lower HbA1c in cirrhosis	Frequent glucose monitoring is recommended in patients with liver disease.
Medications and supplements	Hydroxyurea	Possible HbA1c reduction	Use additional glucose markers in patients on hydroxyurea.
	Dapsone	Significant HbA1c reduction	Avoid using HbA1c in patients taking dapsone.
	Antiretrovirals (ARVs)	Uncertain effects	Data insufficient; interpret HbA1c cautiously.
	Vitamin E supplementation (in T2DM with deficiency)	Reduction in HbA1c	Requires further research; potential implications for monitoring.
Other	Hypothyroidism	HbA1c increases in untreated cases	Use glucose-based testing until thyroid function stabilises.
	Hyperthyroidism	No significant effect	HbA1c remains a reliable marker.
	Seasonal variation	Slight increase in winter	No clinical significance: monitoring remains valid.
	Acute inflammation	No major impact	Elevated HbA1c during acute illness should be confirmed later.
	Acute blood glucose fluctuations	HbA1c reflects long-term trends	Not suitable for detecting acute hyperglycaemia or hypoglycaemia.

*Adapted from Campbell L, Pepper T, Shipman K.[22]

as oestrogen and sex hormone-binding globulin (SHBG), can influence HbA1c in non-diabetic populations, suggesting that hormonal differences may partly account for observed variations.[19]

HbA1c levels can also vary by ethnicity due to genetic differences and variations in red blood cell lifespan, leading to potential misclassification of DM risk and treatment needs, particularly among black individuals who tend to have higher HbA1c levels for the same blood glucose levels compared to white individuals. While some studies report higher HbA1c levels in black individuals than in white, there is no clear evidence suggesting overdiagnosis. Therefore adjusting diagnostic criteria based on race may unintentionally worsen health disparities.[20] It is important to use HbA1c testing uniformly across populations while considering individual patient factors to ensure equitable DM diagnosis and management.

Thus, while HbA1c remains a fundamental tool in DM care, its interpretation should be contextualised within a broader clinical framework. Although certain non-glycaemic factors may influence levels, HbA1c continues to be a dependable and widely used indicator of long-term glycaemic control in most clinical scenarios.[15,23-25]

Recent advances and innovations

Technological innovations, particularly in POCT, have enabled more rapid and accessible HbA1c testing, allowing healthcare providers to make immediate decisions.[15] These devices are essential in rural and underserved areas in South Africa, where laboratory access is limited.[23] Additionally, emerging research emphasises individualised HbA1c targets tailored to the patient's overall health status, age, and life expectancy, ensuring more personalised and effective diabetes management.[15,23-26]

Diabetes management technology is advancing at an exceptional rate, with new tools being developed more rapidly than research can assess their effectiveness. However, the individual with DM

is key to treatment success; effective use of these innovations depends on personal selection, active engagement, and sustained support from healthcare providers. While technology can simplify diabetes management, it does not replace the need for ongoing self-care and education.

Public health implications in South Africa

The rising burden of DM in South Africa underscores the need for widespread and equitable access to HbA1c testing. Integrating HbA1c into community-based screening and health initiatives while empowering pharmacists to conduct POCT can significantly enhance early detection of DM and its management. Despite the benefits of HbA1c testing, cost remains a limiting factor in South Africa's public sector. Government policies to subsidise POCT in community clinics and train pharmacists for HbA1c screening could improve accessibility. Addressing cost barriers and ensuring quality control in POCT implementation are vital for effective use.[27]

Conclusion and recommendations

HbA1c remains an essential tool for DM diagnosis and monitoring response to treatment. However, healthcare providers must consider non-glycaemic influences such as ethnicity, age, and comorbidities when interpreting HbA1c results. Expanding HbA1c testing access, particularly through POCT**,** and adopting personalised treatment approaches are essential for improving DM care outcomes in South Africa.

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Hypertension in South Africa: a growing epidemic and evolving treatment paradigms

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Abstract

Background: Hypertension is a major public health concern in South Africa, affecting 40–50% of adults, with control rates below 50% despite available treatments. It is a key driver of cardiovascular morbidity and mortality, particularly in populations with limited healthcare access, poor medication adherence, and high rates of comorbidities such as diabetes and obesity. This review examines the epidemiology, pathophysiology, diagnosis, treatment strategies, and public health approaches to hypertension in South Africa, highlighting gaps in care and opportunities for intervention.

Results: Pharmacological interventions such as fixed-dose combinations (FDCs) improve adherence but remain underutilised in public healthcare due to cost constraints. Community-based screening programmes (e.g. HealthRise South Africa) have successfully identified high-risk individuals, yet less than 30% of screened patients attend follow-ups due to referral challenges. Primary healthcare (PHC) infrastructure is overburdened, with workforce shortages, inconsistent medication availability, and weak referral systems limiting hypertension management. Public health policies targeting salt and sugar reduction have been implemented, but enforcement remains weak, and public awareness is insufficient.

Conclusion and policy implications: Addressing hypertension in South Africa requires a multi-pronged strategy focusing on:

1. Expanding access to cost-effective FDCs in public clinics to improve adherence and BP control.
2. Strengthening PHC capacity through workforce training, task-shifting, and improved referral pathways.
3. Scaling up community-based screening and linkage-to-care programmes for early detection.
4. Enhancing enforcement of dietary policies and launching nationwide awareness campaigns on lifestyle modifications.
5. Implementing national BP monitoring registries to track trends and guide policy adjustments.

A patient-centred, equity-driven approach that integrates pharmacological advances with robust public health interventions is critical to reversing the current trends of uncontrolled hypertension in South Africa.

Keywords: hypertension, South Africa, fixed-dose combinations, single-drug therapy, cardiovascular risk, primary healthcare, treatment adherence, public health

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Introduction

According to the World Health Organization (WHO), hypertension affects an estimated 1.28 billion adults aged 30 to 79 years globally, with nearly two-thirds residing in low- to middle-income countries.[1] Despite its burden, 46% of adults with hypertension are unaware of their condition**,** and less than half (42%) are diagnosed and treated**,** with only 21% achieving adequate blood pressure control. Hypertension remains a leading cause of premature mortality worldwide, prompting a global target to reduce its prevalence by 33% between 2010 and 2030.[1] In South Africa, hypertension has evolved into a widespread public health crisis, with national prevalence rates now exceeding 40% of the adult population.[2] According to South Africa Demographic and Health Survey (SADHS) (2019), the prevalence of hypertension (measured) has nearly doubled since 1998, from 25% to 46% among women and from 23% to 44% among men.[3]

The burden of hypertension in the country is compounded by socioeconomic inequalities, urbanisation, increasing obesity rates, and inadequate access to continuous healthcare, particularly in rural and peri-urban settings.[4]

