January/February 2025. Vol 92 No 1
SA Pharmaceutical Journal

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- SA Association of Hospital and Institutional Pharmacists
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ISSN: 2221-5875

ADVERTISING SALES
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PUBLISHER
The Pharmaceutical Society of South Africa in collaboration with
Medical & Pharmaceutical Publications (Pty) Ltd
trading as Medpharm Publications
Registration No 93/0794007

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Charting the course: a South African pharmacy roadmap for 2025

Natalie Schellack
Editor: SA Pharmaceutical Journal

"The best way to predict the future is to create it."
– Peter Drucker

As we navigate the complex landscape of South African pharmacy in 2025, embracing innovation and shaping our destiny is not merely an aspiration, but a necessity.

The field of medicine has undergone transformative changes over the past three decades, with advances in basic sciences increasingly translated into clinical applications, improving lives and outcomes.[1] The rapid development of mRNA vaccines against SARS-CoV-2 amid a global pandemic exemplifies the convergence of decades of basic science and translational research, saving millions of lives.[1] This breakthrough underscores the potential for innovative pharmaceutical solutions to address urgent global health challenges.

However, these scientific advancements remain unevenly distributed. The COVID-19 pandemic starkly highlighted health inequities within and between nations.[1,2] As we navigate the complexities of drug pricing and policy changes in South Africa, we must remain cognisant of these global disparities and strive for equitable access to pharmaceutical innovations.[1,2] Looking ahead, the integration of artificial intelligence (AI) in pharmacy practice and the evolving roles of pharmacists align with broader trends in healthcare. Globally healthcare is transitioning from a reactive model to one that is proactive, personalised, and preventive.[1,2] For pharmacists, this could mean leveraging AI-powered diagnostic tools, participating in personalised medicine initiatives, and playing a more integral role in interdisciplinary care teams.[1,2]

In South Africa as we celebrate the achievements in our field and plan for the future, let us heed the call to ensure that our advancements are not confined to the wealthy but are accessible to all South Africans. The journey ahead is as much about technology as it is about our collective values and shared commitment to improving human health. The Pharmaceutical Society of South Africa (PSSA) strives to be the *"undisputed leader and guardian of the pharmacy profession"*, as President Rabali eloquently states.[3] But what does true leadership and guardianship entail in a rapidly changing landscape? It demands we confront the complexities of drug pricing, embrace the potential of AI equitably, and empower pharmacists and pharmacy support staff to face a complex interplay of challenges and opportunities.

The success of the 82nd FIP Congress hosted in South Africa – a first for sub-Saharan Africa – is a testament to the dedication and expertise of our pharmacy professionals. As President Rabali notes,[3] this achievement positions us as leaders on the global stage. But what are our next steps? South Africa's pharmaceutical landscape remains challenged for economic growth with the high demand of the volume of patients in healthcare, as affordability concerns create financial barriers, and high pricing.

These pressures are multifaceted, stemming from a combination of factors, mostly related to affordability concerns. A substantial portion of the South African population face financial barriers to accessing necessary medications, particularly in the context of chronic diseases with even greater expense. Despite generic medicines offering a more affordable alternative, their uptake can be hindered by various factors, including prescriber preferences, patient perceptions, and regulatory complexities. Therefore, the importance of the Essential Medicine List (EML) and adherence to the EML has been highlighted by Leong et al.[4] stating, *"consideration of affordability for EML inclusions/exclusions is paramount"*.

Further to this the need for robust economic evaluations and Health Technology Assessments (HTAs) in this context is critical, as highlighted by Leong et al.[4] Their analysis of four case studies demonstrates how different economic evaluation methods – including international reference pricing, cost-minimisation, cost-effectiveness, and cost-utility analysis – have influenced decision-making by the National Essential Medicines List Committee (NEMLC) and impacted access to medicines in the South African public sector.[4] The study emphasises that a standardised HTA evaluation process, underpinned by a nationally accepted framework, is necessary for evidence-informed selection of essential medicines.[4] Furthermore, the significance of cost-effectiveness, affordability, and resource use should be consistently included when making decisions on new interventions. Since the inception of the South African EML in 1996, economic evaluations have evolved from cost-minimisation to more complex model-based cost-effectiveness with budget impact analyses to better inform decisions using the GRADE approach.[4]

While the South African drug pricing environment is primarily shaped by domestic factors, it is important to acknowledge potential influences stemming from global dynamics. For instance, policies

enacted during the current United States Trump administration, such as those related to international trade and pharmaceutical innovation incentives, could *indirectly* affect the strategies of multinational pharmaceutical companies operating in South Africa. Changes to trade agreements could impact the cost of imported pharmaceutical ingredients or finished products. However, it is crucial to assess the magnitude and direction of these effects, as South Africa has its own trade relationships and import/export dynamics. Policies impacting pharmaceutical innovation in major markets like the US could, in the long run, affect the availability of new medicines in South Africa, as companies prioritise markets with higher returns on investment. This highlights the need for South Africa to foster its own research and development capacity and explore alternative innovation models.

Despite the challenges faced by the pharmacy profession in 2024, there are reasons for optimism as we look towards 2025.[2] While the industry has experienced significant pressures, including pharmacy closures, financial constraints, and workforce shortages, several opportunities for growth and innovation are emerging. The American Society of Health-System Pharmacists' 2025 Pharmacy Forecast highlights key areas of development, including the utilisation of AI and the expanding role of pharmacists in primary care.[2] These advancements align with the local (National Health Insurance) and global trend towards more proactive, personalised, and preventive healthcare models.[2,5,6]

In the UK, the introduction of a new cohort of pharmacists who will become prescribers upon registration in 2026 is set to expand pharmacist prescribing services across Great Britain.[2,6] This development, coupled with changes to pharmacy technician roles and hub-and-spoke dispensing legislation, may allow pharmacists more time to focus on patient-facing care.[2,6] The integration of technology, such as automated dispensing systems and AI-driven drug interactions analysis, is becoming essential for delivering high-quality care and remaining competitive in the job market. These innovations offer opportunities for pharmacists to enhance their roles and improve patient outcomes.[2,6]

As we navigate these changes, it is crucial for the pharmacy profession to adapt, embrace innovation, and advocate for policies that support both the industry and patient care. By focusing on these opportunities, pharmacists can continue to play a vital role in improving healthcare outcomes and addressing the challenges that lie ahead.

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The plight of unemployed pharmacists and pharmacist's assistants

Tshifhiwa Rabali
PSSA President

Looking back on 2024, it's clear that it was one of the busiest and most impactful years for the Pharmaceutical Society of South Africa (PSSA). From active branches across the country to hosting the 82nd FIP Congress—the first ever held in sub-Saharan Africa—it was truly a remarkable year for the PSSA. Not only did we grow our membership, but we welcomed the South African Pharmacy Student Federation (SAPSF) to our NEC meetings. I look forward to working with them for the benefit of our members and the pharmacy profession as a whole. A special thank you to everyone who contributed to these successes.

Strategic planning vision of the Pharmaceutical Society of South Africa

Our strategic planning discussions began at our NEC meeting on 11 November 2024. The debate was rich with thought-provoking perspectives, and after extensive discussion on whether we needed a new strategic planning document, we were able to align on the next steps. It was a valuable experience to hear so many diverse views from our colleagues.

The final document will be available for all PSSA members to view.

This strategic plan is an important document, as it will guide the national office on priorities and timelines moving forward in shaping the future of our Society and the profession. As the strategic plan is being collaboratively developed, the Executive Committee under my leadership will have the final responsibility for its success. The sectors and branches will be assigned, where required, specific action items within the strategic plan to ensure ownership and accountability. A shared sense of ownership will ensure that everyone is committed to its successful execution and is working towards the same strategic objectives.

As we enter the new year, my commitment to engaging with all stakeholders remains a top priority as we work towards our vision of advancing the pharmacy profession in South Africa. The PSSA will continue to strive to become the undisputed leader and guardian of the pharmacy profession. I call on all of you to support this vision so we can represent our colleagues with integrity and passion.

There is much work to be done this year, and with the support of the Executive Director, the national office staff, NEC members, sector leaders, branch chairs, the Young Pharmacists' Group (YPG), and all members, I am confident we can achieve our goals. I call on each of you to actively engage with this vision. Your participation in local branches, contribution to committees, and sharing of expertise are vital to our success. Together, we can elevate our profession, improve healthcare outcomes, and solidify the PSSA's position as the undisputed leader and guardian of pharmacy in South Africa.

Wishing you all a prosperous and productive new year ahead.

I thank you.

Local experts participating in FIP Policy Statement committees during 2024 and 2025

Every year at the FIP Council meeting, the Council agrees to a list of FIP policy statements that will be prepared for adoption at the upcoming meeting. These policy statements can either be revisions of older existing policies or the development of new policies.

The policy statements reflect the FIP's stance on various professional, ethical, social, and other issues important for human health and relevant to pharmacists worldwide. Member organisations may then use a statement for advocacy purposes or to advance the profession, backed up with the recommendations agreed by 158 pharmacists' organisations at a global level.

A FIP policy statement is usually 3-6 pages long and provides recommendations to different stakeholders. In your role as a member of the policy committee, you will be invited to provide input based on your expertise, your experience in a given practice setting, and your knowledge of the needs and priorities related to this topic in your country and region.

FIP Member Organisations, as well as members from the FIP Bureau, Board of Pharmacy Practice (BPP), Board of Pharmaceutical Sciences (BPS), FIP Educational Initiative (FIP*Ed*) and Regional Pharmaceutical Forums, are invited to submit nominations of experts in the respective fields to serve on these global policy statement committees. Such nominees should be fluent in English (as all the work will be conducted in English), knowledgeable in the field and available.

PSSA, a proud member organisation of FIP, adheres to this call for nominations annually by proposing colleagues with experience and insight into the respective fields. The consultation is done via teleconferences (usually 1-2 times per month for a maximum of 2 hours) and email correspondence between February and July, and a final draft should be ready for review by the FIP Bureau prior to approval by the FIP Council.

During 2024, FIP requested nominations for experts to serve on four Policy Committees. All of the below documents were accepted and approved during the FIP Council meeting in Cape Town in September 2024.

- Revision FIP Statement of Policy on the Role of the pharmacist in promoting a tobacco free future, adopted in 2003 – **Jackie Maimin**. The revised statement titled FIP Statement of Policy on the role of the pharmacist in establishing a future free from tobacco and nicotine dependence can be viewed at: https://www.fip.org/file/6049
- New FIP Statement of Policy on Improved access to safe and quality essential medicines and medical devices: The role of pharmacists – **Sham Moodley**. Access the document at: https://www.fip.org/file/6036
- New FIP Statement of Policy on Interprofessional Collaboration – **Deanne Johnston**. Access the document at: https://www.fip.org/file/6041
- FIP Nanjing Statements: Shaping pharmacy and pharmaceutical sciences education to 2030 – **Yahya Choonara**. Access the guidance document at: https://www.fip.org/file/6104

PSSA would like to thank these colleagues for their time and expertise that was dedicated to these international projects and to ensure that the (South) African perspective is mentioned and incorporated in these global publications.

At the FIP Council meeting in Cape Town, it was decided to develop, revise or replace policy statements in 2025 on the following subjects (exact titles to be determined). Following the nomination process, the following South African colleagues will serve on these committees:

- Artificial Intelligence (new) – **Paul Voigt** (Immediate Past Chairman of South African Association for Hospital and Institutional Pharmacists (SAAHIP) Western Cape branch)
- Pharmacy: Gateway to Care (2017) – **Mariet Eksteen** (appointed as co-chair of the committee; PSSA Professional Development and Support) and **Sham Moodley** (PSSA National Executive Committee member, nominated through FIP Community Pharmacy Section [CPS])
- Pharmaceutical Care (1998) – **Johan Moolman** (Chair of the South African Association for Community Pharmacists (SAACP) Primary Care Drug Therapy (PCDT) Interest Group)
- The role of pharmacists in non-communicable diseases (2019) – **Anri Hornsveld** (PSSA Professional Liaison)

In addition to these policy committees, **Nhlanhla Mafarafara** (President of SAAHIP) was appointed to serve on the FIP Hospital Pharmacy Section (HPS) Global Advisory Group. This initiative aims to develop minimum standards for optimal medicine use in hospital pharmacies and strives to be co-endorsed by both the FIP and the World Health Organization (WHO).

Several colleagues also serve on various FIP structures. **Sham Moodley** serves a four-year term on the FIP Community Pharmacy Section (CPS) Executive Committee (Exco). **Seshnee Moodley** (SAAHIP Vice-President) is serving on the Communications and Digital Committee of the FIP HPS. **Tammy Chetty** is the treasurer of the FIP Industrial Pharmacy Section (IPS), while **Avanthi Govender Bester** and **Yahya Choonara** serve as Exco associates. Yahya further serves as a committee member representing the African Region on the FIP Academic Institutional Members (AIM). **Mariet Eksteen** is the Global Lead for FIP Development Goal 7: Advancing Integrated Services in the FIP Hub. **Andy Gray** is one of the Directors of the FIP Foundation for Education and Research.

Three young pharmacists are involved in the FIP Early Career Pharmaceutical Group (ECPG). **Luyanda Khumalo** is the Mentorship Coordinator, **Nomaphelo Krakri** is part of the publications team, and **Ntombizodwa Luwaca** (PSSA YPG Chair) is one of the graphic designers.

Congratulations to the successful candidates elected or appointed to committees. Thank you for your time and energy in representing the country on this international platform. PSSA is looking forward to seeing your contributions.

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 1, 2025 – Anxiety disorders – an update

Occasional fear and anxiety are part of everyday life.

Fear is an emotional, physical, and behavioural response to an immediate and obvious threat, such as losing control of your vehicle or on seeing an intruder in your home.

Anxiety is a normal reaction to stress. It is an unpleasant emotional state of nervousness and uneasiness and its causes are less clear. Mild anxiety can be beneficial as it can alert us to danger or help us prepare for an event. Although anxiety can at times be severe, the symptoms are usually short-lived and do not necessarily affect day-to-day functioning. Anxiety that becomes excessive, causes irrational thinking or behaviour, and impairs a person's functioning is considered an anxiety disorder. The symptoms can have a negative effect on work or school performance and personal relationships. Anxiety disorders are more common than any other type of mental health disorder, with about one-third of people meeting the criteria for an anxiety disorder at some point in their lifetime.

Unfortunately, many people with anxiety disorders who might benefit from treatment are not identified or treated. Since patients who have anxiety disorders are often seen in primary care, healthcare providers (including pharmacists) need to be aware of these conditions, how they are recognised and how they can be treated.

This module discusses the more frequently occurring anxiety disorders, including social anxiety disorder, panic disorder and generalised anxiety disorder.

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 1, 2025 – Anxiety disorders

Anxiety disorders are the most common type of mental health disorder and affect nearly one-third of adults at some point in their lives and one in three to five children and adolescents at some point during their childhood. More women are affected by anxiety disorders than men.

Anxiety disorders differ from feelings of occasional fear or anxiety that are part of everyday life.

Anxiety that becomes excessive, causes irrational thinking or behaviour, and impairs a person's functioning is considered an anxiety disorder.

Anxiety disorders interfere with daily activities and can impair a person's family, social, academic or working life.

People with excessive anxiety should be told to speak to their doctor because most anxiety disorders can be effectively treated.

The module for Front Shop Staff discusses the common anxiety disorders and how they are treated. It is important for members of staff in the pharmacy to know which products may be recommended and when caution is advised.

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.

Mere Pharmacy: The Heart of Pharmacy

Siphokazi B.K. Dludula
YPG SAPJ Coordinator

Dear young pharmacist

As we navigate the early stages of our careers, many of us are confronted with the stark realities of the pharmacy profession in South Africa. Our field, rich with potential, is challenged by high unemployment rates, limited opportunities, and, at times, a culture of complacency. Amid these challenges, we are reminded of the profound responsibility we bear: the task of safeguarding health and well-being in our communities.

According to the **South African Pharmacy Council (SAPC)**, there are approximately 24 000 registered pharmacists in South Africa. Yet, many of our peers are grappling with unemployment, searching for roles that allow them to contribute meaningfully to healthcare (SAPC, 2020). This statistic is more than a personal struggle for those affected; it represents a collective challenge for our profession to fulfil its potential.

Beyond the counter: Our higher calling

We must ask ourselves: are we satisfied with simply dispensing medications, or do we aspire to something greater? As pharmacists, we are educators, advocates, and guardians of health. Every interaction we have with patients is an opportunity to make a lasting impact. The Guidelines for Good Pharmacy Practice (GPP) urge us to be "committed to the well-being of patients" (SAPC, 2019), a principle that should drive us to embrace our roles with passion, purpose, and determination.

Now is the time to shed complacency and reignite our commitment to excellence. By stepping into our roles with confidence and purpose, we can propel our profession forward and ensure that the contributions of pharmacists are valued and recognised within the healthcare system.

United advocacy: Amplifying our voice

One of our most powerful tools as young pharmacists is collective advocacy. When we unite, our voices become stronger, and our impact more profound. Advocacy can take many forms—campaigning for fair employment practices, equitable pharmacist-to-patient ratios, or greater integration within the healthcare team. The **National Health Act of 2003** highlights the importance of pharmacists within the healthcare system, but it is up to us to ensure this recognition is realised in practice (National Health Act, 2003).

Together, we can reframe the role of pharmacists as essential partners in healthcare, not merely as dispensers of medication but as integral contributors to patient outcomes. By sharing our stories, promoting the incredible work being done in our profession, and advocating for the changes we need, we can transform perceptions and unlock new opportunities.

Building a Vibrant Community

The **Young Pharmacists Group (YPG)** of the **Pharmaceutical Society of South Africa (PSSA)** offers a platform for us to connect, share experiences, and support one another. Whether you're facing unemployment or seeking ways to elevate your practice amidst challenges, we want to hear your voice. Let's explore solutions together and create a vibrant community that uplifts and empowers every young pharmacist.

Imagine a future where pharmacists are respected for their expertise, valued for their contributions, and seen as vital partners in healthcare. This vision is within our reach, but it demands action. Start by sharing your thoughts, challenges, and ideas with us—your feedback is essential to our growth as a profession. Connect with us via our social media pages and through the PSSA YPG directly at ypg@pssa.org.za - include "YPG" and your email topic.

The PSSA and the PSSA YPG are committed to supporting and promoting the profession of pharmacy in improving medication use and advancing patient care. Together, we can redefine the essence of our profession and shape a brighter future for pharmacy in South Africa.

Thank you for your dedication to the communities you serve. Let us inspire change, uplift each other, and drive our profession forward. The time to act is now. Join the conversation, share your experiences, and become a catalyst for progress.

In unity and purpose

PSSA YPG

Website	Facebook	Instagram	LinkedIn
www.pssa.org.za/young-pharmacists-group	Young Pharmacists' Group of PSSA	@pssaypg	Young Pharmacists' Group of the PSSA.

Feel free to reach out to us at | Email: ypg@pssa.org.za | Facebook: Young Pharmacists' Group of PSSA | Instagram: @pssaypg

Young pharmacists – connected, engaged, empowered and inspired!

A review on holistic and pharmacological management of insomnia

C Ngomana, KD Komape, E Bronkhorst

Department of Clinical Pharmacy, School of Pharmacy, Sefako Makgatho Health Sciences University, South Africa

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Abstract

Insomnia is a common sleep disorder that has negative impacts on quality of life. It significantly reduces productivity and cognitive function, and in worst cases, causes morbidity and mortality. The various types of insomnia are described according to the duration of the perceived symptoms. It is characterised by both nocturnal and daytime symptoms, with daytime symptoms often the reason for treatment. The disorder may be precipitated by several cognitive behavioural factors.

Although pharmacotherapy is a common option of treatment, clinical guidelines and literature recommend cognitive behavioural therapy as the gold standard and the first-line treatment option. Pharmacotherapeutic agents range from over-the-counter agents, e.g. antihistamines, to scheduled drugs like benzodiazepine receptor agonists. The dual orexin receptor antagonists represent the newest class of drugs indicated for the treatment of insomnia. First registered in 2014, the Food and Drug Authority regulatory body has since approved three agents in this class. Furthermore, the off-label use of medicines with sedating effects is very common in the treatment of insomnia. The popular classes of medicine include sedative antidepressants, atypical antipsychotics, and gabapentinoids. Complementary and alternative therapies, which include dietary and herbal supplements, may be considered an alternative option.

This review discusses the various available therapy options for the treatment of insomnia. The mechanisms of action and adverse effect profiles were elucidated to provide clinical guidance on considerations for the selection of sedative hypnotics to treat insomnia.