Despite concerted national efforts, including the adoption of salt reduction policies and population-wide health promotion strategies, the prevalence of uncontrolled hypertension remains alarmingly high, with fewer than half of those diagnosed achieving recommended blood pressure targets.[5] Notably, poor treatment adherence, complex drug regimens, comorbid diabetes, and fragmented primary care systems present significant challenges in achieving optimal blood pressure control.[6]

Pharmacological treatment strategies in South Africa have historically focused on single-drug (monotherapy) approaches, but there is increasing recognition of the need for fixed-dose combination (FDC) therapies that address multiple

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Table I: Pathophysiological mechanisms of hypertension and relevance to South Africa[1,8,12,16,17]

Mechanism	Pathophysiological impact	Relevance to South Africa
Vascular resistance and endothelial dysfunction	Reduced nitric oxide (NO) availability and increased oxidative stress lead to vasoconstriction and vascular stiffness.	Common due to high rates of obesity and metabolic syndrome.
Renin-Angiotensin-Aldosterone System (RAAS) activation	Angiotensin II causes vasoconstriction; aldosterone promotes sodium and water retention.	Worsened by obesity and salt intake prevalent in South African diets.
Sympathetic nervous system (SNS) overactivity	Increased heart rate, vasoconstriction, and sodium reabsorption. Chronic activation leads to vascular remodelling.	Elevated in low-income communities due to chronic psychosocial stress.
Sodium retention and volume overload	Excess sodium leads to increased extracellular fluid volume and cardiac output, elevating BP.	High dietary salt intake, despite salt reduction policies.
Obesity, diabetes and metabolic factors	Increase RAAS/SNS activity, cause endothelial dysfunction, and promote sodium retention.	Highly prevalent comorbidities contribute to resistant hypertension.
Genetic and environmental interactions	Genetic predisposition interacts with salt intake, inactivity, and stress.	Significant in urbanising and rural populations undergoing rapid lifestyle changes.

pathophysiological pathways and improve adherence.[7,8] While FDCs are now recommended in various treatment guidelines, including those of the Southern African Hypertension Society (SAHS), questions remain regarding their accessibility, cost implications, and suitability across different patient populations.[9]

This review aims to explore the evolving landscape of hypertension management in South Africa, highlighting the growing epidemic of hypertension, current treatment paradigms, and the role of FDCs and single agents within the broader context of public health interventions and primary healthcare (PHC). The review draws from recent South African studies and guidelines to present a comprehensive understanding of this multifaceted health issue.

Epidemiology of hypertension in South Africa

Hypertension is a significant public health problem in South Africa, affecting an estimated 43% to 50% of adults, depending on the population studied and the methodology employed.[2-3] This high prevalence reflects a growing trend over the past two decades, driven largely by rapid urbanisation, lifestyle transitions, and demographic shifts, including population aging.[10] The South African National Health and Nutrition Examination Survey and other regional studies have repeatedly underscored the magnitude of this burden, identifying hypertension as a major contributor to cardiovascular disease (CVD), stroke, and renal failure.[11]

Regional disparities in hypertension prevalence are striking, with provinces such as Northern Cape (55.7%), Eastern Cape (52.8%), Free State (52.4%), and Mpumalanga (50.7%) exhibiting significantly higher rates compared to others.[12] These variations are influenced by sociodemographic factors, including poverty, limited healthcare access, and higher rates of comorbid conditions such as diabetes and obesity.[11] The South African Demographic and Health Survey (2016) confirmed these trends, with higher hypertension rates found in rural areas, where limited access to PHC services exacerbates the burden.[3]

In terms of risk factors, hypertension in South Africa is strongly associated with obesity, diabetes mellitus, and aging.[11] For example, Onwukwe et al. [12] reported that 67.8% of hypertensive patients were either overweight or obese, while 54.0% had coexisting diabetes.Obesity and diabetes compound hypertension's clinical course, increasing the risk of cardiovascular complications and rendering blood pressure (BP) control more difficult.[11] Additionally, as the population ages, the prevalence of hypertension rises, highlighting the need for targeted interventions in elderly populations.[13] Despite the high prevalence of hypertension, awareness, treatment, and control remain inadequate.[13]

Ferro et al.[14] demonstrated that while treatment rates have improved over time, less than two-thirds of hypertensive patients achieve adequate BP control even when on treatment. This finding is consistent with other studies showing low rates of diagnosis and poor adherence to prescribed antihypertensive regimens, particularly in low-resource and rural settings.[12]

The economic impact of uncontrolled hypertension is profound, contributing to the rising burden of non-communicable diseases (NCDs) and placing additional strain on South Africa's healthcare system.[15] Costs are incurred not only through direct medical expenses but also through productivity losses due to hypertension-related morbidity and premature mortality.[15] Addressing hypertension at a population level thus remains an urgent priority for South African healthcare and policy frameworks.[15]

Pathophysiology of hypertension

Hypertension is a multifactorial disorder characterised by persistent elevation of arterial BP, resulting from a complex interaction of vascular, neurohormonal, renal, metabolic, and environmental factors.[1,8,12,16,17] In South Africa, the high burden of hypertension is compounded by obesity, diabetes, and socioeconomic stressors that influence these pathophysiological mechanisms.[18]

Diagnosis of hypertension

Hypertension is confirmed when elevated blood pressure readings are consistently observed. According to both international and South African guidelines, BP should be measured using validated devices under standardised conditions to ensure accuracy.[9,16]

Table II: Current South African Hypertension Society Guidelines of hypertension[9,16]

Blood Pressure Category	Systolic Blood Pressure (SBP) mmHg	Diastolic Blood Pressure (DSP) mmHg
Normal	Less than 120	and less than 80
Optimal	120–129	and below 80
High-Normal (Pre-Hypertensive)	130–139	or 80–89
Hypertension — Grade 1 (Mild)	140–159	or 90–99
Hypertension — Grade 2 (Moderate)	160–179	or 100–109
Hypertension — Grade 3 (Severe)	180 or higher	or 110 or higher
Isolated Systolic Hypertension	140 or higher	and less than 90

Table III: First line treatment agents for hypertension

Drug class	Examples	Notes on use
Thiazide-like diuretics	Hydrochlorothiazide, indapamide	Effective in reducing plasma volume; widely used.
Calcium channel blockers (CCBs)	Amlodipine	Well-tolerated, especially in Black African patients.
ACE inhibitors (ACEIs)	Enalapril, perindopril	Preferred in diabetes and renal disease.
Angiotensin receptor blockers (ARBs)	Losartan, valsartan	Alternative to ACEIs if intolerant; also, renal-protective.