Keywords: insomnia, cognitive behavioural therapy, dual orexin receptor antagonists, hypnotics

https://doi.org/10.36303/SAPJ.2283

Introduction

Insomnia is the most common sleep disorder with a significant impact on both physical and mental health.[1,2,3] The American Sleep Disorder Association (ASDA) defines insomnia as a "repeated difficulty with sleep initiation, duration, consolidation or quality that occurs despite adequate sleeping opportunity and circumstances for sleep, and results in some form of daytime impairment".[4] This means patients have trouble falling and/or staying asleep and frequent awakenings result in daytime impairment.[2,5] Daytime symptoms range from sleepiness, fatigue, impaired attention, mood swings and memory impairment.[1,6] Sometimes these patients may have difficulty maintaining social relationships.[3]

Insomnia can have far-reaching consequences, predisposing affected individuals to cardiovascular, mental, metabolic and other disorders and ultimately negatively affects their quality of life.[3,6-8] The elderly population is more at risk of suffering these consequences.[9] There is strong evidence suggesting that insomnia is a risk factor for the development of certain psychological disorders such as depression and anxiety, with these disorders proposed to increase the risk of mortality, presumably due to the high risk of self-harm and suicide.[3,10] In addition, sleep disorders can result in functional consequences including increased risk for accidents, absenteeism, increased healthcare costs, decreased work productivity and poor academic performance.[6,8,11-13] Although it is considered the second most prevalent mental health disorder, it remains underdiagnosed and undertreated.[1,14]

The diagnosis of insomnia is subjective, as it relies on the individual's perception of sleep difficulties and related daytime malfunctioning.[3,10] This subjective experience may be influenced by religious beliefs, stigma, reasoning fallacy, and differences in symptom presentation. Due to these factors, one may perceive it as a normal or an abnormal experience.[12] This can be classified as a reason for underdiagnosis and undertreatment of the condition. A thorough history of insomnia optimises evaluation of symptoms and behaviours both at night and during the day. The 24-hour history for insomnia assessment may be used to understand the diagnosis as shown in Figure 1. Daytime symptoms, as depicted in Figure 2, are usually the reason patients seek treatment. The disorder is often treated in patients with severe and more chronic insomnia, those with comorbid medical or psychiatric disorders, and those who are more educated.[12]

The reduced level of gamma-aminobutyric acid (GABA) or the impairment of GABAergic transmission is observed in the aetiology and maintenance of acute and chronic stress and acute and chronic insomnia.[15] This explains the use of hypnotics such as benzodiazepines and non-benzodiazepines (Z-drugs) to treat insomnia. Other pharmacological therapies include complementary and alternative therapies (i.e. herbal supplements), off-label use of medicine such as antidepressants,

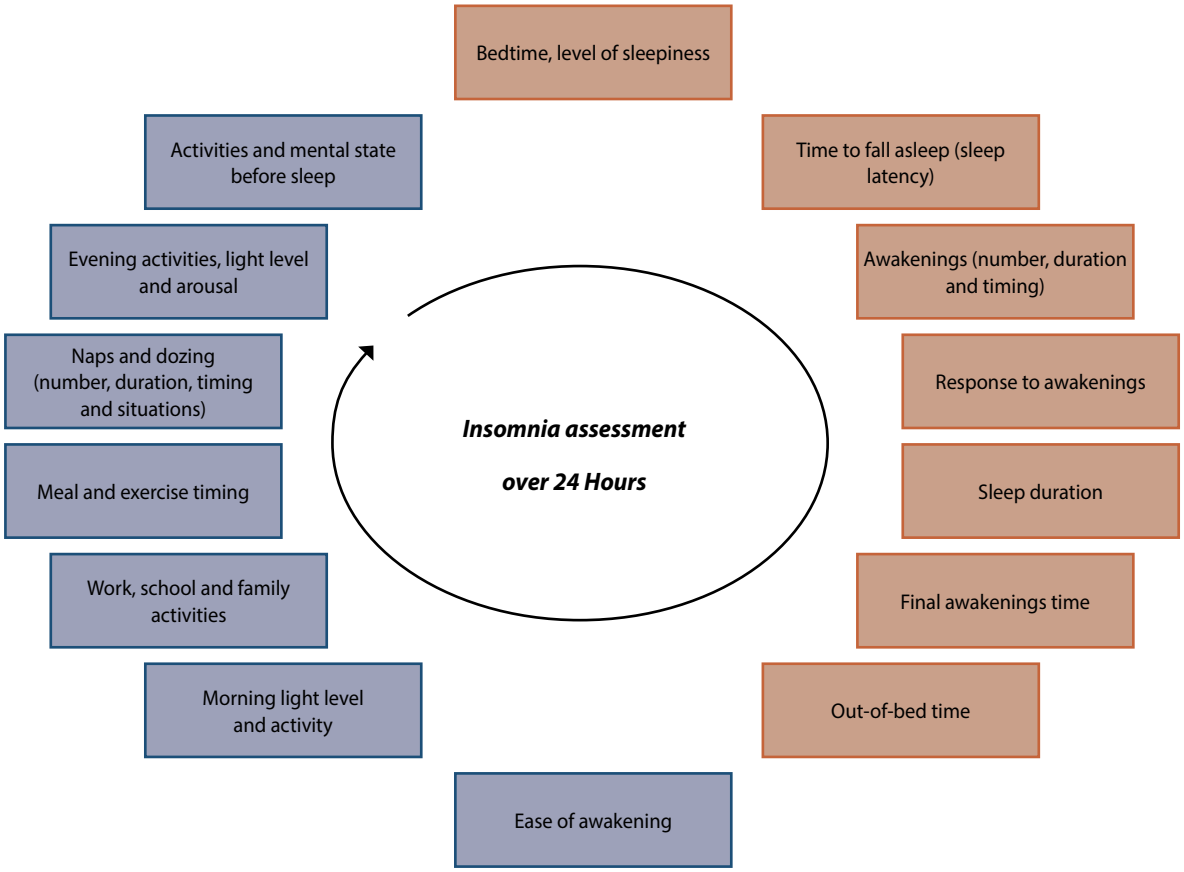

Figure 1: 24-hour history for insomnia assessment (Adopted from Morin and Buysse, 2024)[16]

Figure 2: Daytime symptoms of insomnia[17]

anticonvulsants, and atypical antipsychotics, and the emerging dual orexin receptor agonists (DORAs).[16] Non-pharmacological therapies are indicated as an integral part of insomnia treatment and cognitive behavioural therapy for insomnia (CBT-I) is the most recommended therapy.[13,16]

Types of insomnia

Insomnia is typically classified according to the duration of symptoms. Short-term insomnia is defined as symptoms lasting for days to weeks which are usually prompted by stress. It often resolves following the resolution or mitigation of the stressor; however, it can evolve into chronic insomnia.[5] Chronic insomnia is difficulty initiating sleep, remaining asleep and inability to fall back to sleep after waking up in the early hours for at least three nights per week for a period of at least three months.[2,5,6] It can be exacerbated by excessive time spent in bed in an attempt to sleep more, which may lead to frequent awakenings at night.[5]

Epidemiology and contributing factors

Insomnia is mostly prevalent in women, especially during peri- and post-menopause.[11,18,19] However, it affects the general population including those with poor health, low socioeconomic status and quality of life, shift workers and the elderly.[6,12,18] It affects about 10–30% of the general population,[3,13] with an estimated prevalence of 30–36% experiencing nighttime symptoms.[6] However, the inclusion of daytime symptoms yields a significant drop in the

Figure 3: Contributing factors of insomnia[22]

prevalence, from 10% to 15%.[6,11,12] A prevalence of about 20–48% was observed in adults who have a high risk of incidence, with aging.[20] Global statistics ranked South Africa (45.3%) second behind Brazil (79.8%) in a cross-cultural study that assessed the rate of prevalence of insomnia.[12]

According to Spielman's 3P model, the contributing factors for insomnia can be classified into predisposing, precipitating and perpetuating factors.[1,18,21] With reference to this model, predisposing factors are non-modifiable and include sex, advancing age and family history of poor sleep.[18,21] Precipitating factors, which are usually stressful life events, include perceived stress. Perpetuating factors are the maladaptive coping mechanisms and behavioural patterns that allow for the chronic progression of insomnia. These include daytime napping and excessive hours spent in bed trying to compensate for sleep.[18]

Table I: Non-pharmacological management for insomnia

Therapy	Description
Sleep restriction therapy	Relies on reducing the number of sleep hours, with the idea that limited sleep time might strengthen sleep drive and result in consolidated sleep.
Stimulus control therapy	Involves abandoning counterproductive habits, such as eating or reading in bed, excessive screen time at night, and going to bed only when extremely drowsy.
Relaxation therapy	Involves adopting sleep-promoting habits such as breathing exercises, meditation, and yoga.
Sleep hygiene	Involves education about behavioural interventions like restricting daytime naps, refraining from nighttime smoking, and avoiding eating and drinking (alcohol or caffeine) at night. Patients are encouraged to develop or maintain a healthy diet, engage in physical activity, and maintain a consistent sleep schedule.

Management of insomnia

Non-pharmacological management

Non-pharmacological strategies are regarded as the best option to manage insomnia.[3] Clinical guidelines recommend CBT-I as the first-line treatment for insomnia.[1,5,7,9,15] CBT-I is considered the gold standard as the strategies produce robust and durable therapeutic improvement extending beyond the period of therapy.[3,13] Some of the important components of CBT-I include modification of behavioural patterns as shown in Table I and psychological factors such as excessive worries and unhelpful beliefs about

Table II: Pharmacological management for insomnia

Medication	Mechanism of action and clinical use	Safety
Over-the-counter medicine		
Antihistamines First-generation antihistamines: sedative effects shown useful in the treatment of insomnia. Examples: *Over-the-counter:* diphenhydramine, chlorpheniramine and doxylamine[1,6] *Prescription*: hydroxyzine[16]	Promote sleep effects by crossing the blood-brain barrier and binding to central H1. Limited for use in short-term insomnia, due to rapid development of tolerance.[1] Despite weak evidence of efficacy, their availability and perceived safety compared to benzodiazepine receptor agonists make them a popular option.[16]	*Common side effects*: urinary retention, blurry vision, dry mouth, prolonged sedation, and hypersomnia[1,6,16]
Prescription medicine		
Melatonin and melatonin agonists Ramelteon and tasimelteon are both melatonin agonists that bind to melatonin MT1 and MT2 receptors.[16] Ramelteon indicated for treatment of sleep-onset insomnia.[1,6] Tasimelteon indicated for circadian-rhythm sleep-wake disorders.[16] Daily dose of 8 mg 30 minutes before bedtime recommended.[6]	Melatonin is an endogenous hormone secreted by pineal gland during darkness (night).[16] Exogenous melatonin, known as a sleep supplement, however, in South Africa only accessible with prescription.[23] Indicated for jet lag, shift workers, and older age, due to disruptions of the circadian rhythm and reduced endogenous melatonin levels.[23] Acts on the sleep-wake cycle by stimulating the MT1 receptors, depressining alert signals from the suprachiasmatic nucleus. MT2 receptors are activated leading to synchronisation of the circadian clock.[6] Melatonin has limited efficacy when the endogenous melatonin levels are high. Recommended to administer an hour before bedtime and at the same time every night.[9]	*Common side effects:* **Melatonin** headaches and sleepiness[6] **Melatonin agonists** Tasimelteon: somnolence, dizziness and fatigue[11]

Benzodiazepines Introduced in 1950s. Widely used treatment for treatment of insomnia and anxiety.[15]	Potentiate activity of GABA, by allosteric binding on GABA-A receptors, increasing GABA affinity for binding site on receptors.[15] Activation of receptors allows influx of chloride ions into neurons – hyperpolarisation produces central nervous system depression.[1,6,24] Benzodiazepines show efficacy to reduce sleep-onset latency and wakefulness after sleep onset, with a small increase in the duration of sleep.[16] Agents approved for management of insomnia: loprazolam, lormetazepam, midazolam, nitrazepam, flurazepam, temazepam, and triazolam.[1,2]	*Common side effects*: drowsiness, confusion, syncope, respiratory depression, and tremors.[24] Coadministration with other sedating medicine and longer duration of use may exacerbate side effects.[16] Abrupt discontinuation following prolonged use can lead to rebound insomnia and withdrawal symptoms.[1] Drug tolerance and physiological dependence may develop, however a severe substance disorder is relatively uncommon.[16]
Non-benzodiazepine BZRAs (Z-Drugs) Introduced in 1980s to overcome adverse effects of benzodiazepines.[15]	Selective benzodiazepine receptor agonists enhance GABA's affinity for its binding site on the GABA-A receptor, with high affinity for alpha-1 subunit, which enables mediation of sedative effects of GABA.[1] Agents approved for treatment of insomnia: zolpidem, Zopiclone (in SA), Zaleplon and eszopiclone.[2,6,25] Zolpidem recommended for acute night sleep-onset insomnia.[6]	Thought to be safer option than benzodiazepines; however, increasingly linked to misuse and dependence.[15] *Common side effects:* zolpidem: diarrhoea, somnolence, and visual disturbances.[2] zaleplon: drowsiness, dizziness, and impaired concentration.[26]
Dual orexin receptor antagonists (DORAs) Introduced in 2014.[16] FDA approved, however not registered in South Africa.	Neurons in the lateral hypothalamus that contain orexin (hypocretin) play an important role in regulating sleep and wakefulness. When activated, they stimulate wake-promoting areas in the brainstem and hypothalamus, simultaneously suppressing sleep-promoting areas in the ventral lateral and median preoptic areas.[16] Promote sleep by selectively blocking the orexin receptor-1 and receptor-2 and inhibit the binding of orexin peptides A and B to their receptors, suppressing wakefulness[1,6,27] and promoting sleep.[16] The FDA-approved agents for the treatment of insomnia: suvorexant, lemborexant, and daridorexant.	*Common side effects*: abnormal dreams, cough, dry mouth, upper respiratory tract infections, palpitations, psychomotor hyperactivity, and anxiety[27] Lower risk of cognitive impairment compared to benzodiazepine receptor agonists[16]
Sedative antidepressants – Off-label use		
Sedating antidepressants such as amitriptyline, nortriptyline, and doxepin, including the heterocyclic drugs like mirtazapine and trazodone are commonly used to treat insomnia.[16] Not approved for insomnia indication, clinicians often prefer them due to mild side effects when taken at low doses.[16]	**Doxepin** A tricyclic antidepressant that exerts its sleep-promoting effects through antagonism of H1 receptors.[28] Effective in treating sleep-onset and maintenance insomnia, as well as early waking.[6] **Trazodone** Exerts sleep-promoting effect by blocking the 5-HT-2A receptor, H1 receptor, and alpha-1-adrenergic receptors.[29] Not FDA-approved for insomnia, it is used to treat various presentations of chronic insomnia including early waking, sleep-onset, and maintenance insomnia.[6] **Mirtazapine** Tetracyclic antidepressant with similar sleep-promoting properties to those of trazodone.[1,9] Used off-label for treatment of insomnia, best preferred in patients with comorbid depression.[1,7,30] **Amitriptyline** A tricyclic antidepressant whose sedative action is attributed to its ability to antagonise muscarinic-cholinergic, alpha-1 adrenergic, and H1 receptors. No evidence supporting its use for insomnia with no comorbidities.[6]	*Adverse effects:* **Doxepin** Weight gain, dry mouth, blurry vision, tachycardia and QT prolongation.[28] **Trazodone** Prolonged half-life causes daytime sedation.[1] Associated with risks such as orthostatic hypotension, syncope, priapism and QT prolongation.[29] **Mirtazapine** Drowsiness, increased appetite, weight gain and thrombocytopenia.[30] **Amitriptyline** Anticholinergic effects (blurry vision, dry mouth), weight gain, orthostatic hypotension, and dizziness. Associated with risks like slow intracardiac conduction, QTc prolongation, and arrhythmias.[31]
Atypical antipsychotics		
Quetiapine and olanzapine are sometimes used off-label for insomnia due to their sedating effects.[16]	They bind to H1 receptors and alpha-1 and alpha-2 receptors to induce a sedating effect.[32]	*Potential side effects:* Cardiovascular, metabolic, and neurological risks outweigh their benefits for insomnia treatment.[16] Quetiapine is commonly, reported for weight gain, increased blood sugar levels, and an increase in low-density lipoprotein cholesterol.[32]
Gabapentinoids	Gabapentin and pregabalin are indicated for the treatment of chronic pain and restless leg syndrome; due to their sedating effects, they are prescribed off-label for insomnia, particularly in patients with co-occurring pain.[16]	Some of the common adverse effects include somnolence, dizziness, ataxia, and fatigue.[16]

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Goodbye to **INSOMNIA**

sleep that cause and/or perpetuate insomnia.[13,16] Pharmacological interventions as presented in Table II, are considered the second-line treatment option as there is weak evidence supporting their use in insomnia.[7]

Complementary and alternative therapies

Although there is poor evidence supporting the efficacy of cannabinoids, cannabis, cannabidiol and delta-9-tetrahydrocannabinol (THC)-containing they are widely used as an alternative treatment for insomnia.[16] There are various nutritional supplements that are marketed for sleep.[2] Valerian (*Valeriana officinalis*), chamomile (*Matricaria recutita*) and Kava (*Piper methysticum*) are the most common herbal supplements that have been found to possess sedating effects and are used to treat insomnia despite weak evidence supporting their efficacy for use.[2,16] Valerian (Valerian root) is speculated to stimulate GABA release from the nerve endings and prevent GABA reuptake back into the nerve cells, while valeric acid, an ingredient of valerian oil, inhibits the breakdown of GABA.[28,33] The mechanism of action of both chamomile and Kava are not yet established, but they are believed to work on GABA receptors. All these herbal supplements generally have a good safety profile and minimal adverse effects reported.[2,33]

Conclusion

Insomnia is a highly prevalent sleep disorder associated with negative health outcomes in the affected individuals. Pharmacological treatment may be considered when nonpharmacological approaches have failed to yield any positive clinical outcome. For patients initiated on pharmacotherapy, it should be combined with non-pharmacological treatment to allow the use of the lowest possible doses and for optimal outcomes. Although there is poor evidence on the association between insomnia and mortality, providing psychoeducation on insomnia may also be helpful for a better outcome. Even though medications are widely used for the treatment of insomnia to produce rapid relief, their long-term use increases the risk of tolerance and dependence, and this emphasises the importance of good selection of agents and correct dosing. The comorbidities of patients must be considered to ensure a better selection of agents. As a subjective disorder, cognitive behavioural therapy remains the gold standard in the management of insomnia. Ultimately, when selecting the agent to use, duration of treatment, and available alternatives, the risk-benefit ratio should always be considered, and the patient should be informed for shared understanding and consensus.

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Iron deficiency anaemia: Managing symptoms and supporting self-care. 2024 - Part 2

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Summary

Anaemia is a global public health concern, affecting individuals of all ages and demographic groups, with implications for health, morbidity and mortality. It stems from many factors, including diet, chronic illnesses, infections, hereditary blood disorders and other conditions related to blood loss and reduced haemoglobin levels. While anaemia manifests as decreased haemoglobin or haematocrit levels, iron deficiency anaemia is the most prevalent type, and iron is a crucial element for growth and development and a component of haemoglobin.

In 2022, the International Pharmaceutical Federation (FIP) explored the role of pharmacists in anaemia management, emphasising the need for an educational guide to support pharmacists, particularly in addressing iron deficiency anaemia (IDA). IDA, which affects 1.2 billion individuals worldwide, is preventable and treatable, highlighting the importance of early detection. Pharmacists, as accessible healthcare providers, bear a critical responsibility to educate patients, tailored to factors like age, sex, underlying conditions and the causes of IDA, encompassing self-care interventions and various management approaches. Pharmacists can promote a holistic approach to self-care and can support mitigation of the impact of this condition on overall health and well-being.

This handbook aims to provide a comprehensive guide for pharmacists to manage iron deficiency anaemia effectively, including for more vulnerable populations. It equips pharmacists with information on treatment options, managing special populations, screening and preventive measures for IDA. Nutrition, emphasising iron-rich diets and physical activity, is also described.

Addressing other types of anaemia is equally important, necessitating the identification and tailored treatment of their underlying causes. This handbook only covers anaemia treatment and management due to iron deficiency; there remains a need to further develop resources and guidelines for the management of other types of anaemia.

Further professional programmes designed to enhance pharmacists' competence in managing IDA, such as in a format of workshops, self-directed learning opportunities, or continuing professional development courses, are recommended. Collaboration with national professional leadership bodies would facilitate the organisation of workshops, self-directed learning initiatives, and the sharing of best practices.

In conclusion, this handbook serves as an invaluable resource for pharmacists in managing IDA, underpinning the importance of pharmacists' role in screening, managing, treating, patient education and holistic self-care practices. It is recommended to accompany this handbook with further CPD and resources for other types of anaemia.

4. IDA management in special populations

Despite the efforts in diagnosing the condition and the accessibility of therapeutic iron preparations, IDA still affects a significant number of people and special populations.[187] The approach to effective management of IDA requires early identification,[189] accurate diagnoses,[190] individual-based tailored interventions[187] and patient education. Although IDA treatment involves a combination of dietary changes and oral and parental iron therapy, the differences and uniqueness of each population should be considered when addressing this condition.[187] The underlying cause of IDA should be identified for patients who require immediate management to receive optimal care and ultimately experience improved health.[153] This section aims to provide pharmacists with the necessary knowledge on managing IDA in some special populations.

4.1 Paediatrics

Anaemia is defined in the paediatric population as: [191]

- **Infants and toddlers (0.5–5 years old)** — Haemoglobin concentration < 11 g/dl
- **Children (5–12 years old)** — Haemoglobin concentration < 11.5 g/dl
- **Adolescent females (> 12 years old)** — Haemoglobin concentration < 12 g/dl
- A**dolescent males (12 years old)**: Haemoglobin concentration < 13 g/dl

Possible causes of anaemia in paediatrics are as follows:

- **Infants** — Infants with specific risk factors, such as infants of iron-deficient mothers (there is an increased risk of small

Table IV: Available iron formulations for paediatric prescription

Iron formulation*	Recommended dose	Note
Ferrous sulfate/ferrous gluconate	2–6 mg/kg/day	This is a standard treatment with good intestinal absorption and low cost. Side effect happens in 15–32% of cases and include an unpleasant taste. A low dosage, i.e., 2 mg/kg/day, has been proposed as a still efficacious and better- tolerated schedule.
Ferrous fumarate	12.5 mg/day (6–24 months of age); 20–30 mg/day (2–5 years of age); 30–60 mg/day (6–11 years of age)	Drop and syrup formulations are available.
Ferrous glycinate	0.45 mg/kg/day	Good intestinal absorption, limited side effects, and drop formulation available.
Ferric pyrophosphate transported within a phospholipid membrane (liposomal iron)	1.4 mg/kg/day	Excellent palatability, limited side effects, drop formulation available. Possible less prompt response to therapy.
IV iron gluconate	Total dose to be calculated based on initial Hb and weight	Effectiveness is independent of gastro-enteric absorption and very low gastro-enteric side effects. Hospitalisation is required, along with multiple infusions.
IV carboxymaltose iron	The dose to be calculated based on initial Hb and weight	Effectiveness is independent of gastro-enteric absorption, single administration, and indication for adolescents ≥14 years. Hospitalisation is required.

*There can be variation in the licensing of different medicines containing the same drug. Preparations can be in the form of oral suspension, oral solution, drop, drinkable vials, tablets, capsules or spansules.

for gestational age/growth restriction), those with low birth weight or prematurity (as these can limit their iron stores at birth), multiple pregnancies, early introduction of cow milk (as cow milk can hinder iron absorption), exclusive breastfeeding beyond six months of age (as prolonged exclusive breastfeeding without iron fortification can lead to iron deficiency) and lack of infant iron supply.[74,192,193]

- **Children under five years old** — Children aged under five years are vulnerable to IDA due to their rapid growth and development, increased iron requirements, and often limited dietary diversity.[73,192,194]
- **Adolescents** — Both male and female adolescents face a higher risk of IDA. Factors contributing to this risk include inadequate dietary iron intake, susceptibility to parasitic infections like malaria and worms, heavy menstrual bleeding, gastrointestinal disorders, other chronic blood loss, and extreme athletics.[75,193]

Apart from possible signs and symptoms of ID in Section 3.1.1: Signs and symptoms, some other signs and symptoms that can be looked out are developmental delays, frequent tiredness, less activeness as compared with completely healthy children, motor and cognitive retardation, and mood disorders.[192,195] The preventive dose for the paediatric population is set out in Section 5.3.1. Iron supplements. Table IV provides some iron formulations available for paediatric prescription.[193,196,197]

Some key points to consider in managing IDA in this special population include:[195,198,199]

- Inform parents that iron supplements may cause black stool and constipation in children.
- To prevent tooth staining, consider having the child use a straw when taking oral iron supplements and suggest brushing their teeth after consumption.
- Continue iron supplementation for a minimum of three months after anaemia correction to replenish iron stores. Monitor haemoglobin (Hb) and ferritin levels at this point.
- For children with severe anaemia, schedule an early follow-up within a week to ensure treatment compliance and a proper response (e.g., reticulocytosis and Hb increase).
- Evaluate potential issues related to treatment compliance, as non-compliance is the primary reason for treatment failure.
- Encourage parents to increase their child's intake of iron-rich foods and reduce cow milk consumption. Avoid giving cow milk to children under 12 months and limit it to less than 500 ml per day for those older than 12 months.
- If babies are premature, consider delaying the clamping of the cord.
- It is recommended to do exclusive breastfeeding in the first six months, and solid foods that are given after six months should be rich in iron, zinc, phosphorus, magnesium, calcium and vitamin B6.
- Refer patients to a dietitian for dietary guidance.

4.2 Non-pregnant women of reproductive age

Women of reproductive age, especially those with heavy menstrual bleeding, are at increased risk of IDA, and they should be promptly treated for cause.[200] Some may not respond well to oral iron in the short term.[71] In such cases, IV iron therapy is recommended,

especially for women planning pregnancy, as it is more likely to achieve iron sufficiency before conception. [24]

4.2.1 Heavy menstrual bleeding

Heavy menstrual bleeding (HMB) may affect up to 50% of women of reproductive age.[16] Normally, the blood loss during a menstrual cycle is between the range of 25–50 ml; however, patients with HMB experience a blood loss greater than 80 ml per cycle and excessive menstrual blood loss leading to interference with the physical, emotional, social or material well-being.[201-203] Symptoms such as abnormal frequency, regularity and the unpredictable onset of menstruation might be due to abnormal uterine bleeding.[202] Pharmacists can support identifying possible patients with HMB and refer them to a gynaecologist to confirm the diagnosis and treatment.

The goals of HMB management include reducing or stopping blood loss[19] and supplementing for iron loss.[204] The first- line intervention for HMB patients diagnosed with mild to moderate IDA is the use of oral iron therapy.[19,205] Specific instructions should be given regarding dosing intervals and interactions with substances that can hinder absorption.[206] Dietary changes can be advised, but this is insufficient as the only way to replenish iron stores.[71] Pharmacists can provide counselling after the treatment is confirmed (see Section 3.4.1: Patient counselling guide steps).

In cases of intolerance due to frequent administration of oral iron therapy, the drug should be administered on alternate days to optimise treatment outcomes. If there is no improvement in the level of Hb within a month of therapy, the treatment approach should be reassessed.[206] In severe cases of IDA and intolerance to oral therapy or urgency, iron stores can be rapidly restored by administering IV iron therapy.[16]

In addition, hormonal and non-hormonal therapy can be used in treating blood loss in HMB patients.[207] The most preferred hormonal treatment is the use of 52 mg levonorgestrel-releasing intrauterine system, and other treatments include depot medroxyprogesterone acetate, combined oral contraceptive pills, gonadotropin-releasing hormone analogues and selective progesterone receptor modulators.[19] The administration of NSAID and antifibrinolytic agents such as tranexamic acid are non-hormonal treatments used in managing HMB in individuals intending to get pregnant or who cannot use the hormonal treatment.[19] Gonadotropin-releasing hormone agonist can be used as a short-term solution to boost iron stores and is also appropriate for women who undergo surgery.[19,205]

Women with HMB and IDA require a combined approach of medical and surgical measures in cases where medical treatment is not effective alone. Preoperative amenorrhoea is also necessary before carrying out any surgical measures.[205] For women planning

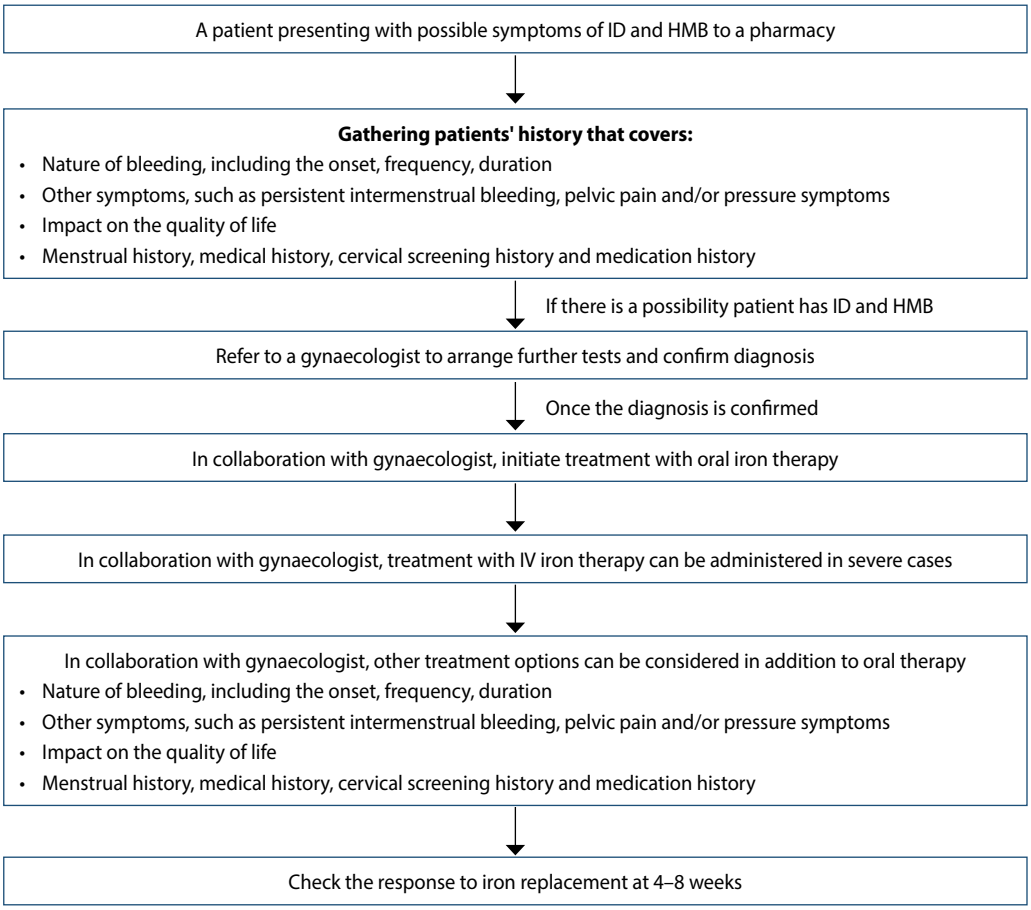

Figure 12: Flowchart for IDA management in HMB[202]

to get pregnant, Hb level and iron status should be assessed, and if deficient, appropriate treatment should be advised before they attempt conception.[206]

Figure 12 describes the flowchart of IDA management for HMB patients.

4.2.2 Women with birth control

Another population that is part of women of reproductive age that will be discussed is those who are with birth control. There are two types of contraceptives — hormonal and non-hormonal. Hormonal contraceptives include hormonal intrauterine devices (IUDs), oral contraceptives and vaginal rings, while non-hormonal contraceptives include barrier methods such as condoms, copper IUDs, the withdrawal method, and the fertility awareness method used to monitor a woman's fertility cycle.[208] The use of oral contraceptives is beneficial for those with haematological disorders and diagnosed with IDA because it alters the hormones, reduces blood loss and is beneficial for family planning.[208,209] Other types of contraceptives, including hormonal IUDs, patches, rings and injections, can be used for similar purposes and benefits. In contrast, copper IUDs are not advised for use because they increase the loss of blood in haemorrhagic patients. [210,211]

The combination of contraceptives and iron supplements has been found to be beneficial in the prevention of IDA.[212] Nevertheless, iron-containing oral contraceptives can be used instead of non-iron oral contraceptives, although the benefits and differences have not yet been identified from the study done so far.[208]

4.3 Pregnant women and breastfeeding mothers

In pregnancy, the demand for iron by the fetus becomes critical after 28–32 weeks for fetal brain development.[71] The period from conception to the infant's second year is crucial because of brain development.[213] Without effective management of anaemia in pregnancy, some adverse fetal outcomes could occur, including preterm birth, low birth weight, impaired neurodevelopmental outcome and perinatal death.[214] Breastfeeding mothers need to provide iron through breast milk for their infants. If their iron stores are depleted or their dietary intake is inadequate, they can become vulnerable to IDA.[67,215]

Anaemia is defined in pregnant women and breastfeeding mothers as:

- **First and third trimester of pregnancy** —Haemoglobin concentration of less than 11 g/dl (Hct 33%).[216]
- **Second trimester of pregnancy** — Haemoglobin concentration of less than 10.5 g/dl (Hct 32%).[216]
- **Breastfeeding mothers** — Haemoglobin concentration of less than 10 g/dl.[217]

Clinical symptoms cannot be relied on alone to diagnose IDA in pregnancy; however, all signs and symptoms should be watched for (see signs and symptoms section). Low haemoglobin, mean cell volume, mean cell haemoglobin, mean cell haemoglobin concentration and serum ferritin (30 microgram/l) are indicative of ID in pregnancy. The values obtained must be interpreted cautiously because of the physiological changes in pregnancy.[218]

The management of IDA in this special population includes preventive oral iron and folic acid supplements[199] (see 5.3.1: Iron supplements for the preventive dose), accompanied by diet, oral or parenteral iron therapy and blood transfusions, if necessary.

4.3.1 Oral iron supplements

Table V outlines different criteria for administering oral iron therapy and conducting serum ferritin tests in both anaemic and non-anaemic pregnant women.[218]

Initially, the recommended daily dose of elemental iron for treating IDA was 100–200 mg.[218] However, recent studies indicate that lower doses or intermittent supplementation may be beneficial to minimise side effects (such as gastric irritation, nausea, constipation, disturbed bowel function).[218,219] Collective evidence and recommendations from guideline and expert consensus suggest as low as 30-60 mg elemental iron to be effective while minimising side effects.[7,220] Hb should be monitored at two to three weeks to ensure an adequate response to oral iron treatment. Daily folic acid (400 microgram) is also necessary before the 12 weeks of gestation to reduce the risk of neural tube defects.[218] The use of enteric-coated or timed-release formulations could be avoided as it demonstrated low levels of bioavailability.[216]

Table V: Criteria for conducting serum ferritin tests and administering oral iron therapy

Conditions	Criteria
Anaemic women with known haemoglobinopathy or who require parenteral iron repletion therapy.	A serum ferritin test should be conducted prior to administering oral iron therapy.
Non-anaemic women at high risk of low iron, including • Previous anaemia • Women who have had many pregnancies • Twin or higher-order multiple pregnancy • Interpregnancy interval < 1 year • Women who have poor dietary habits • Those following a vegetarian/vegan diet • Pregnant teenagers • Recent history of clinically significant bleeding	Empirical iron treatment should be administered with or without serum ferritin testing
Non-anaemic women with: • High risk of bleeding during pregnancy or at birth • Women declining blood products, such as Jehovah's Witnesses • Women for whom providing compatible blood is challenging	Serum ferritin may be necessary

Women of reproductive age often experience multiple-micronutrient deficiencies, increasing their risk of ID and IDA. Iron with multivitamins and multimineral supplementation proves

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References: 1. Ferrous Forte® Somal professional information, August 2022. **2.** Ferrous Forte® Tablets professional information, September 2021. **3.** Kim HJ, Bae SH, Kim HJ, *et al*. Cytotoxicity, Intestinal Transport, and Bioavailability of Dispersible Iron and Zinc Supplements. *Front Microbiol*. 2017;8:749. doi:10.3389/fmicb.2017.00749. **4.** Data on file, iNova Pharmaceuticals. 2022. **5.** Sucrosomial iron patent document. **6.** Data on file, iNova Pharmaceuticals 2024.

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Table VI: Indications and contraindications in the choice of IV iron in pregnant women and breastfeeding mothers [216]

Indications	Contraindications
Failure to respond to oral iron therapy	Lack of facilities for resuscitation
Non-compliance or intolerance to oral iron	Known history of anaphylaxis or reactions to IV iron therapy
Late second or third trimester with moderate to severe IDA	Gestation period less than 12 weeks
Malabsorption (e.g., bowel resection/coeliac disease)	Known state of iron overload
Bleeding diathesis when haemorrhage is likely to continue	First trimester of pregnancy*
In combination with recombinant erythropoietin patients with pregnancy and chronic disease	Active or chronic bacteraemia
Moderate to severe post-partum anaemia when compliance with oral iron therapy and follow-up in the health care facility is doubtful	Decompensated liver disease

*Although IV iron is not recommended in the first trimester, it can be administered when the benefits outweigh the risk, especially in cases where the potential risk will affect the neurodevelopment of the fetus. This should be done with proper counselling and monitoring.

effective in preventing and treating mild to moderate IDA.[221] A study demonstrates that a 90-day regimen of this supplementation significantly improves haemoglobin levels, ferritin, quality of life and IDA symptoms, with early Hb level increase observed by day 14 for moderate IDA subjects. The treatment is well-tolerated, with minimal adverse events. These findings support the use of iron with multivitamin and multimineral supplementation for treating IDA across different patient populations, contributing to the reduction of the global health burden associated with IDA.[181]

Apart from the counselling points for the general population (see Section 3.4.1: Patient counselling guide steps), information that pharmacists should give pregnant women and breastfeeding mothers includes:[218]

- It is advised to take the supplement on an empty stomach first thing in the morning due to the low levels of hepcidin in the morning.
- If point-of-care testing is available, it is advised to check for haemoglobin levels biweekly to ensure adequate response to the medication.
- Other medicines, such as antacids and vitamins, should not be taken with iron supplements (usually, it is recommended to take two hours apart from milk and calcium supplements).
- It is important to discuss common adverse effects such as constipation, metallic taste, enlarged uterus, and nausea, and recommend non-pharmacological treatment and laxatives, such as sorbitol, that are safe in pregnancy if necessary.

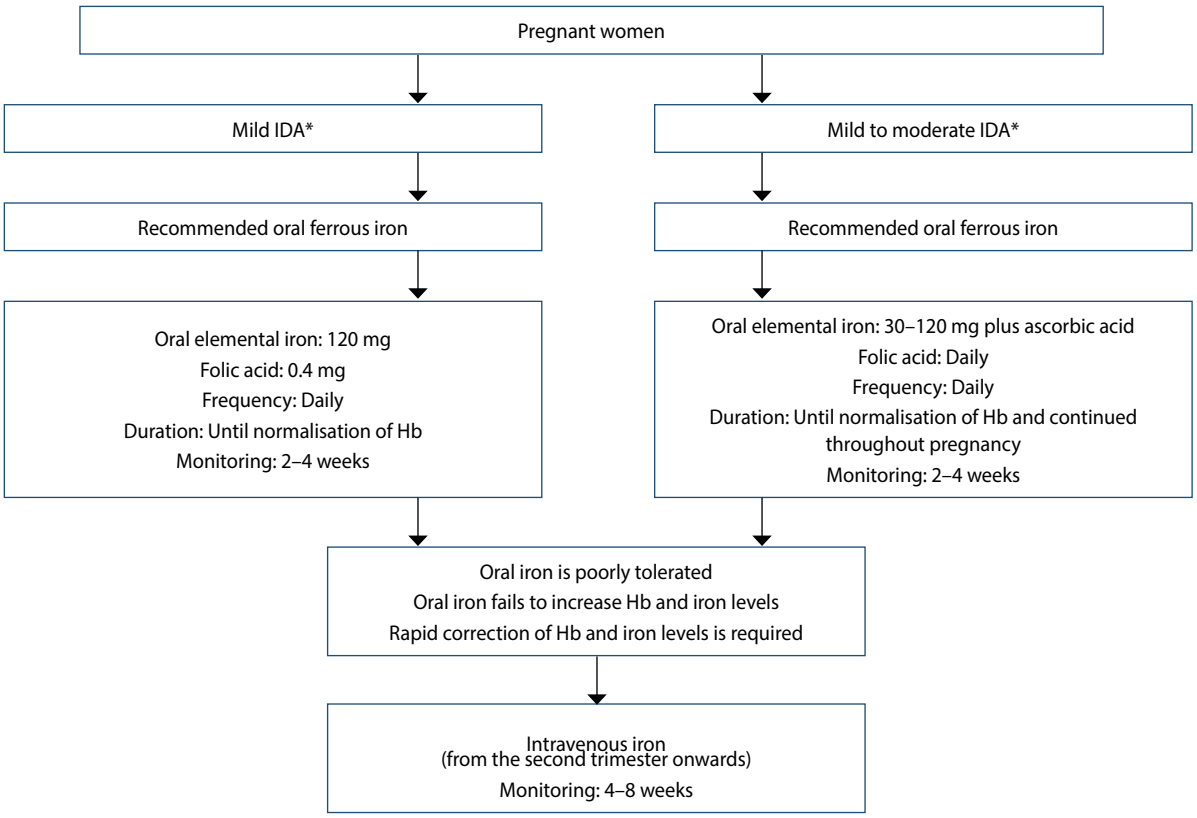

Figure 13: Flowchart for the ID/IDA treatment in pregnant women

*First trimester: mild IDA (10.0–10.9 g/dl), moderate IDA (7–9.9 g/dl).

Second and third trimester: mild IDA (9.5–10.4 g/dl), moderate IDA (6.5–9.4 g/dl)

4.3.2 Parenteral iron therapy

The decision to use parenteral iron therapy instead of oral iron should be based on the patient's needs, and the goal of the therapy should be to increase the haemoglobin level to at least 11 g/dl.[217] Table VI shows indications and contraindications in the choice of IV iron for managing IDA in pregnant women and breastfeeding mothers.[216]

Figure 13 illustrates the treatment of ID/IDA in pregnant women.[220]

4.4 The elderly and patients with chronic diseases

4.4.1 Elderly patients

IDA is the second most common cause of anaemia in elderly patients, accounting for 15–30% of anaemic cases in those over 85 years of age.[222] The causes of anaemia in this population are multiple and complex, including poor diet, reduced iron absorption, occult blood loss, medication (e.g., aspirin) and chronic disease (e.g., chronic kidney disease, chronic heart failure). In addition to the other symptoms of IDA from Section 3.1.1: Signs and symptoms, patients could present with weakness of the body and derailed cognitive function.[60]

The goal of IDA management in this population is to alleviate IDA, replenish iron stores, and treat any underlying disease. As in other special groups, the first-line treatment for IDA in this population is the administration of oral iron therapy, dietary changes and parenteral iron therapy, which can also be administered in cases of intolerance to oral therapy.[223,224] The recommended daily dose of elemental iron is in the range of 60–200 mg, and intravenous iron has also shown high efficacy in patients who cannot tolerate oral therapy, but it has been reported to have side effects such as anaphylaxis in 0.5–1% of treated patients.[223]

It is important to note that a personalised approach that considers comorbidities, drugs and the potential effects of ageing should be considered when managing elderly patients. Pharmacists should be able to provide information in easy-to-understand terms and assist elderly patients to improve their iron status and general health outcomes.[224]

A wide range of co-morbidities in elderly patients could contribute to developing IDA; hence, early and proper diagnosis is beneficial for optimum care.[225]

4.4.2 Patients with chronic diseases

Patients with IDA could present with chronic diseases which are associated with systemic inflammation, such as chronic kidney disease, cirrhosis, heart failure, inflammatory bowel syndrome and cancer. This section will describe brief management of patients with chronic heart failure, chronic kidney disease and inflammatory bowel syndrome.

4.4.2.1 Chronic Heart failure

Patients with chronic heart failure (CHF) have preserved ejection fraction or reduced ejection fraction.[226] The cause of IDA is multifactorial, including malabsorption, malnutrition, gastrointestinal blood loss and chronic inflammation, which could increase the level of hepcidin, thereby decreasing the uptake and absorption of iron.[60]

IDA is defined in CHF patients as serum ferritin < 100 microgram/l and/or a TSAT of < 20%.[60] In cases where IDA is due to CHF, it is recommended to check causes from the gastrointestinal tract through an endoscopic evaluation. A collaborative approach with a cardiologist is crucial for diagnosis confirmation and treatment.[60]

Randomised studies to assess the effectiveness of oral or IV iron therapy in CHF patients are limited; however, studies have been carried out in patients with reduced ejection fraction, and oral iron therapy has demonstrated no prognostic benefit due to low absorption and side effects such as oedema.[224] IV iron is recommended to improve the patient's quality of life and prognosis.[224]

4.4.2.2 Chronic kidney disease

Anaemia in patients with chronic kidney disease (CKD) is common and associated with poor quality of life and increased mortality.[227] Factors contributing to iron deficiency are chronic inflammation and poor hepcidin clearance seen in CKD.[227-229]

Table VII: Iron therapy management in patients with chronic kidney disease (CKD)[232]

Patient treatment	Population	Threshold for iron therapy*	Recommended therapy
Patient is not currently on Erythropoiesis-Stimulating Agents (ESA) or iron therapy	Paediatric CKD patients	TSAT ≤ 20% and ferritin < 100 microgram/l	Trial of oral iron (or trial of IV iron in CKD-Haemodyalisis (CKD HD))
	Adult CKD patients	Increase in Hb concentration without ESA initiation is desired AND TSAT ≤ 30% and ferritin ≤ 500 microgram/l	Trial of IV iron (or trial of oral iron for 1 to 3 months in CKD-Non- haemodyalisis (CKD ND))
Patient is taking ESA therapy and not on iron therapy	Paediatric CKD patients	TSAT ≤ 20% and ferritin < 100 microgram/l	Trial of oral iron (or trial of IV iron in CKD HD)
	Adult CKD patients	Increase in Hb concentration, or decrease in ESA dose is desired, and TSAT ≤ 30% and ferritin ≤ 500 microgram/l	Trial of IV iron (or trial of oral iron for 1 to 3 months in CKD ND)

*Evaluate iron status (TSAT and ferritin) at least every three months during ESA therapy, including the decision to start or continue iron therapy. Test iron status (TSAT and ferritin) more frequently when initiating or increasing ESA dose, when there is blood loss, when monitoring response after a course of IV iron, and in other circumstances where iron stores may be depleted.