Note: Therapy should be individualised based on age, race, comorbidities (e.g. diabetes, renal impairment), and cardiovascular risk.[9]

Special populations

Certain populations require unique considerations due to physiological differences and comorbidities. These include:

Pregnant women

Hypertension during pregnancy, including gestational hypertension and preeclampsia, requires careful management to prevent complications.[19] Preeclampsia is typically diagnosed when hypertension arises after 20 weeks of gestation, often accompanied by proteinuria, acute kidney injury, liver dysfunction, neurological signs, or foetal growth restriction. Careful management, including the use of methyldopa and close monitoring, is crucial to minimising complications.[20]

Elderly patients

Hypertension management in elderly patients requires individualised and comprehensive assessments, such as age-related frailty, organ damage, and reduced physiological reserve complicate treatment decisions.[21] The authors emphasise that while lowering BP reduces cardiovascular risks, adjustments to treatment targets are necessary to minimise adverse effects like falls, cognitive decline, and worsening frailty, highlighting the need for cautious and tailored approaches to antihypertensive therapy in older adults.[21]

According to South African Heart and Stroke Foundation nearly 8 in 10 South Africans over the age of 55 have hypertension, so effective management of hypertension is needed to reduce risk for other cardiovascular diseases such as heart failure and stroke and other complications such as cognitive dysfunction.[21]

Patients with diabetes and chronic kidney disease

Stricter BP control is recommended to reduce the risk of targeted organ damage and reduce the mortality as patients with hypertension and coexisting comorbidities have a higher mortality rate due to the combined effects of organ damage.[22,23]

Pharmacological treatment approaches for hypertension

Effective pharmacological management of hypertension is essential to prevent cardiovascular events, stroke, and renal complications.[1] In South Africa, a stepwise approach to therapy is recommended, often starting with single-drug therapy (monotherapy) and advancing to FDCs when necessary.[8] Given the high rates of comorbid diabetes, obesity, and poor adherence, combination therapy is increasingly prioritised to improve BP control.[17]

First-line antihypertensive agents

First-line agents recommended by the South African Hypertension Practice Guideline include the following:[9]

Fixed-dose combinations (FDCs)

FDCs combine two or more antihypertensive agents in a single pill, targeting multiple mechanisms to optimise BP control.[7,16] These are increasingly recommended as first-line or step-up therapy due to benefits in adherence and efficacy.[16]

Fixed-dose combinations advantages and challenges

FDCs offer several advantages in the management of hypertension. They simplify treatment regimens, thereby improving patient

Table IV: Fixed dose combination therapy

Common FDCs available in South Africa	Combination of classes
Perindopril + Amlodipine	ACEI + CCB
Enalapril + Hydrochlorothiazide	ACEI + Diuretic
Losartan + Hydrochlorothiazide	ARB + Diuretic
Valsartan + Amlodipine	ARB + CCB

Table V: Indications for monotherapy in hypertension

Indications for monotherapy	Details
Newly diagnosed patients with mild hypertension (BP < 150/90 mmHg)[9]	First-line for low-risk individuals
Patients intolerant to multi-drug regimens[9]	Due to side effects or drug interactions
Elderly or frail patients[2]	Where careful adjustment is necessary

adherence to medication.[7] By targeting multiple mechanisms simultaneously, FDCs generally result in better BP control compared to monotherapy.[16] Additionally, they may minimise adverse effects through the use of lower doses of each individual agent, making them more tolerable for patients.[7] Over time, FDCs may also prove to be cost-effective by reducing the risk of complications associated with poorly controlled hypertension.[7] However, there are notable limitations to their use. FDCs offer limited flexibility, making titration and individualisation of treatment more challenging.[16] Although they may save costs in the long term, their initial cost can be higher than single-agent therapies, which may impact accessibility.[7] Furthermore, their availability remains limited within the public healthcare system in South Africa, posing additional barriers to widespread implementation.[7]

Monotherapy (Single-Agent Therapy) (Table V)

While FDCs are ideal for many patients, monotherapy remains important for low-risk patients or those intolerant to combination therapy.[8]

Monotherapy challenges

Monotherapy presents several challenges in the effective management of hypertension. It is frequently inadequate for achieving optimal BP control, particularly among individuals with comorbid conditions such as diabetes, chronic kidney disease, or those at elevated cardiovascular risk.[16] In addition, when more than one medication is needed, patients are often required to take multiple single agents, which can lead to poor adherence – a significant contributor to uncontrolled hypertension, especially in resource-limited settings.[7,16] These limitations highlight the need to consider combination therapies for better BP management in complex or high-risk patients.

Summary of pharmacological treatment options (Table VI)

Alternative treatments for special populations

Pregnant women

Alpha-2 agonists like methyldopa, with labetalol, and nifedipine are preferred due to their safety profiles.[18] Emergency treatment of preeclampsia includes intravenous administration of Ringers lactate at 80 ml/hour, together with 5 g magnesium sulphate administered intramuscularly in each buttock.[24]

Elderly patients

Diuretics are often used as first line treatment with calcium channel blockers. ACE inhibitors like enalapril can also be used but the elderly are started on a small dose and slowly titrated up with continuous monitoring as this treatment may cause excessive hypotension. They, however, can still be used as they have organ protective effects.[21]

Diabetes and hypertension

For patients with diabetes and chronic kidney disease, ACE inhibitors or ARBs are recommended to help preserve kidney function and reduce disease progression, as emphasised in the KDIGO 2020 guidelines.[22,23]

Public health interventions and policy approaches

Effective hypertension control in South Africa requires complementary public health strategies alongside pharmacological treatment to address key risk factors and health system limitations.[1,8]

National dietary policies: salt and sugar regulation

South Africa leads in dietary interventions with mandatory salt reduction (2016) and a sugar-sweetened beverage tax (2018) aimed at lowering population-level risk for hypertension and related diseases.[17] While salt content in processed foods has been reduced, enforcement and public education remain challenges.[17] The sugar tax targets obesity and diabetes, with indirect benefits for hypertension control.[25]

Community-based screening and early detection

Programmes like HealthRise South Africa utilise community caregivers (CCGs) and ward-based outreach teams (WBOTs) for local hypertension and diabetes screening.[26] According to one study, nearly 30% of over 10 000 individuals screened were hypertensive.[26] However, linkage to formal care remains weak,

Table VI: Pharmacological treatment options[16]

Strategy	When used	Key points
Monotherapy	Low-risk, mild hypertension, elderly, intolerant patients	May not achieve target blood pressure in high-risk patients
Fixed-dose combinations (FDC)	Moderate to high-risk, poor adherence, uncontrolled blood pressure	Improve adherence and blood pressure control; limited availability
Stepwise combination therapy	When monotherapy fails, control blood pressure within 4 to 8 weeks	Add second agent rather than increasing the dose of the first agent

with fewer than one-third attending follow-up, highlighting the need for better referral systems.[26]