Iron supplements with erythropoiesis-stimulating agents are the management choices in this population.[230] Iron supplementation can be administered orally, intravenously or intradyalitically (during haemodialysis sessions).[228] Iron therapy should be chosen based on the severity of iron deficiency, availability of venous access, response and side effects from prior iron therapy, patient compliance and cost.[231]

Table VII shows recommendations from the Kidney Disease Improving Global Outcomes guidelines on appropriate treatment regimens for patients with CKD. A multidisciplinary approach is crucial in CKD patient management.[227,231]

4.4.2.3 Inflammatory bowel disease

Inflammatory bowel disease (IBD) is another chronic disease of inflammation in the gastrointestinal tract. While oral iron therapy is indicated for mild anaemia and inactive disease, it is recommended that it should be less than 100 mg of elemental iron.[60] Oral iron in IBD patients can worsen symptoms and disrupt the intestinal microbiome if it is not tolerated.[233,234] The absorption of oral iron may be impaired by the systemic inflammatory process, as well as by small bowel involvement and/or previous surgery, which favours IV iron as the first-line therapy.[235]

Figure 14 illustrates a summary of IDA management and treatment in chronic disease patients.

4.5 Patients with chronic blood loss

4.5.1 Gastrointestinal bleeding

Gastrointestinal bleeding is the second most common cause of blood loss in men and postmenopausal women.[236] IDA is estimated to be present in 61% of those with gastrointestinal bleeding, and studies have shown that it is underdiagnosed, under-recognised and undertreated, especially in hospitalised patients.[236] The blood loss could go unnoticed because it occurs in small amounts with bowel movement.[237] However, blood in the stool can be detected through a haemoccult slide test (a test of faecal occult blood) during further investigation.[238] Other investigation includes upper GI endoscopy and colonoscopy.[239]

IDA treatment for this population aims to restore the haemoglobin level, serum ferritin levels and transferrin saturation to normal.[236] Patients are first started on oral therapy; in other cases, parenteral iron can be administered. The indications for parenteral iron therapy are patients who are intolerant to oral therapy or who have possible intestinal malabsorption, and suspected non-adherence to oral therapy is observed.[237] Blood transfusion should be considered to improve treatment outcomes in patients with persistent bleeding, heart disease, haemoglobin level less than 7 g/dL, comorbidities or postoperative care and symptomatic anaemia.[236] If the cause of gastrointestinal bleeding is ulceration, the use of anti-inflammatory medicines such as NSAIDs and blood-thinners should be avoided.[240]

For individuals who have had bariatric surgery or other procedures that affect the duodenum, taking oral iron therapy may not be effective. Similarly, where there are problems with blood vessels in the digestive tract (gastrointestinal tract angiodysplasia), oral iron therapy may not be able to replace the blood loss quickly. In these conditions, it is advised to use IV iron rather than oral iron.[241]

4.5.2 Bleeding disorders

Bleeding disorders occur due to the absence or deficiency of some clotting proteins. The most common types of bleeding disorders are haemophilia A, haemophilia B and von Willebrand disease.[242]

Pharmacists need to encourage patients with bleeding disorders to optimise iron intake and absorption since they are at a higher risk of IDA. This can be done by recommending patients take 100–200 mg of elemental iron daily to increase gut absorption to at least 5 mg per day. Food rich in iron should be consumed regularly. In addition, medicines that interfere with iron absorption, such as proton pump inhibitors, should be avoided. The underlying bleeding disorder should be managed to prevent further blood loss.[243]

Figure 15 illustrates a summary of IDA management and treatment in patients with chronic blood loss.

4.6 Individuals on strict diets

Patients on strict diets are commonly vegetarians who do not take protein from animals but consume dairy foods and eggs from

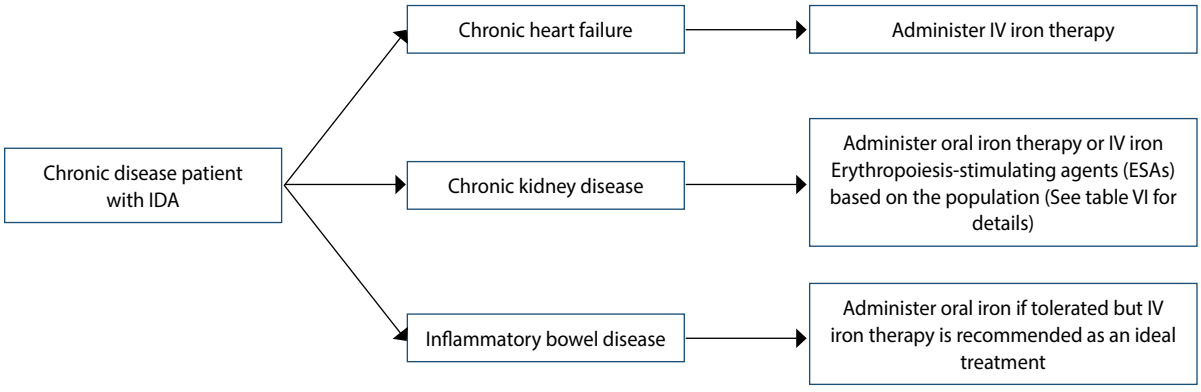

Figure 14: Summary of IDA management and treatment in chronic disease patients

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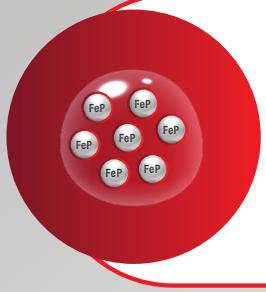

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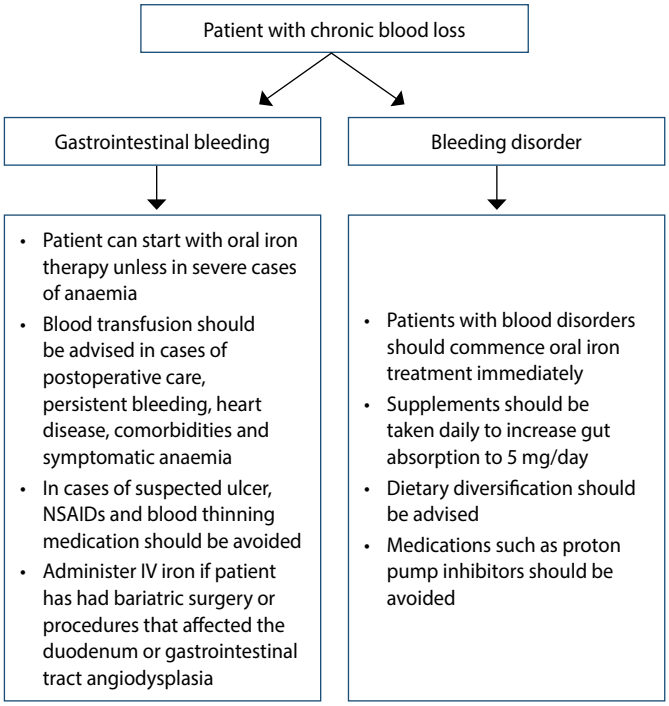

Figure 15: Summary of IDA management and treatment in patients with chronic blood loss

animals and vegans who do not consume any animal protein-based products.[244] Foods from plant sources only contain non-haem iron, obtained from sources such as legumes, peas, nuts and seeds, and wholegrain cereals (see Figure 9: Food containing non-haem iron in Section 3.3.1.1: Iron-rich foods). However, studies have shown that there might be no difference in the iron level between these populations and others; it is advised that in addition to iron supplementation, biofortified food can be consumed to manage IDA.[245] Food sources such as spinach, broccoli, peas etc, which are accommodated in their diet plan and rich in iron, can be consumed.[246]

Patients should be advised to:

- Take oral iron supplements
- Consume non-haem foods that are rich in iron, such as legumes, peas, nuts, etc (see Figure 12)
- Consume biofortified foods

5. IDA prevention

IDA prevention requires a holistic, multi-faceted approach encompassing community consciousness, early detection of high-risk individuals, increasing iron intakes, monitoring and evaluation and proactive engagement of healthcare professionals. Public health initiatives and nutritional education are essential to reduce the prevalence of IDA in communities. This section aims to provide pharmacists with the necessary knowledge and tools to support their roles in preventing IDA in communities.

5.1 Increasing awareness and public education

The initial step in preventing IDA involves enhancing awareness about the condition and its origins. This can be achieved through public health campaigns, educational programmes, and community outreach initiatives.

Public health campaigns can inform people about the importance of iron for health, the signs and symptoms of IDA, and the ways to prevent and treat it. Pharmacists are instrumental in these initiatives, providing accurate information about IDA, its symptoms, causes and prevention strategies. However, it is important to consider the skills and knowledge required for pharmacists to contribute to these measures effectively. Pharmacists need a comprehensive understanding of IDA, including its causes, symptoms, and prevention strategies (see Section 3.1: Identification and investigation of IDA). They should be capable of identifying high-risk individuals (see Section 4: IDA management in special populations) and have knowledge about the various forms of iron supplements available (see Section 3.2.1: Iron repletion therapy).

Effective communication skills are also crucial for pharmacists to educate the community about IDA. They should be adept at explaining complex medical information in a manner that is easily understandable to the public. This includes information on dietary habits that can prevent IDA, such as iron-rich foods (see Section 3.3.1.1: Iron-rich foods).

The WHO published a comprehensive framework for action to accelerate anaemia reduction in May 2023. This framework is based on the core principles of primary health care: meeting people's health needs through comprehensive promotive, protective, curative and rehabilitative care along the life course, systematically addressing the broader determinants of health, and empowering individuals, families and communities to optimise their health.[247] Pharmacists can contribute to the comprehensive approach needed to address anaemia effectively and improve the overall health of individuals and communities.

5.2 Identification and screening of high-risk individuals in the population

Certain groups are more likely to develop IDA due to increased iron needs or losses, and screening can identify iron deficiency at an early stage and improve outcomes.[3,248] Some examples of high-risk individuals are:

- Infants and toddlers under two years of age, due to the high iron requirements needed for their rapid growth and development.
- Children under five years of age.
- Adolescents and women of reproductive age (non-pregnant and pregnant).
- Elderly people.
- People with low dietary iron intake and micronutrient deficiencies, such as in vegetarians and vegans.[67]
- Endurance athletes due to chronic inflammation and increased

iron losses through urine and sweat.[59,67]

- Individuals with chronic diseases or infections, such as malaria and worm infestation (as these infections can lead to chronic blood loss and impaired iron absorption),[249] HIV (as patients may have compromised iron status due to various factors, including infection-related inflammation)[250] and inherited disorders.[75]
- Individuals with chronic blood loss, such as heavy menstrual bleeding, chronic gastrointestinal diseases, and regular blood donation and those with gastrointestinal conditions, e.g., peptic ulcer disease.[67]
- Individuals who have undergone major surgery or physical trauma.

Pharmacists can contribute to the prevention, early detection and management of IDA through the identification of signs and symptoms, point-of-care testing and referrals. They can identify these high-risk individuals by asking about their medical history, dietary habits, menstrual cycle and other risk factors (see Figure in Section 3.1: Identification and investigation of IDA.

It is reasonable to perform annual screening with complete blood count and iron studies in high-risk populations, e.g., women with heavy menstrual bleeding or a history of iron deficiency. Women in the reproductive age group can be screened every five years for haemoglobin or haematocrit. It may be reasonable to screen men and postmenopausal women once or more frequently if any risk factors are present.[21]

5.3 Increasing iron intakes

A range of interventions are available for correcting IDA at the population level. These interventions, which focus on improving iron intake and bioavailability, can be implemented alone or in combination. They primarily revolve around iron supplements, nutrition education coupled with dietary modification or diversification, as well as iron fortification of foods and biofortification.[14] These strategies aim to correct iron deficiency anaemia by increasing iron intake and diversifying nutrient sources, thereby empowering individuals with informed choices for improved well-being.

5.3.1 Iron supplements

Preventive iron supplements are particularly important for paediatric populations, non-pregnant women of reproductive age, pregnant women and breastfeeding mothers. Pharmacists can advise on the appropriate type and dosage of supplements.

Generally, 1–2 mg/kg/day is the preventive dose for iron deficiency.[193] As a preventive measure against IDA, the WHO suggests daily doses of elemental iron for three consecutive months each year.[251]

- **For infants and young children aged six to 23 months** — 10–12.5 mg of elemental iron (equivalent to 50–62.5 mg of ferrous sulfate heptahydrate, 30–37.5 mg of ferrous fumarate or 83.3–104.2 mg of ferrous gluconate) in the forms of drops, syrups or drinkable vials.
- **For preschool-aged children aged 24 to 59 months** — 30 mg of elemental iron (equivalent to 150 mg of ferrous sulfate heptahydrate, 90 mg of ferrous fumarate or 250 mg of ferrous gluconate) in the forms of drops, syrups, tablets or drinkable vials.
- **For school-aged children aged 60 months and older** — 30–60 mg (equivalent to 150–300 mg of ferrous sulfate heptahydrate, 90–180 mg of ferrous fumarate or 250–500 mg of ferrous gluconate) in the forms of tablets, capsules, syrups or drinkable vials.

For infants and toddlers, measures to prevent iron deficiency include completely avoiding cow milk and starting iron supplementation at four to six months of age in breastfed infants (this is because breast milk contains highly bioavailable iron but in amounts that are not sufficient to meet the needs of infants older than four to six months), and using iron- fortified formula when not breastfeeding. When infants are 12 months old, they should be screened for IDA.

The WHO suggests daily doses of elemental iron for non-pregnant women of reproductive age according to the prevalence as a preventive measure against IDA.[251] In areas where the prevalence of anaemia is 40% or higher, the WHO suggests non-pregnant women and adolescents of reproductive age take daily tablets of 30–60 mg elemental iron (equivalent to 150–300 mg of ferrous sulfate heptahydrate, 90 180 mg of ferrous fumarate, or 250–500 mg of ferrous gluconate) for three consecutive months each year.[7] In areas where the prevalence of anaemia is 20–40%, the WHO recommends an intermittent regimen. This involves taking one supplement weekly, containing 60 mg of elemental iron and 2,800 microgram (2.8 mg) folic acid, for three consecutive months, followed by three months without supplementation, and then resuming another three months of supplementation.[163]

Similarly, the WHO suggests daily doses of elemental iron for pregnant women and breastfeeding mothers. In populations where the prevalence of anaemia in pregnant women is 40% or higher, along with blood haemoglobin concentration below 11 g/dl, it is recommended to take a daily supplement containing 60 mg of elemental iron and 400 microgram (0.4 mg) folic acid throughout pregnancy. The supplementation with iron and folic acid should begin as early as possible.[163] In populations with a 20–40% prevalence of anaemia, intermittent oral iron can be provided once a week for pregnant women.[163] The regimen includes 120 mg of elemental iron (equivalent to 360 mg of ferrous fumarate, 600 mg of ferrous sulfate heptahydrate, or 1,000 mg of ferrous gluconate) and 2,800 microgram (2.8 mg) of folic acid throughout pregnancy. This dosing regimen is recommended as an alternative in settings where non- compliance is observed or there are concerns with women who have adequate iron intake.[163] This dosing regimen for pregnant women aims to improve maternal and neonatal outcomes if daily iron intake is not tolerable due to side effects.[163] The amount of elemental iron varies with different types of oral iron salts, and this is important in the choice of the preparation to dispense to a patient.[178]

5.3.2 Dietary modification

Strategies aimed at dietary improvement have been directly applied to vulnerable groups, such as infants, children and pregnant women.[124] Recognising and acting upon the critical role of correcting anaemia is essential to achieving the overarching global nutrition targets identified by the WHO, namely, stunting, low birth weight, childhood overweight, exclusive breastfeeding and wasting.[3]

Dietary diversity refers to consuming various foods or food groups within a specific timeframe,[252] and is viewed as the most long-lasting and desirable intervention. Increasing dietary diversity implies increasing the amount of food consumed and expanding the variety of micronutrient-rich foods incorporated into the diet.[164] Diet quality is characterised by having an adequate intake of essential macro- and micronutrients and incorporating a diverse selection of foods at the household or individual level.[252]

Pharmacists play a crucial role in promoting these dietary changes. They can educate individuals about the importance of a balanced diet for maintaining healthy iron levels. They can advise which foods are high in iron and how to incorporate them into daily meals. They can also inform individuals about the benefits of combining iron-rich foods with foods high in vitamin C (see Section 3.3.1.1: Iron-rich foods).

5.3.3 Iron fortification

The WHO has recommended four types of food fortification: universal or mass fortification, open market (commercial) fortification, targeted (high-risk groups) fortification, and household and community fortification methods.[164] Mass fortification involves adding nutrients, such as iron, folic acid, vitamin B12 or vitamin A, to commonly consumed foods, reaching a wide population. Targeted fortification focuses on specific groups with higher nutritional needs, like infants and pregnant women. Market-driven fortification refers to manufacturers adding micronutrients to processed foods to improve public health. Household and community fortification combines supplementation and fortification, particularly in enhancing foods for young children.[164] Food fortification with suitable iron compounds is considered the best long- term method to prevent iron deficiency.[253] Fortification with micronutrients, such as iron, aims to improve the nutritional status of populations vulnerable to micronutrient deficiencies.[124,164]

Iron fortification, in contrast to supplementation, allows the delivery of lower micronutrient doses in a food vehicle, providing the option of multiple servings throughout the day. Although it takes a longer time to increase body iron levels compared with iron supplementation or iron therapy, iron fortification proves to be practical, more sustainable, and cost-effective and may be the safer intervention over the extended period for addressing iron deficiency at the national level.[164, 172]

5.3.4 Biofortification

Biofortification refers to a range of methods to counter micronutrient deficiencies by enriching the nutritional value of crops using plant breeding techniques, genetic modifications or agronomic practices.[254] It combines conventional crop varieties with modern techniques, merging the favourable characteristics of high-iron and high-yield crop varieties,[255] for instance, rice and legumes with higher iron content, carrots and sweet potatoes rich in beta-carotene varieties, and maize with lower phytate content (which enhances iron absorption and zinc absorption).[256-258]

Biofortification aims to augment the nutritional value of staple foods, including cereals, legumes and tubers, by increasing their nutrient content, such as iron, zinc, provitamin A, amino acids and protein, during the cultivation of these plants. It plays a crucial role in supporting the health of vulnerable populations who lack access to commercially fortified foods.[164,254] Additionally, if biofortified crops possess favourable agronomic characteristics, it could result in an autonomous approach to public health, as farmers would be inclined to choose these crops.[172]

Several research findings suggest that consuming iron-biofortified staple crops, e.g., biofortified millet, can effectively manage iron deficiency.[259,260] A randomised trial was carried out among adolescent boys and girls in India to investigate the effects of supplementation of iron-biofortified pearl-millet-based flatbread on iron status. The supplementation was conducted twice daily for four months. The findings suggested that supplementation of biofortified pearl millet led to a 64% reduction in the prevalence of anaemia among these schoolchildren.[259]

5.4 Monitoring and evaluation

Pharmacists play a crucial role in preventing IDA by monitoring iron stores and ensuring adherence to iron supplementation.

- **Monitoring iron stores** — Pharmacists can monitor patients' iron stores through point-of-care testing for haemoglobin and other relevant tests. Regular monitoring allows for early detection of iron deficiency, enabling timely intervention and preventing the development of IDA.
- **Ensuring medication adherence** — Pharmacists can ensure patients take their iron supplements as directed. This involves educating patients about the importance of regular supplementation, potential side effects, and strategies to manage them. Pharmacists can also provide reminders for refill prescriptions to ensure uninterrupted supplementation.

6. Summary and conclusions

IDA is a significant global public health concern with far-reaching implications for maternal, infant and child well-being. International targets and sustainable development goals reinforce efforts to combat this condition. Health literacy is fundamental in managing IDA, ensuring patients can make informed decisions and engage in meaningful dialogues with healthcare providers. Pharmacological treatment options, including oral

iron supplements and intravenous therapy, are commonly used, along with non-pharmacological approaches that involve dietary diversification. Early identification and accurate diagnosis are pivotal in managing IDA effectively.

Despite ongoing efforts and the accessibility of treatment options, IDA affects many individuals, including special populations. The approach to effective management of IDA requires early identification, accurate diagnoses, individual- based tailored interventions and patient education. Additionally, the prevention of IDA calls for a holistic, multi-faceted approach. This encompasses enhancing community consciousness, early detection of high-risk individuals, proactive engagement of healthcare professionals and dietary enhancements.

Pharmacists play a pivotal role in raising awareness about IDA by offering accurate information regarding its symptoms, causes and preventive strategies. In a community seting, pharmacists can provide health services and information on preventing and managing iron deficiency anaemia. In a hospital setting, pharmacists can optimise patient outcomes by monitoring and adjusting treatment plans. They also actively develop evidence-based practice guidelines in collaboration with fellow healthcare professionals. Their active engagement in providing health advice has yielded significant therapeutic impact and garnered approval from fellow healthcare professionals.

To effectively contribute to these efforts, pharmacists must comprehensively understand IDA, encompassing its symptoms and preventive measures. Furthermore, they should be adept at identifying high-risk individuals and be well- versed in the various forms of iron supplements available. Collaborating with other healthcare professionals, including doctors, nurses and dietitians, is integral to providing comprehensive care for anaemic patients. This involves sharing relevant patient information and actively participating in developing and assessing patient care plans. This handbook is expected to serve as an invaluable resource, providing pharmacists, specifically in patient-facing roles, with the essential knowledge needed to address the identified gaps above in their understanding of IDA.

Further support for research and innovation in anaemia management, including diagnostic tools and treatment modalities, is necessary. Promoting continuous education through workshops, webinars and certification programmes is vital to ensure that pharmacists remain updated with the latest advancements in anaemia care. Organising workshops and group discussions based on handbook guidelines can empower pharmacists, enhancing their understanding and practical application of knowledge in the context of IDA and supporting their roles in promoting self-care to patients and communities.

References available on request.

https://www.fip.org/file/5751

Beyond metformin: the expanding landscape of Type 2 diabetes treatment

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Abstract

Diabetes mellitus (DM) is a chronic, progressive metabolic disorder characterised by elevated and uncontrolled blood glucose levels and is a leading cause of morbidity and mortality worldwide. Type 2 DM accounts for over 90% of all diabetes cases and is primarily managed through lifestyle modification and pharmacological interventions. While metformin remains the first-line drug for the treatment of Type 2 DM, other adjunct therapies provide additional glycaemic control as well as cardiovascular and metabolic benefits. This review provides an overview of the pharmacological agents used in the management of Type 2 DM, and an insight into their mechanisms of action, therapeutic benefits, and side effects. Understanding these agents' roles is crucial in optimising management and reducing possibly preventable and devastating sequalae of inadequately controlled diabetes.

Keywords: Type 2 diabetes mellitus, pharmacological management, antihyperglycaemic agents, metformin, sulfonylureas, SGLT2 inhibitors, GLP-1 receptor agonists, insulin therapy, diabetes complications, glycaemic control, Ozempic

https://doi.org/10.36303/SAPJ.2299

Introduction

Diabetes mellitus (DM) is a chronic, progressive non-communicable disease characterised by increased blood glucose levels and substantially contributes to global morbidity and mortality.[1,2] In 2021, the International Diabetes Federation indicated that more than half a billion people – approximately 536.6 million – were living with diabetes worldwide, with the highest age-standardised prevalence rates observed in Africa and the Middle East.[1] The disease is a rapidly escalating health crisis with 6.7 million deaths attributed to the condition in 2021 alone.[1] Alarmingly, it has been projected that by 2030, the number of people with diabetes will rise to 643 million, further increasing to 784 million in 2045.[1]

Types of diabetes

There are three main disease categories: Type 1, Type 2 and gestational DM.[3] Type 1 DM involves the immune-mediated destruction of pancreatic β cells in the Langerhans pancreatic islets, leading to insulin deficiency.[4] Although the aetiology of Type 1 DM is not completely understood, various genetic and environmental factors have been implicated in its aetiology.[5,6] Lifelong insulin replacement remains the cornerstone of Type 1 DM management.[7]

Type 2 DM is more prevalent and accounts for over 90% of all diagnosed cases of DM.[8] This type is characterised by insufficient insulin secretion from pancreatic islet β-cells, insulin resistance in tissues, and an inadequate compensatory insulin secretion response.[8] In contrast to Type 1 DM, Type 2 DM is rather insidious and often remains unnoticeable for many years which leads to delayed diagnosis.[9] Therefore, at the time of diagnosis, patients are usually at an increased risk of developing micro- and macrovascular complications.[10] Risk factors for Type 2 DM include: a sedentary lifestyle, a genetic predisposition, a history of gestational diabetes, and advancing age.[11] Although Type 2 DM is often associated with adults, it is increasingly being observed in a younger population, due to the rising prevalence of childhood obesity – a major risk factor for the development of the disease.[12] Managing Type 2 DM predominantly includes lifestyle modifications, oral anti-hyperglycaemic agents, and insulin therapy to achieve optimal glycaemic control and mitigate complications.[13]

Gestational DM is a complication characterised by the onset of persistent hyperglycaemia during pregnancy in females who have not previously been diagnosed with DM.[14] Patients with gestational DM are at a high risk of developing maternal cardiovascular disease, Type 2 DM, and delivery complications.[14] The main therapeutic strategies for treating gestational DM include lifestyle modifications, such as dietary adjustments, physical activity, and weight management.[14] Pharmacological interventions are used if the hyperglycaemia is not resolved.

Pharmacological agents for the treatment of diabetes

For individuals with Type 1 DM, insulin replacement therapy is necessary.[7] This involves multiple daily injections of prandial basal and prandial insulin, or continuous subcutaneous infusions.[7] Multiple types of insulin are used in clinical practice, including rapid-acting insulin for prandial glucose regulation, short-acting insulin (regular insulin) for postprandial management, intermediate-acting insulin for background glycaemic control, and long-acting or ultra-long-acting insulin to maintain basal levels

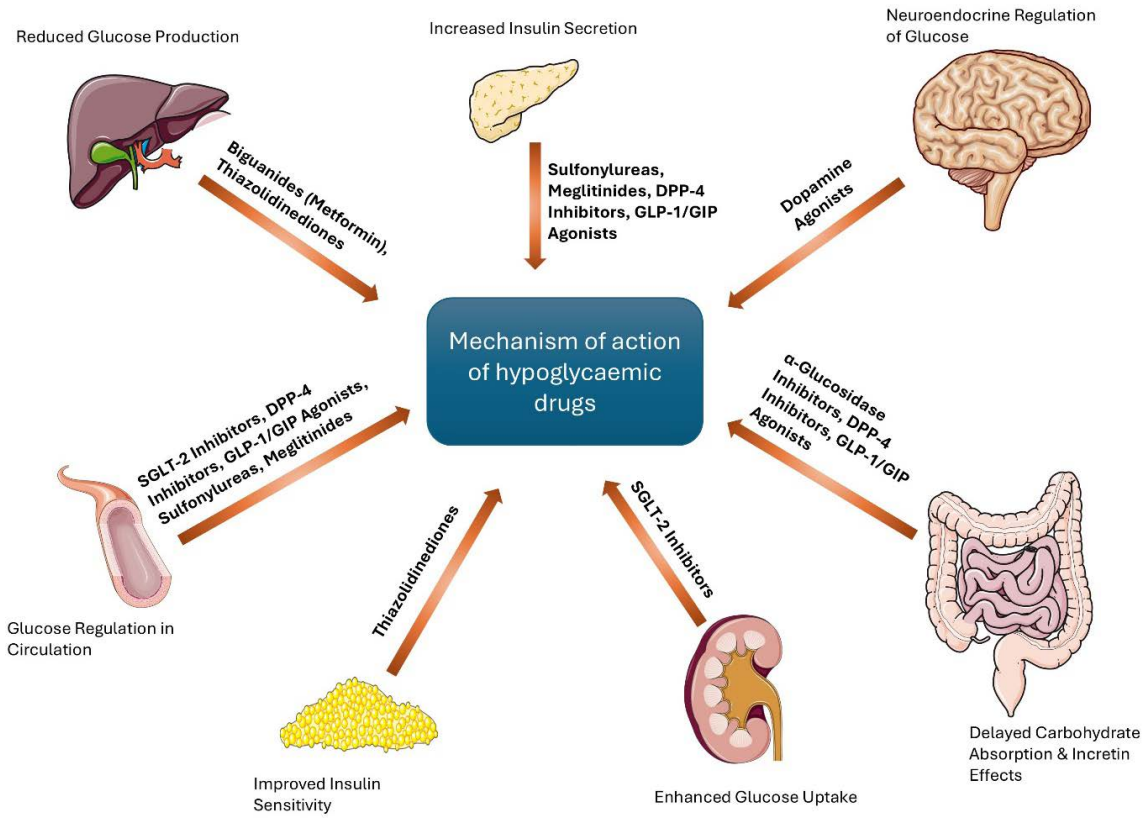

Figure 1: Mechanisms of anti-diabetic drugs in glucose regulation

Various drug classes target different organs involved in glucose homeostasis. Abbreviations: DPP-4, Dipeptidyl Peptidase-4; GLP-1, Glucagon-Like Peptide-1; GIP, Glucose-Dependent Insulinotropic Polypeptide; SGLT-2, Sodium-Glucose Co-Transporter 2. Icons from the image obtained from SMART (freely available under the Creative Commons Attribution 4.0)

throughout the diurnal cycle.[15-17] In certain instances, premixed formulations are used to simplify dosing.[18] On the contrary, various hypoglycaemic agents are used in combination with insulin in the treatment of Type 2 DM. These and their mechanisms of action are outlined in this review. A summary of the drugs used in the treatment of Type 2 DM is provided in Figure 1.

Biguanides (metformin)

Metformin (dimethylbiguanide) is the only available biguanide in clinical practice, as other biguanides have been discontinued due to an increased risk of lactic acidosis.[19] Mechanistically, metformin exerts its hypoglycaemic action through the reduction of hepatic glucose production, enhancing insulin sensitivity, improving the use of intestinal glucose, and stimulating the release of the glucose-like peptide-1 (GLP-1) without increasing insulin secretion.[20] Metformin's side effects include gastrointestinal symptoms like diarrhoea, nausea, and abdominal discomfort, rare but serious lactic acidosis, vitamin B12 deficiency with long-term use, and the potential to induce ovulation in premenopausal women with polycystic ovarian syndrome. Metformin is the most widely prescribed agent for the treatment of Type 2 due to its safety profile, efficacy, low risk of hypoglycaemia, minimal impact on weight and positive impact on vascular disease.[19] In addition to lifestyle modifications, metformin is the recommended first-line treatment for Type 2 DM in South Africa, except in cases where it is contraindicated.[21] Metformin is usually administered

Table I: Recommended therapy for Type 2 diabetes mellitus in South Africa[21]

Therapy level	Preferred options	Alternative options	Notes
Monotherapy	Metformin XR	Gliclazide MR, DPP-4i, SGLT2i, GLP-1a, pioglitazone, insulin	If HbA1c target is not reached, intensify to dual therapy.
Dual therapy	Metformin XR + Gliclazide MR	Pioglitazone, SGLT2i, DPP4i, GLP-1a, insulin	Consider dual therapy if HbA1c > 9% at diagnosis. Adjust based on response.
Triple therapy	Metformin XR + Gliclazide MR + GLP-1a	SGLT2i, Insulin (basal), Pioglitazone, DPP4i	Add insulin or GLP-1a in cases of inadequate control on dual therapy.
Complex therapy	Metformin XR + basal insulin	GLP-1a or additional oral therapy	Insulin should be titrated and supported by education and CGM.

Key: Metformin XR: Extended-release metformin. Gliclazide MR: Modified-release sulfonylurea. DPP-4i: Dipeptidyl peptidase-4 inhibitor. SGLT2i: Sodium/glucose cotransporter-2 inhibitor. GLP-1a: Glucagon-like peptide-1 receptor agonist. CGM: Continuous glucose monitoring.

in combination with other pharmacological agents for Type 2 DM to effectively reduce HbA1c levels.[21] An overview of the pharmacotherapeutic options for Type 2 DM, recommended by the Society of Endocrinology, Metabolism and Diabetes of South Africa in 2017, is shown in Table I.[13,21]

Sulfonylureas

First-generation sulfonylureas such as chlorpropamide and tolbutamide were developed in the 1950s for treating Type 2 DM.[22] However, due to their low binding efficacy, these drugs require high doses to achieve efficacy and are thus rarely used currently.[22] Second-generation sulfonylureas with higher potency such as glyburide, gliclazide, glimepiride and glipizide were subsequently developed in the 1980s, and are widely used currently.[23] These drugs lower blood glucose by stimulating glucose-independent insulin release. This is achieved through the closure of adenosine triphosphate (ATP)-sensitive potassium channels, resulting in membrane depolarisation, calcium influx, and eventual insulin exocytosis.[23] Additionally, they may lower blood glucose by decreasing hepatic insulin clearance, inhibiting glucagon secretion, and enhancing insulin sensitivity in peripheral tissues.[23] The main side effects of sulfonylureas include hypoglycaemia and weight gain, while rare effects such as intrahepatic cholestasis and allergic skin reactions can potentially occur.[20]

Meglitinides

Meglitinides also act as insulin secretagogues, however in contrast to sulfonylureas, they stimulate insulin release in a glucose-dependent manner.[24] Currently available meglitinides include repaglinide, introduced in 1998, and nateglinide, introduced in 2001. The drugs have a rapid onset and a short duration of action and are taken 1–30 min before meals.[20,24] Meglitinides have a similar mechanism of action to sulfonylureas, as they also close the ATP-sensitive potassium channel, resulting in cell depolarisation and calcium influx, although the meglitinides bind at a different site.[20] Similar to sulfonylureas, meglitinides can also cause hypoglycaemia, however to a lesser extent.[19] Additionally, meglitinides cause weight gain as a side effect, with repaglinide more likely to lead to weight gain than nateglinide.[19]

Thiazolidinediones

Pioglitazone, rosiglitazone and troglitazone are members of the insulin-sensitising thiazolidinedione (glitazone) class of drugs used for the treatment of Type 2 DM.[21] Rosiglitazone and troglitazone were introduced in 1999, however, rosiglitazone was discontinued in Europe in 2000 and 2008 in the USA due to cardiovascular risks, although the restriction in the USA was subsequently lifted in 2013.[25] Thiazolidinediones enhance insulin sensitivity by activating peroxisome proliferator-activated receptor gamma (PPAR-γ), which regulates glucose and lipid metabolism. This increases adiponectin levels, GLUT4 expression, and insulin-dependent glucose uptake while reducing hepatic gluconeogenesis.[26] Thiazolidinediones can cause oedema, weight gain, reduced bone density, fluid retention, potential cardiovascular risks, increased LDL cholesterol and triglyceride, and risk of congestive heart failure, particularly in patients with diastolic dysfunction.[25]

Alpha-glucosidase inhibitors

Miglitol, acarbose and voglibose are α-glucosidase inhibitors that delay the absorption of glucose, leading to the lowering of postprandial glucose and insulin levels.[26] These drugs are one of the most effective antidiabetics for the control of postprandial hyperglycaemia and its associated complications.[26] The mechanism of action of α-glucosidase inhibitors involves competitive inhibition of pancreatic α-amylase and membrane-bound intestinal α-glucosidase hydrolase enzymes. This inhibition prevents the metabolism of disaccharides and oligosaccharides into monosaccharides, delaying carbohydrate digestion and absorption, resulting in reduction of postprandial glucose and insulin levels.[19,26] The common side effects of α-glucosidase inhibitors include flatulence, abdominal discomfort, and diarrhoea, which result from the inhibition of carbohydrate digestion, while weight gain and hypoglycaemia are uncommon.[26]

Sodium-glucose transporter protein inhibitors

The sodium-glucose cotransporter 1 (SGLT1) is expressed in the small intestine and the proximal convoluted tubule, whereas SGLT2 is primarily localised to the proximal convoluted tubule.[27] Approximately 90% of filtered glucose is reabsorbed by SGLT2, while the remaining 10% is reabsorbed via SGLT1.[27] As such, SGLT transport inhibitors have emerged as therapeutic agents in the treatment of Type 2 DM.[27] Canagliflozin, ertugliflozin, empagliflozin, dapagliflozin and sotagliflozin are some examples of drugs that fall under this drug class.[27] The side effects associated with SGLT inhibitors include urinary tract infections, genital mycotic infections, Fournier gangrene, hypovolaemia and hypotension, acute kidney injury, diabetic ketoacidosis, and an increased risk of osteoporosis and fractures.[20]

Glucagon like protein-1 (GLP-1) receptor agonists

In recent years, there has been an increase in the use of glucagon-like peptide-1 (GLP-1) receptor agonists and gastric inhibitory polypeptide (GIP) analogs.[28] These peptides increase insulin secretion in response to glucose, thereby lowering fasting and postprandial glucose levels by reducing glucagon release.[2,28] Furthermore, GLP1 and GIP may delay gastric emptying, thereby resulting in a reduction of postprandial glucose levels and inducing satiety, which consequently leads to decreased food intake.[3,29] Injectable GLP-1 agonists such as semaglutide (Ozempic), liraglutide, and dulaglutide, and oral agents such as semaglutide (Rybelsus) act to potentiate the effects of GLP-1.[20,30] Tirzepatide (Mounjaro), a dual GLP-1/GIP receptor agonist, also enhances insulin secretion by targeting both GLP-1 and GIP receptors, further improving its therapeutic effects.[31] The side effects of these drugs include gastrointestinal issues, gallbladder disease, injection-site reactions, potential thyroid concerns, pancreatitis, retinopathy complications, anaesthesia-

related risks, and concerns about suicide and self-harm, though the severity and risk vary across individuals and treatment regimens.[32-36] Notably, these drugs often result in the side-effect of weight loss, which has prompted practitioners in South Africa to use drugs like Ozempic and Mounjaro off-label for weight management.[3,29,38] Moreover, these drugs are expensive which makes them inaccessible to the larger population of South Africa.[37] These issues have prompted the manufacturing of inauthentic semaglutides which The South African Health Products Regulatory Authority strongly advised against.[38] It is important to note that no generics are available or authorised in South Africa at this time and no GLP-1s are registered for weight loss.[37]

DPP-4 inhibitors

Sitagliptin, saxagliptin, linagliptin, and alogliptin are examples of dipeptyl peptidase-4 (DPP-4) inhibitors.[39] This enzyme normally degrades the GLP-1 and GIP.[39] Inhibiting the enzyme with DPP-4 inhibitors increases incretin levels, leading to increased beta-cell insulin secretion in the pancreas, and a consequent reduction of postprandial and fasting hyperglycaemia.[39] There are minor side-effects associated with DPP-4 inhibitors, and the drugs are generally well-tolerated by patients, however rare hypersensitivity reactions have been reported.[40] Additionally, a bullous pemphigoid has reported in some large-scale studies.[40]

Dopamine agonists

Bromocriptine, a dopamine agonist, is used as adjunct therapy for Type 2. Its activity at the D2 dopamine receptor in the hypothalamus results in decreased insulin resistance, enhances glucose disposal, and decreases hepatic glucose production, without raising insulin levels. Side effects may include nausea, dizziness, and hypotension.

Conclusion

Metformin remains first-line therapy for Type 2 DM. However, newer agents such as GLP-1 receptor agonists and SGLT2 inhibitors offer additional benefits, such as improved cardiovascular, renal and metabolic outcomes. In South Africa, the increasing use of Ozempic not only for diabetes management but also for weight loss intervention has led to shortages, particularly in the private sector. The rising demand has led to the emergence of counterfeit and possibly dangerous products which are not approved and fully understood. This review highlights that a comprehensive approach, which combines pharmacological treatments and lifestyle modifications, remains key to managing diabetes and preventing devastating complications.

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Psilocybin: revealing the enigmas of a revolutionary fungi

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Abstract

Psilocybin, a psychoactive compound found in certain mushroom species, has garnered significant attention for its potential therapeutic applications in mental health. This article provides a review of psilocybin's historical, cultural, and clinical relevance. The ancestral use of psilocybin-containing mushrooms in traditional rituals underscores its longstanding association with spiritual and healing practices. Scientific exploration has elucidated its mechanism of action, highlighting its similarity to serotonin and its ability to modulate neural activity through serotonin receptor binding, particularly 5-HT2A. Clinical evidence from recent trials indicates that psilocybin, when administered in controlled settings, may provide substantial benefits in treating conditions such as depression, anxiety, and alcohol use disorder. Key studies have demonstrated sustained symptom relief and improvements in quality of life for patients, although challenges such as controlled usage, potential adverse effects, and regulatory status persist. A systematic literature search was conducted across PubMed, MEDLINE, Scopus, and ScienceDirect using keywords such as *psilocybin*, *psychedelic therapy*, and *mental health treatment*. From an initial pool of 30 articles, 10 studies were included based on relevance and alignment with the review objectives. The review also emphasises the importance of safe administration under professional supervision, focusing on the roles of "set" and "setting" in optimising therapeutic outcomes. Ongoing research is necessary to further substantiate these findings and integrate psilocybin into conventional mental health treatment protocols. This exploration provides valuable insights into the potential of psilocybin as a transformative tool in modern psychiatry, poised to offer alternatives for patients who have not responded to existing treatments.

Keywords: psychedelic-assisted treatment, mental health, psilocybin

https://doi.org/10.36303/SAPJ.0982

Introduction

For many years, psilocybin—a naturally occurring psychoactive substance present in some mushroom species—has captivated scientists, therapists, and psychonauts. Recent years have seen a significant increase in interest in this subject due to its unique capacity to induce profound altered states of consciousness as well as its potential for therapeutic and spiritual exploration applications.[1]

There are now six known indigenous species of psychedelic mushrooms in the genus Psilocybe, after two new species from southern Africa were described. With about 140 identified species, psilocybe is one of the most well-known and researched genera of hallucinogenic mushrooms worldwide.[2] The two new species are identified as *Psilocybe ingeli* and *Psilocybe maluti* by researchers from Stellenbosch University (SU) and mycologists in a paper that was published in the journal *Mycologia*.[2]

Indigenous peoples in parts of Mexico and Central America have been using psilocybin, derived from specific types of mushrooms, for thousands of years as a part of a sacred and ancient tradition.[1] Psilocybin is now classified as a psychedelic, a type of substance that produces profound changes in perception, mood, and cognitive processes.[1] Psilocybin is sometimes referred to by the street names magic mushrooms, mushrooms, or shrooms.[1] This piece explores the realm of psilocybin, including its usage, effects, potential as a medicine, and current research.

The historical use of psilocybin in Africa is not as extensively documented as in other regions, such as Central and South America, where psilocybin-containing mushrooms have a well-recorded history of ceremonial and medicinal use.[1] However, there is evidence to suggest that the use of psychoactive substances, including plants and fungi with psychoactive properties, has been a part of various traditional practices in Africa.[1]

In some regions, indigenous communities are known to have employed psychoactive substances for spiritual, healing, and shamanic purposes.[1] The continent's vast biodiversity supports the possibility that certain fungi containing psychoactive compounds, including psilocybin, could have been part of local traditions.[1] Ethnobotanical records indicate that indigenous healers, known as shamans or traditional medicine practitioners, used various plants and mushrooms to induce altered states of consciousness for rituals, healing ceremonies, and connecting with the spiritual world.[1]

However, while there is some anecdotal and speculative evidence pointing to the use of psychoactive mushrooms in parts of Africa, detailed documentation and scientific studies specific to psilocybin use are limited.[1] Further research and exploration

into ethnobotanical traditions may reveal more about the historical role of psilocybin-containing mushrooms and their potential applications in traditional African medicine.[1] This gap in documented history underscores the need for comprehensive anthropological and ethnobotanical studies to explore traditional African knowledge systems and their potential use of psychoactive substances.

Literature search strategy

The literature search for this narrative review on psilocybin was conducted across major scientific databases, including PubMed, MEDLINE, Scopus, and ScienceDirect, to identify relevant studies and articles published within the last five years. Keywords such as *psilocybin*, *psychedelic therapy*, *mental health*, *depression treatment*, and *serotonin receptor activity* were used. Additional sources were retrieved through cross-referencing citations from key articles.