Primary health system limitations and chronic disease integration

Primary care clinics are overburdened, especially in rural areas, limiting hypertension care due to staff shortages, medicine stock-outs, and focus on infectious diseases like HIV and TB.[27] The Integrated Chronic Disease Management (ICDM) model aims to streamline care by combining NCD, HIV, and TB services, supporting task-shifting to nurses and community workers.[27] Despite its promise, ICDM remains inconsistently implemented and requires further investment.[27]

Despite existing efforts, hypertension control in South Africa remains inadequate, underscoring the need for targeted priorities to improve outcomes. One critical priority is the stricter enforcement of existing salt and sugar reduction regulations to mitigate key dietary risk factors.[17,25] Additionally, there is a pressing need to expand community-based screening initiatives and enhance referral systems to ensure that individuals identified with elevated BP are effectively linked to care.[26] Strengthening PHC by addressing staffing shortages and ensuring consistent availability of essential antihypertensive medications is also crucial.[27] Equally important is improving public education to foster better adherence to treatment regimens and promote healthier lifestyle choices, particularly regarding diet, physical activity, and medication use.[17,26] These actions collectively represent essential steps toward improving hypertension management and reducing CVD burden in South Africa.

Despite the availability of effective therapies and national guidelines, BP control rates in South Africa remain inadequate, particularly among patients with comorbid diabetes, obesity, and in low-resource settings, due to poor treatment adherence, socioeconomic barriers, and limited healthcare system capacity. Although some rural community interventions have shown improvements in BP control, overall management remains fragmented, highlighting the urgent need for better follow-up, integrated care models, and targeted public health strategies to address persistent gender, regional, and socioeconomic disparities.[28,29,30,31]

Lifestyle interventions and pharmacist's role

Pharmacists play a crucial role in managing hypertension through patient education, medication adherence support, and lifestyle modification counselling.[32]

Lifestyle modifications

Diet

Reduce sodium intake (< 2 g per day).[33]

Higher potassium intake, primarily from fruits and vegetables, is recommended as part of dietary strategies to lower BP and enhance cardiovascular health.[34]

Follow the DASH (Dietary Approaches to Stop Hypertension) and Mediterranean diet which focuses on reducing sodium intake while increasing consumption of fruits, vegetables, whole grains, lean proteins, and low-fat dairy.[33]

Limit processed foods that contain high amounts of unhealthy fats and sodium as well as caffeine intake.[33]

Reduce stress

Practice deep breathing exercises, engaging in meditation, yoga and progressive muscle relaxation.[35]

Ensuring sufficient sleep at least seven to eight hours per night.[36]

Exercise

Engage in at least 150 minutes of moderate-intensity exercise per week.[37]

Include aerobic training such as walking, jogging, cycling or swimming and resistance training e.g. weightlifting, push ups, etc. Aerobic and resistance training should be done together for maximum benefits.[37]

Weight management

Achieve a healthy BMI through dietary changes and physical activity with a healthy BMI for adults being between 18.5–24.9.[38]

Smoking cessation and alcohol reduction

Reduce tobacco, electronic smoking devices and alcohol consumption to lower cardiovascular risks.[39]

Conclusion

Hypertension remains a critical driver of cardiovascular morbidity and mortality in South Africa, with control rates remaining unacceptably low despite the availability of effective treatments and national guidelines. Key challenges include limited access to essential medications (particularly fixed-dose combinations), poor adherence, fragmented care pathways, and inadequate healthcare provider capacity. Additionally, low awareness and engagement among patients, particularly in underserved areas, further contribute to poor hypertension control.

However, targeted interventions can bridge these gaps. Expanding cost-effective FDC access, strengthening PHC capacity, scaling up community-based screening and education programmes, and fully integrating hypertension care within the ICDM model are critical steps forward. Further, enhanced public health education and dietary policies can play a key role in reducing hypertension incidence.

Achieving meaningful improvements in hypertension management requires a coordinated, multi-sectoral response that includes the following: Policy reforms to ensure equitable access to antihypertensive medications; workforce training and multidisciplinary, team-based care; community-driven education and outreach to enhance adherence and early detection and

robust monitoring systems to track progress and refine interventions.

A patient-centred, equity-driven approach—integrating pharmacological advances with public health interventions—is essential to reversing the rising burden of hypertension in South Africa and improving long-term cardiovascular outcomes.

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Pharma Dynamics introduces new Vidamace 50 mg tablets for type 2 diabetes management

Pharma Dynamics has launched Vidamace 50 mg an antidiabetic agent that contains vildagliptin, a potent and selective dipeptidyl peptidase-4 (DPP-4) inhibitor.

This new offering promises to enhance the treatment landscape for patients with type 2 diabetes (T2D). Vildagliptin lowers blood glucose levels by selectively inhibiting dipeptidyl peptidase-4 (DPP-4), an enzyme responsible for the breakdown of GLP-1 and GIP after their release from intestinal cells. By preventing this degradation, vildagliptin significantly extends the half-life of these incretin hormones, leading to increased levels of active GLP-1 and GIP.

Vildagliptin improves glycaemic control by reducing fasting and postprandial glucose levels, lowering HbA1c, and enhancing the glucose sensitivity of pancreatic alpha- and beta-cells. It also supports glucose-dependent insulin secretion while improving postprandial lipid and lipoprotein metabolism.

Vildagliptin helps stabilise blood glucose levels without causing significant weight gain or hypoglycaemia – common side effects of other antidiabetic treatments.

Ingrid Singels, Marketing Manager of Pharma Dynamics' Scientific Division, says vildagliptin has been extensively studied in multiple clinical settings, demonstrating significant efficacy in managing blood glucose levels in T2D patients and has shown effectiveness both as monotherapy and in combination with other antidiabetic medication or insulin.

"It is also well tolerated with a low risk of hypoglycaemia and weight gain. A meta-analysis of various studies highlights its safety profile, particularly in patients at risk of cardiovascular and cerebrovascular events."

She emphasises that the management of T2D, particularly in elderly patients, presents unique challenges.

"Elderly patients are more susceptible to hypoglycaemia and often have multiple comorbidities, including undiagnosed renal impairment and depression. These factors necessitate individualised treatment plans. Despite these challenges, approximately 20% of elderly patients are newly diagnosed with T2D, making them suitable candidates for monotherapy. Vildagliptin has shown significant efficacy and safety in patients aged 75 years and older."

Additional studies underscore vildagliptin's use in specific patient segments, particularly those where metformin is contraindicated or not tolerated. Patients with normal or mildly impaired renal function will also benefit from Vidamace 50 mg.

According to Singels, the introduction of Vidamace 50 mg offers a valuable treatment option for patients who require an effective and well-tolerated T2D therapy, while addressing a critical need for flexible treatment options in T2D management. Vidamace 50 mg is most effective when combined with a healthy lifestyle, which include a nutritionally well-balanced diet and regular exercise.