Search outcome

The initial search yielded 30 articles. After applying inclusion and exclusion criteria, a total of 10 studies were included in the final review.

Inclusion and exclusion criteria

- **Inclusion criteria**: Peer-reviewed articles, clinical trial reports, and reviews discussing psilocybin's pharmacological properties, therapeutic potential, and safety in mental health treatment.
- **Exclusion criteria**: Studies not published in English, non-peer-reviewed literature, articles focusing solely on non-clinical uses of psilocybin, and publications older than five years unless seminal to the topic.

Ancestral history

Mushrooms containing psilocybin have been used for thousands of years. Indigenous cultures have used these mushrooms in shamanic and spiritual rituals throughout the Americas and other parts of the world.[3] Species like *Psilocybe cubensis* and *Psilocybe mexicana* have been used ceremonially by indigenous people in Central and South America for many generations; this provides insight into the profound cultural significance of these fungi.[3] Cultural use of the *Psilocybe maluti* species, which was found in Lesotho's highlands, has been documented.[2] As one of the first hallucinogenic mushrooms with confirmed indigenous uses in Africa, *P. maluti* (locally known as koae-ea-lekhoaba) is reportedly incorporated into spiritual practices by Basotho traditional healers.[2]

The science of psilocybin

The indole alkaloid psilocybin (4-phosphoryloxy-N, N-dimethyltryptamine) was first isolated from fungi, mainly from species of *Psilocybe (Fr.) Kumm*.[3] Psilocybin is converted to the bioactive substance psilocin in the body by dephosphorylation.[3] From a structural perspective, psilocybin and psilocin resemble the neurotransmitter serotonin (5-hydroxytryptamine).[3] 5-hydroxytryptamine (5-HT2A, 5-HT2C, 5-HT1A, 5-HT1B, and 5-HT1D) receptors are bindable to serotonin and psilocin, which disrupts serotonergic neurotransmission and produces physiological effects.[3] Changes in mood, awareness, and perception result from this interaction.[3] Psilocybin is distinct from other psychedelics due to its pharmacological effects. Like other tryptamines, psilocybin, the active ingredient in psychedelic mushrooms, works by binding to serotonin receptors, especially the 5-HT2A receptor. DMT (N,N-Dimethyltryptamine), 5-MeO-DMT, and LSD (Lysergic acid diethylamide) are tryptamines that have comparable effects and mechanisms.[3]

Effects of psilocybin

Psilocybin consumption can result in a variety of subjective effects, such as altered emotional states, improved creativity, altered perceptions, and changes in sensory perception.[4] Users frequently describe vivid visual experiences, including enhanced colours and geometric patterns.[4] Furthermore, experiencing a sense of oneness with everything or a sense of interconnectedness with the universe is not unusual.[4]

Known for its ability to bring about profound insights and a sense of unity, psilocybin is also known for inducing what is commonly called a "mystical experience" which possesses the following qualities: ineffability, noetic quality, timelessness and spacelessness, sacredness, and ego transcendence.[4] A person's life may be profoundly impacted by these mystical encounters, which may result in increased spiritual or existential awareness and personal development.

Psilocybin, a naturally occurring psychoactive compound found in certain mushrooms, has significant effects on the brain's default mode network (DMN).[4] The DMN is a network of brain regions that are active when the mind is at rest and engaged in introspection, self-referential thought, or daydreaming.[4] It plays a crucial role in maintaining an individual's sense of self, or "ego", and is associated with conditions like depression and anxiety when it becomes overactive or rigid.[4]

Research has shown that psilocybin disrupts the usual patterns of activity within the DMN, leading to a state of "ego dissolution", where an individual feels a reduced sense of self and a greater connection to the external world.[4] This altered activity allows for new connections and communication between brain regions that do not typically interact, promoting a state of cognitive flexibility.[4] Such changes have been linked to therapeutic benefits, particularly in patients with depression, where an overactive DMN is associated with rumination and negative self-focus.[4]

Psilocybin's modulation of the DMN helps break entrenched patterns of thought and behaviour by reducing its activity and increasing brain network integration.[4] This can lead to insights, shifts in perspective, and improved emotional processing, potentially offering lasting mental health benefits when combined with guided therapy sessions.[4] Studies suggest that these changes can promote long-term improvements in mood and mental

health, supporting its potential as a treatment for depression, anxiety, and other disorders involving the DMN.[4]

Potential for therapeutics

In recent years, psilocybin's therapeutic potential has drawn a lot of attention. Its effectiveness in treating mental health conditions like depression, anxiety and alcohol use disorders has been shown in clinical studies.

Psilocybin may be useful for alcohol use disorder, according to one study. In a 2022 study, 93 individuals with moderate alcohol use disorders were enrolled in psychotherapy plus two psilocybin sessions versus psychotherapy plus a placebo.[5] Over the course of 32 weeks, there were fewer days when the participants in the psilocybin-assisted psychotherapy engaged in heavy drinking, indicating that psilocybin may be beneficial for treating alcohol use disorder.[5] Nonetheless, the majority of study participants accurately identified the therapy they had received, and it's unclear if the psilocybin effect persisted for more than 32 weeks.[5]

The use of psilocybin for anxiety and existential distress in serious medical illnesses such as advanced cancer has been the subject of a small amount of research. According to a 2020 analysis of four small studies involving 117 participants, the majority of whom had life-threatening cancer, psilocybin in combination with psychotherapy may be a safe and useful way to improve quality of life and alleviate symptoms of anxiety, depression, and existential distress.[6] The authors acknowledge that there may have been bias in the conclusions due to factors such as small sample size and health status of the participants, as well as limitations in the study design.[6]

Psilocybin in conjunction with psychotherapy may be beneficial for depression in the short and medium term, according to an increasing amount of research. A 2023 evaluation and analysis of five trials involving 215 depressed individuals discovered that psilocybin therapy along with psychological support could alleviate depressive symptoms for up to five weeks.[7] Although there was insufficient data to make a firm conclusion, it is feasible that the advantages will persist longer than five weeks.[7]

According to a 2023 study involving 104 depressed individuals, psychotherapy aided by a single dose of psilocybin significantly decreased depressive symptoms in eight days, with benefits continuing for six weeks.[8]

Psilocybin has garnered significant interest for its potential therapeutic effects in treating mental health conditions such as depression and anxiety.[5] While psilocybin is generally considered to have a favourable safety profile when used in controlled settings, it is not without risks. One of the primary concerns is the potential for serotonin syndrome, a potentially life-threatening condition caused by excessive serotonin activity in the central nervous system.[6]

This syndrome can occur when psilocybin is combined with other serotonergic agents, leading to symptoms such as agitation, confusion, rapid heart rate, and hyperthermia.[6] Additionally, psilocybin can trigger acute psychotic episodes or exacerbate existing mental health conditions, particularly in individuals with a history of schizophrenia or those in the prodromal phase of the disorder.[7] This risk underscores the importance of thorough psychological screening and the need for administration under professional supervision. Ensuring that contraindications and patient history are carefully evaluated is essential to minimising the risks and enhancing the therapeutic potential of psilocybin.[7]

Psilocybin produces altered states of consciousness that encourage self-reflection and emotional breakthroughs by binding to serotonin receptors in the brain. Clinical research has shown that it can provide patients with terminal illnesses with a sense of acceptance and serenity while also reducing anxiety and depressive symptoms. Furthermore, by assisting patients in reframing their thought processes and behavioural patterns, psilocybin-assisted therapy has demonstrated promise in easing the symptoms of substance use disorders, including alcohol and nicotine addiction. To create standardised treatment protocols and gain a complete understanding of the mechanisms of action and long-term effects of psilocybin, more research is necessary.

Safety of psilocybin

Psilocybin is not thought to be physically addictive and has a comparatively low toxicity profile. But it's important to remember that psilocybin has risks just like any other drug, particularly when used carelessly and without supervision. Unfavourable or difficult side effects that users may encounter include confusion, anxiety, and paranoia.[9] Consequently, it is impossible to exaggerate the significance of using psilocybin in a monitored and controlled environment. An essential component of psilocybin safety is the "set" and "setting". The term "set" describes the psilocybin user's mental state at the moment of ingestion, including their mood, expectations, and underlying psychological state.[9] The term "setting", however, describes the social and physical context in which the experience occurs, encompassing elements like the location, the presence of helpful people (like facilitators or guides), and the sensory elements of the surroundings.[9]

Psilocybin safety has been questioned for a number of reasons:

- One article published in 2022 for palliative care clinicians recommends that individuals take psilocybin only while receiving supervision from a qualified therapist or facilitator.[6] According to the article, the therapist is responsible for overseeing the participant's mental state when they enter the experience, as well as the physical surroundings, personnel, and additional elements surrounding the experience, like music.[6] These are crucial components of safety for psychedelic-assisted therapy.
- People's experiences can be erratic and vary based on their personality, mood, expectations, and environment (such as the presence of a trained facilitator, the type of light and music, and whether the setting is indoors or outdoors), in addition to how much psilocybin they take.[10] Other variables that may impact

the encounter include the user's health, the kind of mushroom, prior exposure to comparable substances, and concurrent use of other medications.[10]

- Unpleasant experiences, sometimes referred to as "bad trips," involving intense fear, perplexity, or panic have been reported by certain individuals.[9]
- High blood pressure and heart rate, headache, nausea, dizziness, exhaustion, restless nights, anxiety, paranoia, psychosis, and hallucinations are some of the negative effects of psilocybin.[9]
- Sleeplessness, elevated anxiety and depression, low mood, low energy, physical discomfort (such as headaches, gastrointestinal symptoms, impaired sense of smell, temperature dysfunction), poor focus and cognitive functioning, and hampered social skills can all result from microdosing on psilocybin.[11]
- People with severe forms of bipolar disorder, borderline personality disorder, schizoaffective disorder, or other psychotic conditions should not take psilocybin.[12,13]

Current views

Psilocybin research is growing quickly as researchers look into possible uses and improve our understanding of the drug's mechanisms of action. Research is being conducted to examine its potential applications in the management of various ailments.

Since many people do not tolerate the current pharmaceutical treatments well and they do not work for everyone, patients need to be given options. The side effects of the current depression medications can include sexual, mood, weight, cognitive, and other issues.[14,15] It frequently takes weeks or months of trying various medications before finding one that works or doesn't work.[15] The side effect profile of psilocybin is much better: mild to moderate transient anxiety and a transient headache that can be relieved with over-the-counter drugs.

Psilocybin has long intrigued scientists due to its profound mind-altering properties and potential therapeutic benefits. In recent years, research into how psilocybin affects the brain has expanded, aiming to unravel the mechanisms behind its influence on perception, cognition, and mental health. A groundbreaking study led by Dr Nico Dosenbach, an associate professor of neurology at Washington University School of Medicine in St Louis, took this exploration a step further. Dr Nico Dosenbach had done dozens of brain scans on himself in the name of science. However, this was the first time he'd taken something that defied logic before entering an MRI machine.[16] It was his colleagues who had given Dosenbach a high dose of psilocybin.[16] All of this was done as part of a study published in *Nature* to demonstrate how psilocybin causes its mind-altering effects.[16] "It was definitely an awesome experience for a neuroscientist. It's really fascinating how your brain can fall apart — because how something breaks tells you how something works", he stated.[16] His findings indicated that psilocybin «desynchronized» the *brain*, *but* also produced subtle, lasting effects in boosting plasticity.[16]

All things considered, the study has offered us a promising look at the science underlying the mystique of magic mushrooms and serves as an example of what can be accomplished by the renewed interest in psychedelic medicine. Figure 1 depicts that the depressed brain encourages rigid thought patterns that impact well-being. This can be viewed as a "landscape" with deep wells that make it difficult for patients to "move between" different thoughts and perspectives.[17] Figure 2 indicates psilocybin's' mechanism of action.

Conclusion

The exploration of psilocybin's therapeutic potential has brought renewed attention to the power of natural compounds in addressing mental health challenges. With a rich history of cultural and ceremonial use, psilocybin has transitioned from a traditional context to being a focal point of modern scientific inquiry. Research has demonstrated its promise in treating various mental health conditions, including depression, anxiety, and substance

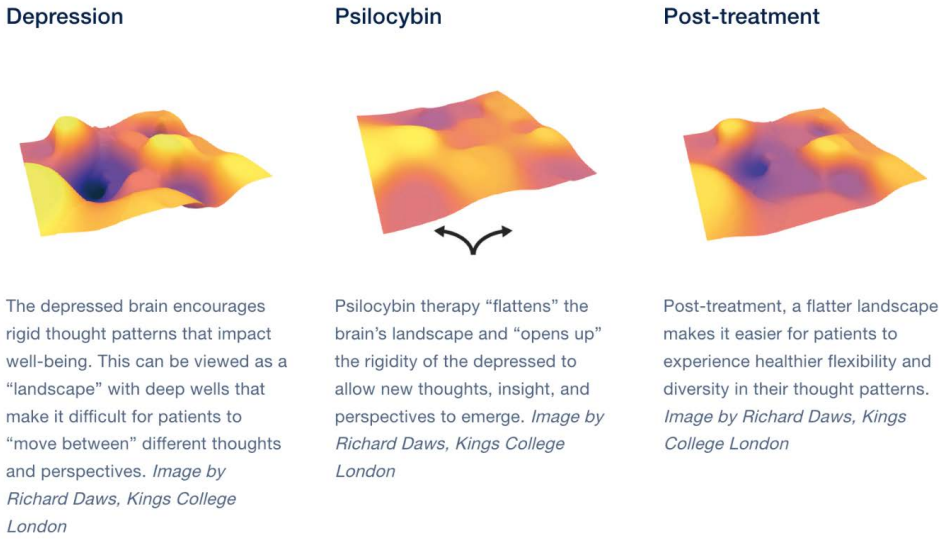

Figure 1: Depiction of the rigid thought patterns of depressed patients that change post-treatment with psilocybin. [17] *Credit: Richard Daws, Kings College London*

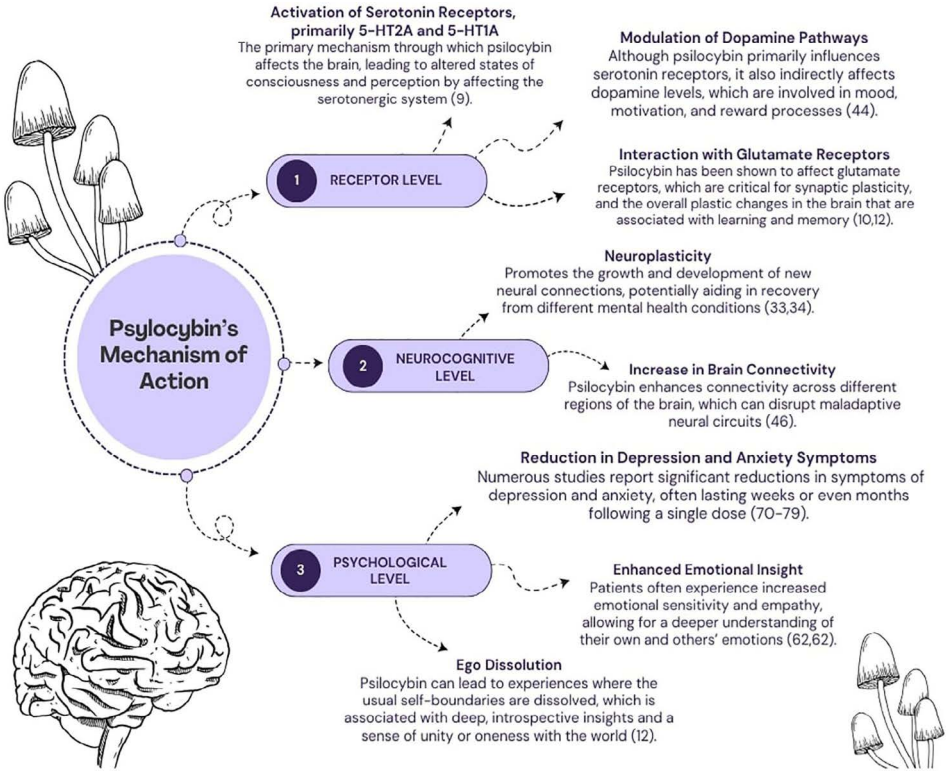

Figure 2: A diagram depicting several mechanisms of psilocybin's action. The effects of its action are categorised into three levels: (1) pharmacological, (2) neurocognitive, (3) psychological.[18]

use disorders. Clinical trials have shown that, when administered in controlled settings with professional oversight, psilocybin can facilitate profound psychological experiences that contribute to significant symptom relief and personal growth.

Despite these promising findings, the path to integrating psilocybin into mainstream treatment is complex. Concerns related to safety, optimal treatment protocols, long-term effects, and the potential for misuse must be addressed through rigorous, ongoing research. Additionally, the legal status of psilocybin remains a barrier in many parts of the world, necessitating policy changes informed by scientific evidence to ensure safe and ethical use.

In conclusion, psilocybin holds considerable potential to revolutionise the treatment of mental health disorders, offering an alternative for patients unresponsive to conventional therapies. Future research and evolving public perception may pave the way for psilocybin to become a standard component of psychiatric care. Continued exploration, robust clinical trials, and interdisciplinary collaboration will be essential in transforming this potential into widespread clinical application.

Conflict of interest

The author declares no conflict of interest.

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The adequacy and safety of anticoagulation therapy with warfarin at the medical outpatient clinic of an academic hospital

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Abstract

Introduction: Warfarin remains the mainstay long-term oral anticoagulant in the public sector; newer agents are available only in special situations such as in cases of warfarin allergy. Regular monitoring of the international normalised ratio (INR) is the gold standard for assessing the adequacy of treatment with warfarin. INR determinations are inconvenient and expensive for patients in resource-limited settings as they involve frequent travel. Our hospital serves predominantly indigent communities who might find it hard to adhere to these regular checks, placing them at risk for the complications of over-or-under anticoagulation.

Objective: The primary purpose of the study was to determine the adequacy of anticoagulation among patients on warfarin for the prevention or treatment of various thrombo-embolic phenomena.

Study setting: The INR clinic of Dr George Mukhari Academic Hospital (DGMAH).

Study design: The study was cross-sectional and informed consent was obtained from all participants. The study consisted of both record reviews and face-to-face interviews. The Rosendaal linear interpolation method was used to determe the adequacy of anticoagulation.

Results: A total of 167 patients were studied. The mean age of the study population was 59.2 ± 15.30. The most common indication for anticoagulation was venous thrombo-embolism. In total, only 54 patients (32.4%) were adequately anticoagulated at the time of this assessment (TTR > 60%). The rate of thrombo-embolic events was 2.96 per 100 patient-years, while the rate of bleeding was 6.95 per 100 patient-years.

Conclusion: Most patients were sub-optimally anticoagulated. A few suffered complications related to both inadequate anticoagulation and over-anticoagulation. Additional studies of this nature are required as they may help inform the discussions between healthcare providers and funders about the necessity of access to alternative anticoagulants for appropriate patient groups.

Keywords: anticoagulation therapy, medical outpatient clinic

https://doi.org/10.36303/SAPJ.0963

Introduction

Anticoagulant therapy has significant clinical benefits when the indication is appropriate and therapy is carefully managed.[1,2] When poorly managed, death and/or significant disability can result from embolic as well as bleeding complications.[3]

Warfarin has been widely used for outpatient anticoagulation therapy.[4] It remains the most commonly used oral anticoagulant for both primary and secondary prevention of thromboembolism in South Africa.[5] Its effectiveness in preventing thrombo-embolic episodes is well established.[6] It remains an important anticoagulant, especially in resource-limited settings.

However, warfarin is challenging for both patients and healthcare providers to manage. It requires frequent monitoring and dosing adjustments so that it remains in the therapeutic range to prevent thrombosis from subtherapeutic INR or haemorrhagic complications from supratherapeutic INR. In addition, it has multiple drug–drug, drug–food, and drug–disease state interactions that patients and clinicians may not be familiar with.[7]

Warfarin has delayed anticoagulant effect, often necessitating bridging therapy. It has a narrow therapeutic index.[8,9]

The problems encountered with the use of warfarin have led to the development of easy-to-manage and safer agents. These newer oral anticoagulants, e.g. thrombin and factor Xa inhibitors, have been compared to warfarin and have been found to have a better risk–benefit ratio.[6,10,11] In addition, they have predictable pharmacokinetics, eliminating the need for monitoring. The exception remains their use in patients with prosthetic heart valves, where they are currently contraindicated, and their role in valvular atrial fibrillation (AF) remains unclear.[12,13] Approriate dose adjustment is necessary in patients with chronic kidney disease (CKD), when the estimated glomerular filtration rate (eGFR) is less than 30mℓ/min.[14]

Aim

To determine the adequacy and safety of anticoagulant therapy with warfarin at the medical outpatient clinic of Dr George Mukhari

Academic Hospital (DGMAH).

Objectives

1. To determine the time spent in therapeutic range (TTR) using the Rosendaal interpolation method. Patient who spent 60% or more of the time in the 2–3 INR range were considered adequately anticoagulated.
2. To determine the presence and frequency of thrombotic and/or bleeding episodes while on treatment through both record reviews and interviews.

Methodology

Study setting

The INR clinic of DGMAH.

Study design and population

This study was cross-sectional and consisted of appropriate patients (≥ 18 years) who were agreeable to being interviewed for the study. The study included both face-to-face interviews and record reviews. Informed consent was obtained. Participants had to have had at least three consecutive INR measurements and only the latest three INR measurements were considered. The number of INR values in the range 2 to 3 (both values included) were counted for each individual patient and expressed as a percentage of 3. Patients with concomittant uncontrolled congestive heart failure (CHF), liver disease (transaminases more than five times upper limit of normal) and those with severe thrombocytopaenia were excluded. These patients were excluded as these disease states increase the risk of bleeding which would confound the interpretation of bleeding as a complication of warfarin therapy. In addition, hepatic congestion from CHF and liver disease can render the INR abnormal.

Sample size

Based on findings from a published study conducted in Israel, the anticipated percentage of warfarin-treated patients reaching the therapeutic INR range was projected to be 43.0%. The study was powered at 85% and with a two-sided alpha error limit of 0.05, the statistically derived sample size was 167 patients.