Pharma Dynamics' commitment to advancing diabetes care through its diabetes basket – Dynacaz and now Vidamace 50 mg - underscores the ongoing need for tailored, patient-centric therapies in the management of T2D.

Vidamace 50 mg tablets is conveniently packed in 30s and 60s. Vidamace 50 mg tablets is affordably priced at up to 68 % less than the originator and 15 % less than the market leader.

pharma dynamics
EFFECTIVE AFFORDABLE HEALTHCARE

SILVERLAB DAILY HEALTHCARE

From Ancient Remedy to Clinical Tool: Silver in Wound Healing

One of the most effective wound treatments in modern medicine has been around for over 2 400 years! When Hippocrates recommended silver for treating wounds in his 400 BC book *On Ulcers,* he could hardly have imagined that this remedy would still be widely used in 2025. What's even more fascinating is that modern science now backs what he intuitively knew, with the effects of silver in wound healing well documented in contemporary research.

So, why has silver stood the test of time? The answer lies in its near-miraculous, multimodal action in wound care.

Pathogens don't stand a chance

Silver's first line of action in wound care is its potent ability to destroy pathogens. And it's not just limited to bacteria, silver effectively targets viruses and fungi as well, all of which can hinder proper wound healing.

The science behind silver's healing power

Research reveals that silver does far more than just fend off harmful microbes. When applied to a wound, it triggers a series of events that significantly boost the likelihood of successful healing.

The fibroblast connection.

These specialised connective tissue cells produce collagen and other essential fibres crucial for tissue repair and recovery. Silver binds to fibroblasts, encouraging them to revert to a more primitive state, making them more adaptable and efficient in the wound-healing process. This ultimately leads to enhanced collagen production and faster recovery.

Can any silver product be used safely to achieve these wound healing benefits? The short answer is no, not all silver products are created equal, and some may even be harmful. The risks are primarily linked to unregulated or inappropriate forms of silver, such as high-concentration colloidal silver, banned nano silver formats, or silver compounds produced without proper quality control.

What sets Silverlab Healthcare apart

Silverlab Healthcare has addressed these concerns by formulating a pharmaceutical-grade ionic silver (Ag^+) suspended in purified, deionised water. Manufactured under validated GMP (Good Manufacturing Practice) conditions, Silverlab products are free from stabilisers, carriers, and excipients. The typical concentration remains below 0.003%, offering a remarkably safe profile. Toxicology assessments, ranging from lung cell line studies to animal oral and inhalation models, consistently demonstrate minimal risk, even at higher exposure levels.

Wound care that works

For practical clinical use, Silverlab offers a convenient and effective product line suitable for various wound types and stages:

- Silverlab Healing Gel: For open wounds, cuts, and abrasions
- Silverlab Healing Cream: For dry or cracked skin requiring repair
- Silverlab Skin Rescue: A multipurpose option for skin conditions
- Silverlab Burn Rescue: For soothing and treating thermal injuries
- Silverlab Healing Spray: Ideal for broad application across all wound types, especially where gentle, touch-free coverage is preferred

The bottom line

Silverlab's ionic silver formulations not only guard wounds against infection but also actively support faster healing and reduced scarring, making them a smart, science-backed addition to any pharmacy's wound care offering.


Clinically
Trusted.
Naturally
Formulated.
Burns & wounds
Oral infections & eye infections
Rashes & fungal infections
SILVERLAB
HEALING SPRAY
Ionic+ Colloidal Silver
SILVERLAB
DAILY HEALTHCARE
Silverlab's HEALING SPRAY is a versatile product for burns, wounds, acne, rashes and fungal conditions like athlete's foot. HEALING SPRAY targets areas directly by spraying it onto an affected area, and is clinically proven to repair damaged tissues in open wounds and burns.
More info

Pharmaceutical Practitioner

South African Association of Community Pharmacists

PCDT
Primary Care Drug Therapy Pharmacists
SAACP
South African Association of Community Pharmacists

PCDT as integral part of the South African Association of Community Pharmacists

The PCDT Special Interest Group is officially recognised as an integral part of the SAACP, committed to promoting, collaborating and addressing specific areas of interest within the PCDT community pharmacy profession.

Our Aim

Add value to PCDT registered, SAACP members

- Protecting the rights of PCDT pharmacists
- Facilitating Discussions & Representation
- Addressing issues & Opportunities related to PCDT
- Promoting Research & Knowledge-sharing in the field
- To Collaborate with Stakeholders
- To Propose Initiatives & Enhance the Role of the PCDT community pharmacist

Scan here for more info

Membership

Become an official member

Membership to the PCDT special interest group is open to Pharmaceutical Society of South Africa (PSSA) members, who select as their sector of choice, the South African Association of Community Pharmacists (SAACP); and who have completed the PCDT supplementary training, registered with the South African Pharmacy Council (SAPC) for supplementary training, and applied for the relevant section 22A(15) permit for offering PCDT services.

If you meet all of these criteria, and you wish to join this special interest group, then scan and submit the online Membership Registration Form. Or email pcdt@saacp.org.za with any questions you may have or any PCDT-related enquiry.

Check your PSSA/SAACP Membership Status

Membership to the PSSA, and SAACP offers numerous benefits, including access to professional services, networking opportunities, assistance with legislative matters, participation in national symposiums, and continuing professional development opportunities. In order to join the PCDT special interest group, complete the PSSA membership application form available at https://www.pssa.org.za/online-application.html to become a member, and/or email info@pssa.org.za to confirm your membership or sector affiliation to the SAACP.

Scan here to complete an online Membership Registration Form

Scan here to register

Contact Us

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The South African Association of Hospital and Institutional Pharmacists (SAAHIP)

38th Annual Conference and 69th Annual General Meeting

16-19 April 2026

Operation 3i^{s}

Advancing Pharmaceutical Services

innovate, integrate, improve

Conference Announcement

About the SAAHIP Conference

The South African Association of Hospital and Institutional Pharmacists (SAAHIP) hosts an annual conference that brings together hospital and institutional pharmacy personnel to explore the latest advancements in hospital pharmacy practice. This event serves as a platform for hospital and institutional pharmacists and pharmacist's assistants to exchange knowledge, share research findings, and discuss emerging trends in medication management, patient safety, and healthcare policy. SAAHIP continues to focus on continuous professional development. The 2026 conference will feature a variety of academic and practice-based podium and poster presentations, pearl presentations, workshops, keynote presentations, and networking opportunities, offering valuable insights into enhancing pharmacy services across South Africa.

Advancing Pharmaceutical Services: Innovate - Integrate - Improve

The Northern Gauteng Branch of SAAHIP is pleased to announce the 2026 conference where we will be delving into the evolving role of hospital and institutional pharmacy amid the implementation of the National Health Insurance while advancing pharmaceutical services in South Africa. Chapter 11 of the National Health Insurance Act, Act no. 20 of 2023 section 57, subsection 3(d) informs us of the establishment of the Health Technology Assessment agency which will promote a high-quality, equitable, and efficient healthcare system using health technologies.

As technological advancements and innovative healthcare solutions re-shape the pharmaceutical landscape, it is imperative for hospital and institutional pharmacists to adapt and lead in this transformative era. This conference will provide a platform to explore how cutting-edge technologies, automation, and integrated healthcare systems can enhance patient care, optimise pharmacy practice, and strengthen pharmacy services within the framework of the National Health Insurance.

Invitation

We invite researchers, practitioners, and industry experts to submit abstracts that contribute to this critical discourse and help shape the future of hospital and institutional pharmacy in South Africa. Join us as we **Innovate - Integrate - Improve** pharmaceutical services for the betterment of healthcare.

- **When: 16-19 April 2026**
- **Venue: Location to be confirmed at a later date**
- **Theme: OPERATION 3i^{s} - Advancing Pharmaceutical Services: Innovate - Integrate - Improve**

Operation 3i^{s}

Advancing Pharmaceutical Services

innovate, integrate, improve

Call for Abstract

The healthcare landscape is undergoing great transformation, driven by rapid technological advancements, evolving healthcare policies, and the increasing need for integrated, patient-centred pharmaceutical services. This landscape brings forth new opportunities for personalised medicine, automation, artificial intelligence, data-driven decision-making, and digital health solutions. As South Africa progresses towards the implementation of the National Health Insurance, hospital and institutional pharmacists must **innovate, integrate, and improve** pharmaceutical services to ensure efficient and effective pharmaceutical care within a restructured healthcare system.

This conference aims to provide a platform for knowledge exchange, discussions, collaborations, and equipping hospital and institutional pharmacy personnel with the insights and tools needed to thrive in this transformative era.

We invite researchers, pharmacy personnel, managers, and thought leaders to submit abstracts for a podium or poster presentation (academic, scenario, quality improvement project), a pearl presentation and or a workshop/symposia/seminar that contribute to this vital discourse and shape the future of hospital and institutional pharmacies in South Africa.

Categories for submission of abstracts	
Sub-themes	**Category**
Access to medicines	Supply chain resilience, medicines availability, logistics and procurement strategies and ensuring equitable access in institutional settings.
Patient-centred care	Management and prevention of communicable and non-communicable diseases using strategies such as, but not limited to personalised pharmacotherapy, pharmacogenomics, vaccines, medication adherence and patient counselling.
Evidence-based practice	Implementation of clinical guidelines and best practices including real-world evidence and health outcomes research. Analysis of economic evaluations and cost-effectiveness in pharmaceutical care.
Digital health solutions	Digital health technologies e.g. tele-pharmacy, mobile applications, and electronic health records, in optimising pharmacy practice.
Sustainable resource management	Readiness to thrive in high service-demand environments experiencing resource challenges and workforce inadequacies.
Legislative readiness	Current and future strategies to navigate legislation, regulation and policies within the South African context.
The above sub-themes are not an exhaustive list, and other topics may also be worth presenting.	

Important Dates	
Description	**Dates**
Abstract submission deadline	30 September 2025
Abstract review	1 October – 14 November 2025
Notification of abstract submission outcome	15 November 2025

You are invited to come and enjoy spring in Cape Town. This year's conference will be a season of new growth and rejuvenation bringing together academic leaders, researchers, pharmacy students, and healthcare professionals to explore ground breaking innovations and research in the pharmaceutical and healthcare industry.

The APSSA conference promotes and encourages participation by our younger members through the Young Scientist Competition. We also acknowledge excellence in research, teaching and learning through our Publication Awards and Teacher of the Year Award.

The 2025 conference is hosted by the School of Pharmacy, University of the Western Cape.

Delegate fees

The registration fees include all lunches and tea during the conference as well as the Cocktail evening. The Gala dinner is **NOT** included in the registration fee; should you wish to attend then indicate this on the registration form.

	Early bird registration Before 16 June 2025	Registration fee 16 June – 22 Aug 2025
APSSA member *(full conference excl. travel, accommodation & Gala dinner)**	R 2 800	R 3 300
APSSA student member *(full conference excl. travel, accommodation & Gala dinner)**	R 2 200	R 2 700
Non-member *(full conference excl. travel, accommodation & Gala dinner)**	R 3 500	R 4 000
Student non-member *(full conference excl. travel, accommodation & Gala dinner)**	R 2 900	R 3 400
Gala dinner *(should you wish to attend indicate on registration form)*	R 600	R 600
Daily registration (full conf only) **No onsite daily registration**	R 1 800	R 2 300
Accompanying person (only Cocktail & Gala dinner, excl. travel and accommodation)	R 1 300	R 1 900

*Full conference includes all teas, lunches and Cocktail; Does not incl. Gala dinner, travel or accommodation

Important dates

Closing date for abstract submission and Young Scientist (YS) Competition: 30 May 2025

Closing date for Best Publication Competition: 15 June 2025

Closing date for Teacher of the Year Award: 30 June 2025

Closing date for early bird registration: 15 June 2025

Criteria and application forms can be downloaded from the APSSA website: https://pssa-academy.org.za/

Provisional programme

(subject to change)

Sunday	31 August	Registration from 15:00 Conference Opening/Cocktail 18:00
Monday	1 September	Full day Academic programme
Tuesday	2 September	Full day Academic programme Gala dinner
Wednesday	3 September	Departure

Registration

Register via this link: https://forms.office.com/r/idZe5MXCaS

Accommodation & Travel

Delegates are responsible for their own accommodation and travel arrangements.

Limited accommodation is available at Lagoon Beach Hotel (https://www.lagoonbeachhotel.co.za/).

Contact Tendy Siwela via email: Confer1@lagoonbeachhotel.co.za with the conference reference: 2448251 or APSSA Conference for inquiries and bookings.

Queries and invoices

Any queries and invoice requests can be emailed to nitsa@pssa.org.za.

Improving the management of severe asthma in South Africa

sanofi

Johannesburg, 26 May 2025: Despite national guidelines and access to essential medicines, severe asthma remains under-recognised and inconsistently managed within South Africa's healthcare system. It is therefore critical to address ongoing patient challenges, particularly regarding access to diagnostic tools, limited use of phenotyping, and the imperative to align clinical practice with international best practice recommendations.