Data collection

The following data were obtained from all patients: demographics; comorbidities; primary indication for warfarin therapy; duration of warfarin treatment at the time of the interview; and current or previous bleeding events/thrombo-embolic episodes while on treatment. The bleeding episodes were classified as major if they were intracranial or required transfusion. The information relating to the estimation of the TTR, which required at least three INR measurements, was obtained from the patients' records.

Data analysis

The statistical analysis was descriptive and all the procedures were performed on SAS (SAS Institute Inc, Cary, NC, USA), release 9.4. Categorical variables were summed up using percentages and non-categorical variables summarised as means and standard deviations. TTR was determined using Rosendaal's method of linear interpolation (Rosendaal et al, 1993), with a target therapeutic range of 2 to 3.

Ethical considerations

Permission to conduct the study was requested and obtained from the research and ethics committee of Sefako Makgatho Health Sciences University and DGMAH authorities prior to commencement of the study (SMREC/M/244/202:PG). Informed consent to participate in the study was obtained from all patients. The data collection tool was used without patients' identifying details and kept safe by the researchers. Data captured onto the researcher's personal computer was password protected. Patient interviews were confidential and undertaken in a private room.

Results

A total of 167 patients were studied. The mean age of the group was 59.2 ± 15.30. The age distribution was slightly negatively skewed, with 55.0% of the patients 60 years of age or older (see Figure 1).

Comorbidities

Hypertension was the most common comorbidity, constituting 74% (n = 124) of the study population. Other comorbidities included diabetes mellitus (16%; n = 27), controlled congestive cardiac failure 15.5% (n = 26), dyslipidaemia 0.03% (n = 5), CKD 0.2% (n = 3), hypothyroidism 0.05% (n = 1), hyperthyroidism 0.01% (n = 2), HIV 0.13% (n = 21), underlying malignancy 0.04% (n = 6: 1 cervical, 1 breast, 1 colon and 3 prostate), protein C and S deficiency 0.017% (n = 3) and anti-phopholipid syndrome 0.012% (n = 2). Some patients had multiple comorbidities.

Several patients (38.3%; n = *64*)) were taking medication that could potentialy interact with warfarin, such as statins (n = 50), aspirin (n = 3), Epilim (n = 1), rifampicin (n = 1), diclofenac (n = 1), β-blockers (n = 37), carbamazepine (n = 1), carbimazole (n = 1), spironolactone (n = 42) and antiretroviral therapy (ARV) (n = 21).

Indications for treatment

Pulmonary embolism was the most common indication for warfarin therapy in this cohort, making up 50.9% (n = 89) of the

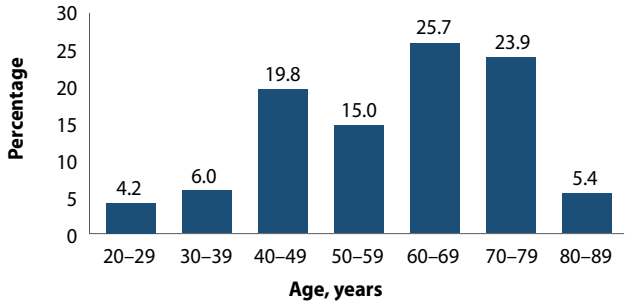

Figure 1: Age distribution
Most (121; 72.5%) of the patients were females

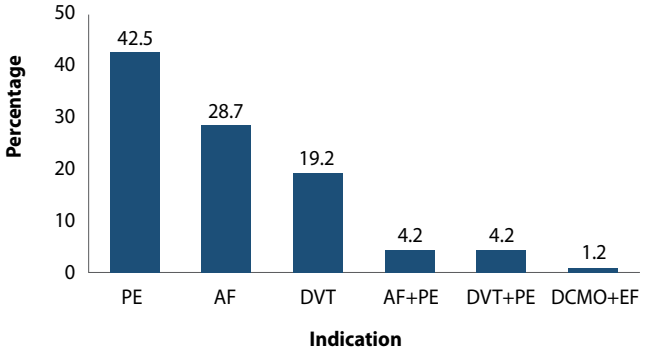

Figure 2: Indications for anticoagulation: PE = pulmonary embolism, AF = atrial fibrillation, DVT = deep vein thrombosis, DCMO = dilated cardiomyopathy.

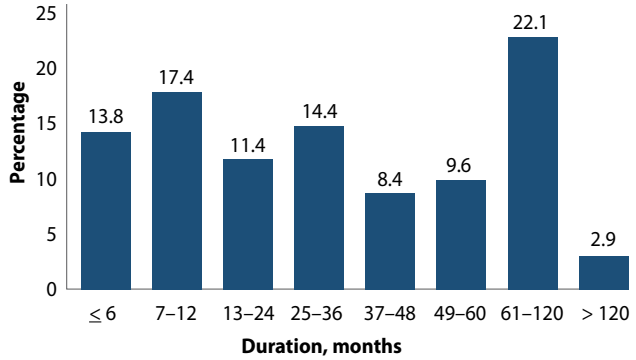

Figure 3: Duration of warfarin therapy

indications. Figure 2 is a summary of the other conditions.

Point-of-care INR testing was the method used to determine the INR in all the cases and evaluations were carried out monthly for all patients.

Twenty-five per cent of the patients had been on warfarin for more than five years. Figure 3 depicts a summary of the length of time that the patients had been on warfarin therapy.

Complications

In total, 40 (24.0%) of the patients experienced a bleeding complication, giving a rate of bleeding of 6.95 per 100 patient-years. In 28 (16.8%) patients, the bleeding was classified as minor.

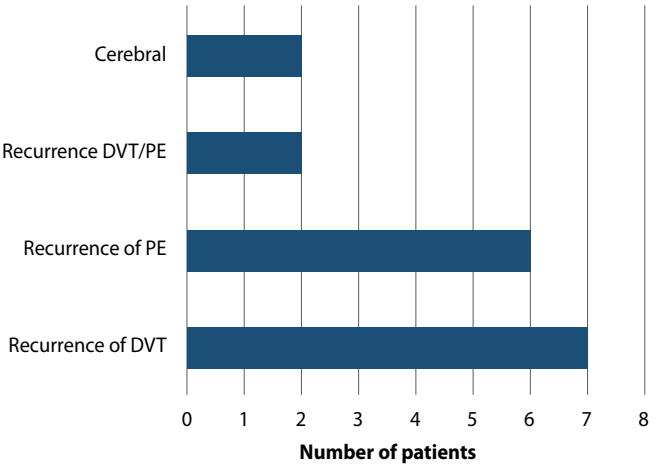

Figure 4: Thrombo-embolic events

Major bleeding occurred in 12 patients (7.2%).

Seventeen (10.2%) patients experienced a thrombo-embolic event. The rate of thrombo-embolic events was 2.96 per 100 patient-years. Figure 4 provides a summary of the thrombo-embolic events encountered within the study population.

A total of 501 INRs were performed. The number of INR values < 2.0 (subtherapeutic) during the study period was 222 (44.3%) and those > 3.0 (supratherapeutic) was 99 (19.8%). A summary of the performance across all patients in the study is reflected in Table I.

Table I: Time in the therapeutic range (TTR)

TTR	Number (%) of patients
0	51 (30.5)
33.3	62 (37.1)
67.7	44 (26.4)
100	10 (6.0)
Total	167 (100)

In total, 44 + 10 = 54 (32.4%) of the patients in the study were adequately anticoagulated with a TTR > 60% during the study period.

A comparison of the proportion of patients who spent TTR by age and gender was performed. The distribution of TTR outcomes for males and females did not differ significantly ($p = 0.522$, Fisher 's Exact test). The distribution of TTR outcomes for patients in the age categories < 50 years vs ≥ 50 yeas did not differ significantly ($p = 0.993$, Fisher's Exact test).

Discussion

The study supports previous findings indicating poor attainment of therapeutic INR among patients on warfarin in a real-world situation.[15,16] The proportion of patients in therapeutic range during the study period, defined as the TTR ≥ 60%, was 32.4%. A meta-analysis of studies looking at anticoagulation control, outcomes and related factors among long-term care patients on warfarin in Africa revealed that 10.4% and 32,3% of patients maintained their TTR within the therapeutic range. Of the studies reviewed, the highest percentage of patients in TTR was 32.25% in Tunisia and the lowest was 10% in Namibia.[17] Studies done in the Western Cape assessing INR control in patients on warfarin therapy did not show dissimilar results. Prinsloo et al.[18] found only 17.8% of their patients (attendees of eight non-metropolitan clinics) were in TTR, defined as TTR > or equivalent to 65%.The median (IQR) TTR was 37.2% (20.2–58.8).

Another study by Ebrahim et al.[15] in Cape Town, South Africa, which found only 25.1% of their study population achieved good INR control, despite regular INR monitoring, also defined as TTR and proportion of TTR more or equivalent to 65%.In the study by Sonuga and colleagues, the results were slightly better, with

48.5% of their study population able to achieve target therapeutic range.[19]

Complications

Bleeding as a complication occurred in 24.0% of the cases in this study (6.95 per 100 patient-years). Eight out of 50 patients who were on concomitant statins experienced a bleeding complication. Just over 10% (10.2%) of the study participants experienced a form of thrombotic or embolic complication (2.96 per 100 patient-years). Thrombotic events while on warfarin were experienced by only 2.2% of the cases, with haemorrhagic adverse events occurring in 14% of the study population in the study by Sonuga and colleagues.[19] Most of the patients with bleeding events in the latter study were on concurrent other medication with potential drug–drug interactions with warfarin.

A Tunisian study of patients in AF on warfarin found a thrombo-embolic incidence of 2.8%; the incidence of bleeding was 3.9%.[20]

A study in Botswana found rates of major bleeding and thrombo-embolic complications to be 1.5 per 100 person-years and 2.80 per 100 person-years respectively.[21]

Unlike the Western Cape studies in which AF and valvular heart disease were the more common reasons for anticoagulation with warfarin, venous thrombo-embolism was the most common indication in this study.[15,18,19] This difference is to be viewed with caution as this study was restricted to the attendees at the general medical outpatient clinic. Most cases of AF and all those with valvular heart disease are normally looked after at the cardiology outpatient clinic in our institution.

Comorbidities

Much like the study by Sonuga and colleagues, hypertension was the most common comorbidity among these patients.[19] In addition, the age distribution of the study population had a slight negative skew, with more than 55% of the patients above the age of 60 years.

Previous researchers looked at the relationship between various demographic and clinical factors and TTR. Among the factors associated with poor INR control were younger age (< 50 years of age), female gender, poor socioeconomic status, concurrent use of medication with potential for interaction with warfarin, and the presence of significant medical comorbidities (CCF, malignancy, chronic liver or kidney disease).[22]

The mean (SD) age of the study population was 59.2 ± 15.30. Previous studies suggested a bigger proportion of older patients (60 years and above) achieving the target therapeutic range compared to younger patients; defined as below 50 years of age.[18,19] In some studies, this was, unfortunately, accompanied by more bleeding complications.[19] Using 50 years of age as cut off between the young and the old, this study could not detect a statistically significant difference in bleeding risk between the two age groups.

The majority of patients enrolled in this study were female. This is similar to other studies.[15, 21] It remains unexplained why fewer male patients were enrolled in the study.

Previous studies have suggested that males achieve better anticoagulation outcomes compared to females.[18,19] This study was not able to confirm those findings.

Drug–drug interactions

It is a known fact that drug–drug interactions between warfarin and other simultaneously administered medication could adversely affect the level of anticoagulation.[23] This study did not assess the impact of known drug interactions with warfarin but a number of observations were made. Sixteen per cent (8/50) of the patients on a statin developed a bleeding complication. The potential interaction of statins and warfarin has been well described with minimal elevations of the INR of unclear clinical significance.[24,25]

Of the 21 patients on ART, four developed bleeds and three (14%) sustained a thrombo-embolic complication. One of the three patients was also on anti-tuberculosis (TB) treatment. South Africa has the largest antiretroviral therapy (ART) programme in the world and TB is endemic in the country.[26] It is, therefore, worth remembering that ART and anti-TB treatment can be a significant source of potential drug–drug interaction with warfarin.

Conclusion

Warfarin therapy is likely to remain an important anticoagulant option in resource-limited settings. The study provides good evidence of periods of inadequate anticoagulation control among patients on warfarin attending our INR clinic. The findings from this study may help inform the discussions between healthcare providers and funders regarding accessibility to alternative agents but further studies are necessary. A number of direct oral anticoagulants are available in South Africa e.g. rivaroxaban, dabigatran and apixaban. As a class, these agents have been shown to be non-inferior and, in some cases, superior to warfarin therapy in patients requiring anticoagulation, with significantly better safety profiles. Care needs to be taken when prescribing warfarin to patients with comorbidities as warfarin interacts with many other drugs.

Study limitations

Data on diet and supplements that could affect anticoagulation control were not collected. Data on compliance with warfarin usage, dosing recommendations or adherence to dose adjustment recommendations were not collected. Other patient populations, such as cases with prosthetic heart valves and cases of valvular AF who receive care in the specialised cardiology clinic were not studied.

Conflict of interest

The authors have no conflict of interest to declare.

Funding source

No funding sources were involved in the manuscript at all stages.

Ethical approval

Permission to conduct the study was requested and obtained from the research and ethics committee of Sefako Makgatho Health Sciences University and DGMAH authorities prior to commencement of the study (SMREC/M/244/202:PG).

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Supplementary file available online

SAAHIP Presidential Annual Report 2024/2025

Nhlanhla G Mafarafara
President, SAAHIP

Introduction

I am pleased to present the President's report to our members for the 2024/2025 term of office. For the pharmacy profession, this period was one that we will remember for many years. It has presented so many opportunities, moments to snapshot and achieve, and engagements that will somewhat buy the future. The year 2024 began with an outcry from hundreds of young pharmacists facing unemployment and closed the same way to usher 2025. The unemployment of pharmacists is a real challenge and requires long-term thinking, collaboration to find fitting solutions, and a realistic mindset. South Africa's economy, on the one hand, is struggling to grow to the level that is sufficient for all citizens' needs, and on the other, public health challenges are looming, requiring more pharmacists on the ground to meet the high patient volumes. Taking from some of the discussions from the International Pharmaceutical Federation (FIP) World Congress that took place on 1–4 September 2024 in Cape Town, the new roles that pharmacists can play means the country needs more pharmacists to meet the demand.

We are all proud that the Pharmaceutical Society of South Africa (PSSA) successfully hosted what was reported as the second-biggest FIP congress in numbers. Many pharmacists and, especially, members of the associations took part in different activities during FIP. And now, as we present this report, we are preparing for SAAHIP's annual conference in April. A meeting that many hospital pharmacists always look forward to attending. This year's theme "Future Ready 5.0," is conceptualised to bring hospital pharmacists around the table to discuss what they did and will do to make the future of pharmacy desirable and achievable. It is a conference that we believe will document, among many things, some of the emerging opportunities as well as strategies to leverage them.

As you read through the report, I will update members on the new branch executive committee members, membership growth, branch activities, international collaborations, FIP highlights, and some other exciting opportunities for the future.

Nhlanhla G Mafarafara

National Executive Committee

The National Executive Committee remained intact. Table I below introduces to you the current executive committee. The presidential term of office comes to an end on 12 April 2025, during the 68th Annual General Meeting. We welcome the new branch chairpersons who were elected during the October/November 2024 season of Branch AGMs. The new branch chairpersons are Samke Mathibela (KZNC), Handsome Mashego (Mpumalanga), and Geziena Kruger-Swanepoel (NC/FS). We also want to appreciate the work done by the previous branch chairpersons, Thandeka Njapha (KZNC), Ndumiso Mdluli (Mpumalanga), and Rumbidzai Murahwa (NC/FS). Their work forms part of the pillars on which the continued work of the branch stands.

Over the year, we were joined by Joggie Hattingh, Thanushya Pillaye, Lorraine Osman and Lourens van der Merwe who gave us valuable support, not only in this term but also in the two years running. The committee received administrative support from the PSSA's office through Anri Hornsveld, especially at the secretarial desk.

Table I: National Executive Committee

President	Nhlanhla G. Mafarafara	**Coopted Members**	Thanushya Pillaye
Vice President	Dr Seshnee Moodley		Joggie Hattingh
National Secretary	Caroline De Beer		Lorraine Osman
Honorary Treasurer	Nomfundo Zwane		Lourens van der Merwe
Past President	Shawn Zeelie	**Office Support**	Anri Hornsveld
Branch Chairpersons			
Eastern Cape	Robyn Wates	**Northern Cape/Free State**	Geziena Kruger-Swanepoel
KZN Coastal	Samke Mathibela	**Northern Gauteng**	Kesentseng Mahlaba
KZN Inland	Vusi Dlamini	**Northwest**	Ignatius Muller
Limpopo	Salome Makofane	**Southern Gauteng**	Rashmi Gosai
Mpumalanga	Handsome Mashego	**Western Cape**	Brent Sin Hidge

Figure 1: Members of the National Executive Committee at FIP World Congress in Cape Town. Back row (from left) Thandeka Njapha, Seshnee Moodley, Thanushya Pillaye, Rashmi Gosai, Nhlanhla Mafarafara, Vusi Dlamini, Ignatius Muller & Caroline De Beer. Front row (from left) Shawn Zeelie, Kesentseng Mahlaba, Robyn Wates, Brent Sin Hidge & Joggie Hattingh

Membership

SAAHIP membership has consistently grown from 2021 to date. Western Cape, KZN Coastal, and Southern Gauteng remain our top three biggest branches with membership exceeding 500. KZN Inland, Limpopo, and Mpumalanga reported the highest growth over the five reporting periods. KZN Inland and Limpopo doubled their membership by 53.62% and 51.3% respectively since 2021. Limpopo and Northern Gauteng achieved double-digit growth between March 2024 and January 2025.[a] Table II and Figure 2 show the membership changes from March 2021 to date in both numbers and graphical form.

Notably, four branches recorded an exodus of members with Eastern Cape recording the highest membership reduction over the same year. While there is a slight decline in the membership number, the overall change is positive due to the work done by the branches to engage members and host CPDs, membership drives, and participation in conferences.

Branch Activities

Continuous Professional Development

Our branches have been taking the lead in representing the ideals of SAAHIP almost across the board. However, there have been functionality challenges in Northern Cape/Free State. North West and Limpopo also needed intervention in working through their focus areas. The Vice President, Dr Seshnee Moodley, was tasked with the responsibility of supporting the branches that were struggling to maintain visibility and build capacity. Notably, there is some good action in the Northern Cape/Free State branch, and plans are in place under the new chairperson to help the branch reach full functionality.

All the branches have had several CPDs, recruitment drives, professional engagement with other stakeholders as well as consistent social media presence. I want to draw your attention to some of the activities that happened within the reporting period.

- Collaboration with YPG during the sector CPD for Young Pharmacists as part of their ongoing mentorship programme. SAAHIP was represented by the Western Cape branch Chairperson, Brent Sin Hidge. He presented about SAAHIP and hospital pharmacy together with the branch's former chairperson, Paul Voigt.
- Branch visibility campaigns have been ongoing. Each month the Membership, Marketing, and Branding FA team took notice of the health calendar events and put a spotlight on key messages that were shared through social media. The branch also ran campaigns and marketing/promotional material on social media throughout all the branches. Their work ensures that there is consistent messaging, branch visibility, targeted engagement, marketing of CPD events, AGMs, and branch conferences, and scrutinised social

Table II: SAAHIP membership report

Branch	AGM 2021	AGM 2022	AGM 2023	AGM 2024	Jan-25	% Growth (March 2024 to January 2025)	% Growth (March 2021 to September 2024)
Northern Gauteng	238	260	254	282	320	11,9%	25,63%
Southern Gauteng	390	373	440	458	501	8,6%	22,16%
Mpumalanga	102	124	149	160	169	5,3%	39,64%
North West	114	136	158	178	175	-1,7%	34,86%
Free State/Northern Cape	133	136	149	169	187	9,6%	28,88%
Eastern Cape	273	293	324	415	379	-9,5%	27,97%
Western Cape	473	517	577	585	612	4,4%	22,71%
KZN Coastal	354	421	422	529	523	-1,1%	32,31%
KZN Inland	141	236	336	323	304	-6,3%	53,62%
Limpopo	150	171	183	266	308	13,6%	51,30%
Non-resident	3	3	3	3	2	3,2%	31,95%
Total	**2 368**	**2 667**	**3 141**	**3 368**	**3 480**	**3,5%**	**33,73%**

[a] The total membership is reported as 27 January 2025. The numbers may change per branch or the entire sector between February and March 2025 as some members migrate between branches and sectors, i.e. such as changes that occur when Community Service Pharmacists get permanent employment in other provinces or sectors outside their current registered sector or province.

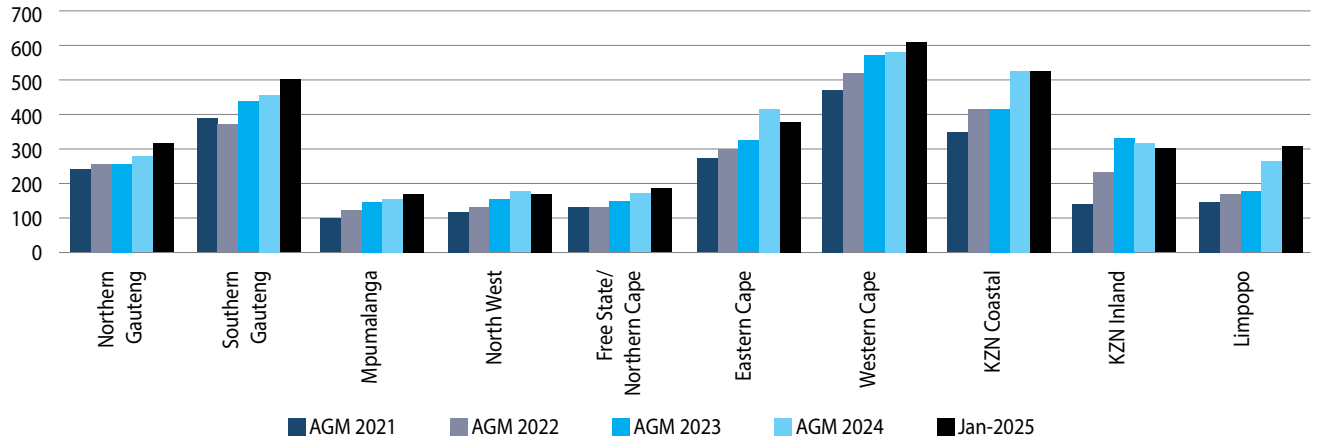

Figure 2: SAAHIP Membership changes from March 2021 to January 2025 showing status reported during the AGMs

media posts. Branches are urged to utilise the team to ensure that their messaging is always consistent with SAAHIP ideals. All the posts are guided by the Social Media policy that was developed in 2023/24. Similarly, the PSSA also concluded a more consolidated social media engagement policy and posting guidelines to ensure that the media presence of the Society and sectors takes place within a structured and guided manner.

- Other CPDs hosted on virtual platforms and attended by pharmacists from all provinces are listed in Table III. The CPDs featured in this report are not exhaustive of what transpired in the branches. However, the topics included are those that were shared nationally.
  These CPD sessions have played a critical role in increasing visibility and engagement platforms for members.

Focus Areas

There was very little progress concerning focus areas. The Eastern Cape, Southern Gauteng, KZN Coastal and KZN Inland have, however, worked hard this year. The Eastern Cape is responsible for Membership, Media, and Branding, and has kept all branches busy with social media engagement. We believe that this, combined with branch CPDs helped increase the membership. The KZN branches have lifted the banner of SAAHIP. The CPDs by both branches are in alignment with their focus areas, for example, KZN Coastal hosted a CPD on quality in healthcare, in line with their focus area: Ensuring quality of healthcare and KZN Inland which is responsible for "ensuring access to medicines" hosted a CPD on Supply Chain.

The actual output of the Focus Areas is not as anticipated, while they are still very relevant, there may be a need to change the method of delivery. This may include the consideration of establishing expert advisory teams to look at the focus areas and other emerging priority pharmaceutical services areas.

FIP 2024

One of the highlights of 2024 was attending and participating in the FIP 2024 World Congress. The theme was Innovating for the future of healthcare. SAAHIP was well represented in different

Table III: CPD topics hosted and presented by SAAHIP branches in 2024/25

Topic	Branch
Virtual CPD Sessions	
Winning the fight against malaria	KZN Coastal
Current Malaria Treatment Protocols	Mpumalanga
Pharmacovigilance	Mpumalanga
Rifampicin Resistant TB regimens	Mpumalanga
CSP preparatory workshop	Mpumalanga
Pharmacist Intern CPD Series (6 virtual sessions)	Mpumalanga
Career Positioning webinar (CV, Job interviews skills and LinkedIn profile optimisation)	Mpumalanga
Specialising in Pharmacy in South Africa: Exploring the pros, cons and career impact	Limpopo
Pharmaceutical Supply Chain in the private sector	KZN Inland
Quality in healthcare, (part 1): quality, health standards and accreditation	KZN Coastal
NHI Debate	Western Cape
Physical Sessions	
Let's talk about vaccines	North West
Let's talk about vaccines	Limpopo
Antimicrobial Stewardship and Implementation of Basel Statements	Mpumalanga
Pharmacist specialist and training	Eastern Cape
"Food for thought" – Diet and medicines, exploring dietary modifications in response to pharmacological treatment	Eastern Cape
Advanced wound care	Eastern Cape
Promoting Mental Health Awareness and Destigmatising Mental Health	Southern Gauteng
CPD collaborations	
Topic	**Collaboration/ hosting partner**
Exploring the difference between public and private sector hospitals and how to adequately prepare yourself for practice in either	YPG
The future pharmacist: navigating leadership development	SAPSF
Limpopo 3rd Annual Wound Care Conference	Limpopo Department of Health
Preparing for Internship	UL / Limpopo Department of Health

sessions. For this report, the NEC wants to acknowledge the individual members of SAAHIP who in their capacity as pharmacists, shared their work during Congress. Their work solidifies the contribution of practising pharmacists to evidence-based pharmacy practice fitting international standards.

We want to acknowledge the pharmacists and members of the association who presented during the FIP congress such as podium presentations from Kristien Schutte, former SAAHIP National Secretary (who was also nominated for best oral presenter) for her presentation "Improvement in Pharmacist initiated antimicrobial stewardship interventions following the implementation of a customised digital solution"; Dr Mcengeli Sibanda – "An integrated immunization program for the elderly in South Africa: expert and stakeholders views"; Brent Sin Hidge – "Pharmacy in South Africa, opening session"; Prof Renier Coetzee – "Pharmacy in South Africa, opening session" and "Antimicrobial Resistance: Pharmaceuticals and the Environment"' On 3 September, the SAAHIP President presented on the "use of the Basel Statements in South Africa" during the Basel Statements in Africa Session and shared the session with FIP-HPS Vice President for Africa, Mujahid Valji.

Other pharmacists who were the finalists for the Hospital Pharmacy Section Best Poster Presentation Award 2024 are:

- Maletjie Griesel, poster title: A South African model for reducing Specialized high-cost medication rejections: Clinical Pharmacist led interventions.
- Mpho Mogale Sylvester, poster title: Demand planning and forecasting to improve medicine availability in Limpopo Province, South Africa-operational research.
- Martine Vorster, poster title: Integrating self-reported adherence with clinical data in patients receiving antiretroviral therapy in a public sector hospital in North West Province, South Africa.

From the SAAHIP members who participated in the FIP presentations, there was a total of 49 different inputs made by individual members which included 22 poster presentations and 6 oral presentations in the hospital section as well as other presentations in plenary or sessions.

On 1 September, many of our members participated in the Basel Statements updates to develop an application and educational framework for the procurement statements. The workshop was attended by over 230 pharmacists from all over the world, many of whom were practising in South Africa. The outcomes of the workshop will be released by FIP in due course.

Pharmacy Month 2024

September is Pharmacy Month in South Africa. This year's theme was: Let's talk about vaccines. Pharmacists from all over the country partnered and collaborated with different stakeholders to promote the importance of vaccines and vaccination. They also engaged in other charitable activities, health promotion activities as well as CPDs. SAAHIP Northern Gauteng with the PSSA went on a vaccination campaign that promoted not only vaccines and vaccination but showed the diverse skills and expanded the role pharmacists play in administering vaccines. The branch in partnership with Sefako

Figure 3: SAAHIP Cape Western Province: Brent Sin Hidge during the Morning Expresso Show on SABC 3

Makgatho Health Sciences University (SMU), SMU Association of Pharmacy Students, and TUT Association of Pharmacy Students visited various communities to vaccinate children and offer other primary healthcare services. The campaign was a resounding success. A total of 800 community members received different services such as health screening, family planning, cancer screening, and HIV testing. They administered 400 influenza vaccines, and 160 children received missed scheduled vaccines, deworming agents, and vitamin A supplements. Western Cape branch chairperson Brent Sin Hidge represented SAAHIP at SABC 3's Morning Expresso show, where he talked about pharmacists' key role in healthcare, especially vaccination. He used the Rubik's cube to explain herd immunity in an effortless, practical way.

Conference 2025

Among the many exciting things happening at SAAHIP, is the Annual Conference. The conference will take place with the 68th Annual General Meeting (AGM) from 10–12 April 2025. The theme is **FUTURE READY 5.0: *Empowering Hospital pharmacists for tomorrow's healthcare revolution.*** This conference aims at looking into what the future of South African Hospital Pharmacy practice looks like.

- Precision medicine and personalised therapies
- Digital health solutions
- Data analytics and predictive modelling
- Telepharmacy and remote patient monitoring
- Pharmacy automation and robotics
- Advanced drug delivery systems
- Ethical and regulatory considerations
- National Health Insurance readiness
- Patient-centred care

What we can guarantee is it's going to be spectacular, mind-stretching, and unforgettable. The conference report will be published with highlights.

Social Responsibility

As of June 2024, branches have donated R44 000.00 towards Operation Smile. This money was handed over to Operation Smile. The donation

covers 8 smiles. We appreciate the voluntary contribution of our members towards making a difference over the years.

Conclusion

Together, we can make SAAHIP stand out. More so, to make hospital pharmacists shine. There is still more work to be done in getting hospital pharmacists to both do and be recognised for the work and value they add to healthcare. It is for this reason that we have taken it upon ourselves to drive the Basel Statement in South Africa as a tool that hospital pharmacists can use to engage with administrators to build a conducive environment for pharmacists. We plan to do Basel Statements workshops in different provinces in 2025, one has already been done in the Mpumalanga Province, and another one is planned for Limpopo Province on 20 June 2025.

We are working on building new collaborations with various stakeholders to help us deliver quality service to our members and contribute to hospital pharmacy in South Africa, including UNICEF in pharmaceutical public health, Universities on Research, EM-Guidance on clinical reference and CPDs for hospital pharmacists on their platform. We also want to build strong relationships with other pharmacy organisations to help strengthen our objectives as well as non-pharmacy organisations to achieve our goal in the MDT practice.

We had four pillars that drove this work, namely:

- Shared vision: to realise a better future, all pharmacists must see the profession as one and put resources, efforts, and commitment toward a common goal.
- Collaboration and partnership: we believe that a three-strand rope is not easily broken.
- Commitment: now more than ever, we need to jointly commit to excellence, continuous learning, renewal, innovation, and documenting and publishing the work that ordinary pharmacists do in their hospitals.
- Embracing innovation: the sector, like any other, is faced with the positive challenge of searching, developing, accepting, and adapting to innovative ways of delivering pharmacy with speed, precision, and quality. We are to embrace automation and robotics, artificial intelligence and machine learning, and develop technologies for flawless data analytics and clinical decision support systems.

I want to thank the National Executive Committee for the continued support and confidence they had in me. The profession trusted me to lead the sector in the last two and half years, and for that, I will forever be indebted to serving our pharmacists, both locally and across the world.

Pharmaceutical Practitioner

South African Association of Community Pharmacists

A status update and view on: Pharmacist Initiated Management of Antiretroviral Therapy (PIMART)

Jameel Kariem

Introduction

Effective and sustainable HIV/AIDS interventions and programmes supplying antiretroviral therapy (ART) are fundamental in reducing human immunodeficiency virus (HIV) infection rates and managing the health of those living with HIV/AIDS.[1] Due to the country's high prevalence of HIV/AIDS, and to address the challenge of expanding the delivery of ART programmes, the National Department of Health (NDOH), felt the public needed to have increased access to ART for the purposes of pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP). It is against this background as well as through the interest of pharmacists and pharmacy associations, that the idea of Pharmacist Initiated Management of Antiretroviral therapy (PIMART) supplementary training and certification was developed. PIMART is also in line with South Africa's public health commitment to reach the World Health Organization (WHO) and Joint United Nations programme on HIV/AIDS (UNAIDS), 95-95-95 targets, and upscaling our interventions to reduce HIV infections. According to the WHO, by 2025, 95% of all people living with HIV should have a diagnosis, 95% of whom should be taking lifesaving ARVs, and 95% of people living with HIV on treatment should achieve a suppressed viral load for the benefit of the person's health and for reducing onward HIV transmission.[2]

Pharmacist Initiated Management of Antiretroviral Therapy (PIMART)

The course was designed as such that PIMART-trained pharmacists, who have completed the required supplementary training, may initiate PrEP, PEP and first-line ART, as well as the initiation of Tuberculosis Preventative Therapy (TPT).[3] This programme is key to increasing access to HIV prevention and treatment, especially for those patients not currently reached by traditional consultations in both the public and private healthcare sectors. It also capacitates the ability of pharmacists to provide HIV care to patients in a pharmacy setting, which is easily accessible. Treating patients in a pharmacy reduces stigma as care is offered in a less traditional clinical environment.

Developing and legislating PIMART

The SAPC is a regulator set up by the Pharmacy Act of 1974 to regulate pharmacists, pharmacy premises, and pharmacy support personnel. It also regulates the education of pharmacists in South Africa, and accreditation of expanded scopes of practice like PIMART. Tasked with this challenge, several prominent experts from the Southern African HIV Clinicians Society (SAHCS), assisted to develop processes and guidelines for a course in PIMART. SAHCS is a membership organisation of healthcare workers with an interest in HIV, promoting evidence-based HIV healthcare through programmes, education, and publications. The individuals involved in designing the PIMART course, were also responsible for designing other SAHCS courses like the Nurse Initiated Management of Antiretroviral Therapy (NIMART), and advanced clinical HIV management courses for doctors and nurses. Upon successful completion of the PIMART course, the Director General (DG) of Health would issue a Section 22A (15) permit, which would then be recorded with the SAPC, allowing a PIMART-trained pharmacist to practice.

In March 2021, the SAPC prepared and published the scope of practice, competency standards, and criteria for the accreditation of PIMART, for comment. PIMART was gazetted for implementation in the Government Gazette on August 13, 2021, through Board Notice 101 of 2021.

About the course

The course, run under the auspices of SAHCS, consists of 21 modules, 24 case studies, a final exam, and a portfolio of evidence of at least 10 client consultations with doctor supervised PIMART prescriptions issued. Students must attend ongoing accredited CPD masterclasses and webinars through SAHCS to support professional development. To be allowed to practice, the intention was that students who have completed the training, must apply for a Section 22(A) 15 Permit from the NDoH and include their portfolio of evidence. This permit would then be lodged with the SAPC.[4]

Defined scope of practice for PIMART-trained pharmacists

One of the underlying principles of the course is the premise that pharmacists, like doctors and nurses, are part of a healthcare team, and that referrals to physicians when needed make for safer and more efficient healthcare. An example of this type of referral would be when a discordant result is obtained during a consultation. The primary qualifying criteria for the treatment of HIV with first-line ART, is that PIMART-trained pharmacists may only treat uncomplicated non-immunocompromised HIV-positive persons. This narrow window of treatment allows for treatment within the scope of practice of a PIMART pharmacist. This defined scope and practice limitations supports the argument for the capability of PIMART-trained pharmacists to practice

as such. In addition, PIMART-trained pharmacists must also be able to take a comprehensive patient history, must be able to check, measure and report outcomes, and must be able to treat and report adverse events and anaphylactic shock. PIMART-trained pharmacists must keep correct records and support confidentiality.

The court case for and against PIMART

However, in 2022, following the publication of the Board Notice for implementation, the Independent Practitioner Association Foundation (IPAF), a voluntary professional association of private medical practitioners, objected to the implementation of PIMART, and took the matter to court. On 14 August 2023, the North Gauteng High Court (Pretoria Division) ruled in favour of the implementation of PIMART. The High Court confirmed that PIMART is a necessary and competently designed intervention programme to support South Africa's efforts in providing access to patients diagnosed with HIV and AIDS. The SAPC argued that it is legally entitled to introduce PIMART, and that PIMART operates entirely within the scope of practice of pharmacists.

The IPAF later appealed against this decision, and on 18 September 2023, leave to appeal to the Supreme Court was granted to IPAF in the Pretoria High Court. According to the judgement, the leave to appeal was granted primarily based on the question of whether the SAPC had the authority to introduce PIMART. The issuance of Section 22A (15) permits in relation to PIMART and the recording of PIMART supplementary training with SAPC was put on hold due to the IPAF's appeal against the High Court's ruling. It is expected that the next court case, challenging this ruling, will be towards the end of 2024, with a judgement expected early in 2025.[5,6]

Consequences of PIMART implementation on hold

The issuance of Section 22A (15) permits in relation to PIMART and the recording of PIMART supplementary training with SAPC is still on hold due to the IPAF's appeal against the High Court's ruling.[7] The interest shown by the number of pharmacists that completed the PIMART training, is also an indication that pharmacists are keen to increase access to care. Currently PIMART-trained pharmacists are unable to consult with patients if called upon and can refer the patient back to a doctor for consultation. This may lead to a missed opportunity to treat.

Outside of PIMART, pharmacists can perform an HIV telemedicine consultation, using a video consultation platform, in consultation with a doctor. This type of consultation is used to treat patients for PrEP, PEP and first line ARTs. Whilst this was not the intention of the scope of PIMART, it does however allow access to those seeking medical care, thereby preventing missed opportunities.

Support for PIMART

PIMART is supported by the SAPC, the Pharmaceutical Society of South Africa (PSSA), the Independent Community Pharmacy Association (ICPA), and the Southern African HIV Clinicians Society (SAHCS). An article published as far back as 2021, in the SAMJ December 2021, Vol. 111, No. 12 journal, by some members from the above organisations, bears testimony to the value that PIMART can bring in reducing our HIV burden of disease, as well as highlighting the suitable qualifications pharmacists have. The authors state that "Pharmacists are trusted healthcare providers, and are critical to ensuring quality, rational use of medicines. PIMART is key to increasing access to PrEP and ART, especially for those patients not currently reached by either the public or the private healthcare sectors."[8]

Opposition to PIMART risks hindering progress in the fight against HIV/AIDS. Concerns by IPAF about conflicting professional roles and quality of care warrants discussion but must be weighed against the depth and quality of training extended by the PIMART course, and its public health benefits. PIMART is designed to complement existing services, and not replace services offered by other health professionals.

Conclusion

Pharmacists are already empowered to provide HIV-related healthcare services through the legislated pharmacist-initiated therapy (PIT) protocol, and the primary care drug therapy (PCDT) qualification. Services that fall within the ambit of PCDT and PIT are PEP for healthcare workers, HIV testing, pregnancy testing and sexual health education. PIMART is a pragmatic evidence-based approach to contribute to reducing the burden of HIV disease. With the high burden of HIV/AIDS disease, and a shortage in healthcare workers, PIMART-trained pharmacists would be an added cadre of health professionals, easing the workload of doctors and nurses working in the HIV environment. Widening the scope of practice of pharmacists with supplementary training to include PrEP, PEP and first-line ART, should be considered a positive move in increasing access to care, especially considering the financially strained environment within the healthcare sector, and the burden of disease presented by HIV/AIDS.

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CPD questionnaire • January/February

Psilocybin: revealing the enigmas of a revolutionary fungus

1.	**Which receptor is primarily responsible for psilocybin's psychoactive effects?**
a	5-HT1A
b	5-HT2A
c	Dopamine D2
d	NMDA
2.	**What was a key finding of Dr. Nico Dosenbach's study on psilocybin and the brain?**
a	Psilocybin activates the default mode network (DMN)
b	Psilocybin only affects serotonin levels in the brain
c	Psilocybin desynchronises brain activity and boosts plasticity
d	Psilocybin permanently alters the brain's structure
3.	**What is a significant risk associated with psilocybin use, particularly when not supervised?**
a	Serotonin syndrome
b	Addiction
c	Permanent psychosis
d	Cardiac arrest
4.	**What is the mechanism behind psilocybin's potential to treat depression, according to research?**
a	Increasing dopamine release in the prefrontal cortex
b	Enhancing GABAergic transmission
c	Reducing activity in the default mode network (DMN)
d	Promoting the synthesis of norepinephrine

The adequacy and safety of anticoagulation therapy with warfarin at the medical outpatient clinic of an academic hospital

5.	**What is the most feared consequence of poorly managed anticoagulant therapy?**
a	Dizziness
b	Nausea and vomiting
c	Headache
d	Bleeding
6.	**The commonest comorbidity in the study was……**
a	Hypertension
b	Malignancy
c	Chronic liver disease
d	Dyslipidaemia
7.	**What test can be used to monitor warfarin?**
a	Full blood count
b	Rosendaal method of linear interpolation
c	Time in therapeutic range
d	International normalised ratio
8.	**The commonest thrombo-embolic complication the patients on warfarin anticoagulant therapy experienced was:**
a	Recurrence of DVT
b	Recurrence of both DVT and PE
c	Cerebrovascular accidents
d	Recurrence of PE

Beyond metformin: the expanding landscape of Type 2 diabetes treatment

9.	**What is the main concern with counterfeit semaglutide products in South Africa?**
a	They have been approved by health authorities but are expensive
b	They lack clinical evidence for diabetes management
c	They pose serious safety risks due to unknown formulations
d	They cause excessive weight gain and hypoglycaemia
10.	**Which of the following drug classes works by inhibiting carbohydrate digestion and absorption in the intestines?**
a	Thiazolidinediones
b	Alpha-glucosidase inhibitors
c	Meglitinides
d	DPP-4 inhibitors
11.	**Which of the following drug classes enhances insulin secretion by inhibiting the enzyme responsible for degrading GLP-1 and GIP?**
a	DPP-4 inhibitors
b	SGLT-2 inhibitors
c	Thiazolidinediones
d	Alpha-glucosidase inhibitors
12.	**What is the primary mechanism of action of metformin in managing Type 2 Diabetes Mellitus?**
a	Stimulating pancreatic β-cell insulin secretion
b	Reducing hepatic glucose production and increasing insulin sensitivity
c	Blocking the sodium-glucose cotransporter in the kidneys
d	Activating glucagon-like peptide-1 (GLP-1) receptors

A review on holistic and pharmacological management of insomnia

13.	**What is the first-line therapy option for insomnia according to clinical guidelines?**
a	Over-the-counter antihistamines
b	Benzodiazepine receptor agonists
c	Cognitive behavioural therapy for insomnia (CBT-I)
d	Melatonin supplements

14.	Which melatonin agonist is indicated for the treatment of sleep-onset insomnia?
a	Ramelteon
b	Diphenhydramine
c	Zolpidem
d	Tasimelteon
15.	**Which of the following options describes the mechanism of action of benzodiazepines in treating insomnia?**
a	Binding to histamine receptors
b	Enhancing GABA affinity for its binding site
c	Blocking orexin receptors
d	Stimulating melatonin receptors
16.	**Which of the following is a common side effect of antihistamines used to treat insomnia?**
a	Dry mouth
b	Weight gain
c	Diarrhoea
d	Increased appetite

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 • November/December 2024

1. b 2. c 3. d 4. b 5. a 6. c 7. b 8. b 9. c 10. b 11. b 12. c 13. b

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].

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FEMIGEL	819875-007	S4	17β-oestradiol	1.5mg/2.5g	Gel in pump	80g
UTROGESTAN	851957-005	S4	Micronised progesterone	100 mg	Capsules	30

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- Improved metabolic parameters
- Increased lean muscle mass
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A40/21.7/0260

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3000765-001	S5	Testosterone	50mg/5g	Gel in sachet	30 per box

References: 1. **Androgel®** Package Insert; 2. Wang C et al.J Clinc Endocrinol Metab 2000;85:2839-2853; 3. Wang C et al.J Clinc Endocril Metab 2004;89:2085-2098; 4. Behre HM et al.Aging Male 2013;15:198-207

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