The Severe Asthma Index 2025 found that South Africa scored below the global average in four out of five domains, revealing persistent gaps in policy coordination, equitable access, diagnostic capacity, and environmental health.[1a] Of concern is the continued reliance on oral corticosteroids (OCS) without proper assessment or referral, especially where evidence-based, targeted biologics remain inaccessible or unfunded.[1b+2a]

Understanding asthma in South Africa

South Africa has robust asthma guidelines, but the absence of a national asthma strategy and lack of participation in global severe asthma registries limit insight into outcomes and weaken care coordination. Specialist care and phenotyping are largely confined to urban centres, and national data on hospitalisations and treatment outcomes is scarce. Although reported asthma-related societal costs and disability adjusted life years (DALYs) are relatively low, this likely masks the true burden among patients with severe, underdiagnosed, or poorly controlled disease.[1b] Traditionally, asthma mortality in Southern Africa has been considered as relatively high due in large part to short-acting beta-agonists (SABAs) overuse.[3]

Environmental factors compound these challenges. High levels of particulate matter (PM2.5) and poor indoor air quality contribute significantly to disease severity, particularly in low-income areas. Meanwhile, access to advanced diagnostics and therapies remains limited. Biologic add-on therapies and fractional exhaled nitric oxide (FeNO) testing are not routinely available in the public sector, leaving most patients dependent on standard treatments with few options for escalation if the disease remains uncontrolled.[1b]

Rethinking corticosteroid use

The *Severe Asthma Index 2025* highlights the widespread use of OCS in South Africa as a persistent pattern that may pose long-term health risks if not carefully managed or replaced by more targeted therapies.

While OCS play a critical role in treating acute exacerbations, frequent or prolonged use is linked to serious side effects, including osteoporosis, adrenal suppression, diabetes, and infections.[2c]

"There's growing awareness that long-term OCS use can lead to significant health risks," says Dwayne Koot, Medical Manager at Sanofi South Africa. "For severe asthma, the shift is towards biologic therapies that specifically target the underlying inflammation, not just the symptoms.[1c] As a simple regimen (where available), inhaled corticosteroid–formoterol combinations are now recommended as the preferred reliever across all severity levels.[3] If high-dose ICS-LABA is needed, its use should be limited to 3 – 6 months, prompting phenotyping and biologic therapy add-on if asthma is not controlled. Low-dose maintenance OCS should only be considered as a last resort if no other options are available."

Improving diagnosis and referral

Access to diagnostic tools remains uneven across South Africa, particularly in the public sector. Spirometry is not routinely available at primary care level, while FeNO testing, oscillometry, and biomarker analysis are largely limited to research centres or private practices.[1b]

"This makes it difficult to accurately diagnose, phenotype, and manage asthma, potentially leading to suboptimal treatment decisions and poorer patient outcomes," says Koot.

"There's an opportunity to enhance the referral pathway to specialists and expand access to advanced diagnostic tools by defining referral criteria and partnering with specialised centres," Koot says. "Routine phenotyping at GINA step 5, crucial for tailoring treatment plans and identifying suitable candidates for biologic therapies, is currently limited in many healthcare settings. Expanding these capabilities would enable a more personalised approach to asthma management."[3]

To help close these gaps, the *Severe Asthma Index 2025* recommends piloting basic phenotyping tools such as eosinophil counts at regional hospitals, establishing asthma registries to monitor outcomes and access, and expanding clinician training in severe asthma diagnosis and escalation pathways.[1b] "Better data and better training could transform how we identify and treat severe asthma," says Koot.

Next steps for clinical practice

Healthcare professionals have a pivotal role to play in strengthening asthma care — from recognising poor control early to ensuring patients access the most appropriate treatment in a timely manner. This includes reassessing those with persistent symptoms, reinforcing correct inhaler technique, referring for further investigation when needed, and considering alternative therapies when conventional options are no longer sufficient.[3]

South Africa already has many of the essential components in place: national treatment guidelines, access to key medicines, and clinical expertise. The next step is to ensure that patients with severe asthma are consistently identified, supported, and offered the full range of available interventions.

"As the World Asthma Day 2025 theme reminds us, the goal is to 'Make Inhaled Treatments Accessible for ALL', because inhaled medications are vital not just for preventing attacks, but for controlling chronic inflammation," says Koot. "We encourage healthcare practitioners and policy makers to help make appropriate, evidence-based asthma care a reality for every South African asthmatic ."

For more information about asthma management and Sanofi's commitment to respiratory health, please visit www.sanofi.co.za.

References

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Obituary

Michéle Coleman

Written by Dalene Kuisis

Our beloved colleague and friend, Michéle, passed away on 18 April 2025 (Good Friday) at the age of 68 years old.

Michéle was a dedicated and passionate pharmacist who touched the lives of countless individuals through her work and personal relationships.

Michéle began her career in the profession of Pharmacy when she studied at Rhodes University and qualified as a pharmacist. She quickly established herself as a respected and innovative pharmacist.

Michéle was known for her exceptional leadership skills at work and in the professional societies that she was a member of, viz. SAAHIP Northern Transvaal (Gauteng) Branch and PSSA, where she served as Chairperson, National Secretary and Treasurer. She also served on the PSSA National Executive Committee for a number of years and served three terms as the PSSA National Treasurer. She was awarded Fellowship of the PSSA in 2011.

Michéle was appointed as Pharmacy Manager at Montana Hospital Pharmacy and at Bougainville Private Hospital and later at Life Wilgers Hospital Pharmacy.

In later years, she worked for surgical companies, suppliers of goods to hospital groups like Netcare and LifeHealthCare and Mediclinic and others and ended her career at Fresenius Kabi, where she was managing the supply of enteral and intravenous feeds to hospitals. Her abilities and success knew no end!

Beyond Michéle's professional accomplishments, she was a kind, compassionate and generous person who always put others before herself. Michéle had a remarkable ability to connect with people from all walks of life. She had an infectious smile and a wonderful sense of humour that could light up a room. She was always full of fun!

Michéle is survived by her loving family, Andrew and Tammy, her children, and her three grandchildren, whom she adored!

She had recently moved to Sydney, Australia, where she was very happy to reside in her retirement.

May her beautiful soul rest in peace in Eternity!

sapj

CPD questionnaire • May/June

Lemborexant: mechanism, efficacy, and clinical implications	
1.	**What is the primary mechanism of action of Lemborexant?**
a	Enhancing GABAergic transmission
b	Blocking histamine receptors to promote sleep
c	Antagonising orexin receptors OX1R and OX2R
d	Increasing serotonin levels to induce drowsiness
c	Stimulating melatonin production
2.	**What is an advantage of Lemborexant over traditional benzodiazepine receptor agonists?**
a	It has a longer half-life, allowing for multiple daily doses
b	It reduces wakefulness without causing next-day drowsiness
c	It increases REM sleep while suppressing deep sleep phases
d	It acts by stimulating melatonin receptors for natural sleep regulation
e	It has a stronger sedative effect than Z-drugs like zolpidem
3.	**Which of the following clinical trials provided long-term efficacy and safety data for Lemborexant?**
a	SUNRISE-1
b	SUNRISE-2
c	ZOLPIDEM Study
d	SLEEP-2023 Trial
e	REM-Cycle Evaluation
4.	**In which patient population is Lemborexant particularly beneficial due to its safety profile?**
a	Pregnant women with insomnia
b	Paediatric patients with sleep disorders
c	Elderly individuals at risk of falls and cognitive impairment
d	Patients with epilepsy-related sleep disturbances
e	Athletes needing post-workout sleep recovery
Haemoglobin A1c (HbA1c): clinical relevance, history, and role in diabetes mellitus management – a South African perspective	
5.	**Which of the following statements best describes the advantage of HbA1c over fasting blood glucose (FBG) in diagnosing and monitoring diabetes mellitus?**
a	HbA1c is more affordable and widely available than FBG
b	HbA1c reflects short-term fluctuations in blood glucose
c	HbA1c provides an average glucose level over 2–3 months and does not require fasting
d	HbA1c is significantly influenced by daily dietary intake
e	HbA1c is only used for screening, not for diagnosis
6.	**In the context of rural South African healthcare, why is Point-of-Care Testing (POCT) for HbA1c particularly valuable?**
a	It is more accurate than laboratory-based tests
b	It eliminates the need for professional interpretation
c	It facilitates immediate decision-making where lab access is limited
d	It is more cost-effective than oral glucose tolerance testing (OGTT)
e	It automatically adjusts for patient-specific risk factors
7.	**Which of the following non-glycaemic factors may lead to falsely elevated HbA1c results and should be considered when interpreting results in the South African population?**
a	Pregnancy and hydroxyurea use
b	Iron deficiency anaemia and hypothyroidism
c	Smoking and hyperthyroidism
d	Acute stress and alcohol consumption
e	Recent fasting and exercise
Hypertension in South Africa: a growing epidemic and evolving treatment paradigms	
8.	**Which of the following statements best reflects the current epidemiological situation of hypertension in South Africa?**
a	Hypertension affects less than 25% of South African adults and is mostly confined to urban areas
b	The prevalence of hypertension has decreased due to national salt reduction policies
c	Hypertension affects 40–50% of adults, with control rates remaining below 50%
d	Most South Africans with hypertension are aware of their condition and adhere well to treatment
e	Hypertension is only a concern in patients over 60 years old in rural provinces
9.	**What is a key advantage of using fixed-dose combinations (FDCs) over monotherapy in the treatment of hypertension?**
a	FDCs are cheaper than single agents in all healthcare sectors
b	FDCs provide higher doses of each medication for faster results
c	FDCs eliminate the need for follow-up blood pressure monitoring
d	FDCs improve patient adherence by simplifying regimens
e	FDCs are only recommended in patients over 65 years

10.	**Which of the following lifestyle interventions should pharmacists prioritise when counselling patients with hypertension?**
a	Promoting reduced salt intake, regular aerobic exercise, and weight management
b	Recommending caffeine-rich energy drinks for improved focus
c	Encouraging use of traditional herbal tonics as primary therapy
d	Advising all patients to stop antihypertensives once they feel better
e	Suggesting unmonitored intermittent fasting to rapidly reduce blood pressure
11.	**Which of the following is a documented limitation in hypertension control within South Africa's public health system?**
a	Over-prescription of antihypertensives to normotensive patients
b	Universal availability of FDCs at primary healthcare level
c	Mandatory community-based screening for all adults over 18
d	Poor referral systems and inconsistent medicine availability in rural clinics
e	Implementation of free gym memberships

Oral nutritional supplementation in paediatric feeding difficulties: a South African pharmacist's evidence-based review

12.	**Which of the following statements about picky eating in children is TRUE, according to the article?**
a	Picky eating always leads to malnutrition regardless of context
b	It affects fewer than 10% of preschool-aged children
c	In low- to middle-income countries (LMICs) like South Africa, picky eating may contribute to significant micronutrient deficiencies
d	It usually resolves on its own without any health consequences in all settings
13.	**According to recent data, what is one of the most commonly observed micronutrient deficiencies in South African children with picky eating habits?**
a	Iron
b	Vitamin K
c	Vitamin B12
d	Selenium
14.	**What role can pharmacists play in addressing feeding difficulties in children, based on the findings in the article?**
a	Prescribing long-term tube feeding for picky eaters
b	Diagnosing genetic causes of malnutrition
c	Replacing dietitians in all aspects of paediatric nutrition
d	Help identify the clinical need, match supplement choice to risk profile, promote safe supplement use and encourage ongoing monitoring
15.	**What is the significance of early intervention in children with feeding difficulties?**
a	It is unnecessary unless the child is underweight
b	It helps prevent growth faltering and long-term developmental issues
c	It guarantees that picky eating will resolve immediately
d	It should only be done after age five

Musculoskeletal pain

16.	**Which of the following statements best describes the mechanisms involved in musculoskeletal pain?**
a	Musculoskeletal pain arises solely from tissue injury and resolves once healing occurs
b	Musculoskeletal pain involves only peripheral nervous system activity and does not include brain processing
c	Musculoskeletal pain is driven by both peripheral and central nervous system mechanisms, including sensitisation and altered pain modulation
d	Pain perception in musculoskeletal conditions is unaffected by chemical mediators or neurotransmitters
17.	**Which of the following statements is TRUE regarding the use of NSAIDs in the treatment of musculoskeletal pain?**
a	NSAIDs treat pain by promoting the production of prostaglandins, which reduce inflammation
b	Topical NSAIDs like diclofenac are useful alternatives for patients who cannot tolerate oral NSAIDs
c	Traditional NSAIDs selectively inhibit COX-2 and have no gastrointestinal side effects
d	NSAIDs are safe for long-term use in all patients, including those with asthma
18.	**Which of the following statements accurately reflects the use and risks of opioids in managing musculoskeletal pain?**
a	Opioids are considered first-line therapy for musculoskeletal pain due to their minimal side effects
b	Opioids act as antagonists at mu, delta, and kappa receptors to relieve pain
c	Opioid use is associated with serious risks, including respiratory depression, dependence, and overdose
d	The incidence of opioid-related disorders is decreasing in private healthcare sectors worldwide
19.	**What is the primary reason antibiotics should not be used to treat colds and flu?**
a	They are ineffective against viral infections
b	They can cause allergic reactions
c	They are too expensive
d	They are only available by prescription

The answers for these CPD questions will be in the upcoming issue of the SAPJ.
This activity can contribute towards your CPD compliance.

CPD answers • March/April 2025

1. c 2. b 3. c 4. c 5. c 6. e 7. b 8. a 9. b 10. c 11. c 12. c
13. c 14. d 15. b 16. c 17. c 18. b 19. a

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