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Clinician-scientist pathways at the University of the Witwatersrand: A model to grow clinician-scientists in South Africa

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Clinician-scientists are medical professionals who dedicate a substantial proportion of their time to research, while remaining involved in clinical practice. They bridge patient care and scientific enquiry, contributing to mentorship, leadership and teaching. In South Africa (SA), there is a shortage of clinician-scientists despite their proven ability to address local health priorities and inform global best practice. Barriers include lengthy training, lack of institutional support, poorly defined career pathways, reliance on grant funding for salaries, limited protected research time, and salary disparities between clinical and academic posts. This article provides pragmatic advice to aspirant clinician-researchers to navigate these challenges, and underscores the importance of structured institutional support to strengthen clinician-researchers' competitiveness for external funding opportunities and long-term career sustainability. Newly created programmes at the University of the Witwatersrand may guide other SA universities seeking to establish clinician-scientist career pathways.

Keywords: clinician-scientist, clinician-researcher pathways

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Clinical research competence, defined as the ability to design, conduct and interpret clinical research, is essential for the modern clinician and for the translation of scientific evidence into clinical practice. At minimum, clinicians must be able to critique studies and determine when and how to apply research findings to their practice, because inability to do so can impact on clinical outcomes.[1] While all clinicians require foundational research competence, a smaller cadre take on more advanced research roles that integrate sustained scientific enquiry with clinical practice. Clinician-scientists are medical professionals who serve the dual professional roles of dedicating a substantial proportion of their time to research, while remaining involved in clinical practice.[2,3] Furthermore, clinician-scientists contribute to teaching, communication, mentorship, leadership and collaboration,[2-4] and occupy a critical position at the interface of clinical care and research. Patient presentations generate clinically relevant research questions, while research findings can be translated back into practice to improve patient outcomes and transform healthcare.

Despite the importance of clinician-scientists in strengthening evidence-informed healthcare systems, there is a paucity of clinician-scientists in Africa, and they face constrained pathways for development, support and retention. The number of clinician-scientists has also been in the decline in the Global North.[5-7] South Africa (SA) has long faced a deficit of clinician-scientists,[8] despite the recommendations from a consensus study conducted by the Academy of Science of South Africa (ASSAF) in 2009.[8] Accurate data on the current clinician-scientist workforce in SA are

lacking. This persistent gap between national research needs and workforce capacity remains an ongoing concern, as highlighted in the Academy of Medical Sciences 2026 report on strengthening clinical research pathways in low- and middle-income countries (LMICs).[9] The implications are particularly acute in SA, where clinician-scientist-led research directly addresses local health priorities of medical conditions with high prevalence and substantial economic and societal impact. Notably, locally generated clinical research in SA has frequently informed international best practice, underscoring the global competitiveness and relevance of clinician-scientists in SA.

As noted in the ASSAF consensus study,[8] several factors contribute to the depleted clinician-scientist workforce in SA. Clinician-scientists require training in medicine and scientific methods. The prolonged duration of training to become a specialist is a possible deterrent to individuals further developing competencies to becoming clinician-scientists. Furthermore, career pathways for the clinician-scientist remain poorly defined in many academic institutions, and they are often expected to cover their salaries through self-generated grant funding. Medical students and junior clinicians may not perceive becoming a clinician-scientist as a viable or sustainable career pathway owing to the absence of structured programmes, protected research time and visible role models or mentors. In SA, clinicians affiliated with academic institutions are almost all employed by provincial departments of health. In the context of public sector staff shortages, service delivery demands take precedence, leaving limited time for research engagements among mid-career and senior clinicians. Attracting clinicians to full-time academic positions is hindered by the remuneration differential between clinical and academic salaries. In addition, an increasingly competitive grant funding environment makes it challenging for clinician-scientists to establish and sustain research programmes, further discouraging long-term research engagement.

Although there are no clear criteria for an individual to be recognised as a clinician-scientist, such individuals are at the least expected to demonstrate sustained self-initiated research output and ability to secure competitive grant funding, have a consistent and strong publication record, and mentor postgraduate students. In SA, recognition of the standing of scientists also involves independent peer evaluation through the National Research Foundation (NRF) rating process and via university professorial promotion criteria. Clinician-researchers may be variably involved in research and may be described as research aware, research active, or research intensive; alternatively, depending on the stages of their research career, they may be described as early-career/emerging researcher, mid-career researcher, or senior-career or established researcher. Notably, clinician-scientists may undertake research in diverse domains including clinical trials or observational studies, epidemiological studies, laboratory-based investigations, or translational research.

In this article, we outline interventions introduced in the Faculty of Health Sciences (FHS) at the University of the Witwatersrand (Wits) to: (*i*) support clinicians in attaining key research competencies; and (*ii*) promote the sustainable development of a critical mass of clinician-scientists.

Encouraging research competencies at varying clinical stages – the Wits model

Desirable research competencies for clinicians vary depending on their career stage. Clinicians pursuing a career as a clinician-scientist should aim to develop the proposed research competencies alongside their clinical competencies.

Undergraduate medical students

Medical students should be conversant with the fundamentals of research. These include defining a research question, selecting the appropriate study design, understanding the importance of appropriate methodology and the rigorous processes of data collection, applying appropriate statistical methods, and designing methods to support dissemination and communication of research findings. At Wits, these skills are fostered through a mandatory supervised research project undertaken by 3rd-year medical students. While this is the only structured exposure all medical students receive, students receive lectures and are encouraged to interact with established researchers at the institution, and to actively seek out research opportunities. In addition, the formal introduction of an intercalated MB BCh-PhD programme in 2022 was geared towards routing future graduates into considering being a clinician-scientist as a future career pathway.

Interns, community service doctors and medical officers

Academic institutions have no direct oversight role for interns, community service doctors and medical officers. Medical staff working in these public sector positions have a primary role dedicated to direct patient care. Nonetheless, nurturing research competence is critical for front-line healthcare doctors to deliver best care. Not only is the ability to critically evaluate published peer-reviewed research essential for clinical care, but first-hand research engagement also enhances competitiveness for specialist clinical training posts and provides opportunities for employment in research entities. In the absence of a formal association of interns and medical officers with Wits University, the Wits Health Consortium, a wholly owned subsidiary of the university, offers *ad hoc* workshops and mentorship initiatives that allow early-career doctors to formally acquire selected research competencies.

Registrars

During specialty training, clinicians return to the ambit of the academic institution because the Health Professions Council of South Africa requires a research competency for specialist certification. Demonstrating research competency counts towards 30% of the Master of Medicine (MMed) degree. During registrarship, the trainees initially learn and then apply research methodology to conduct formal research studies. However, completion of MMed research studies within the time frame of the clinical specialisation is variable and is hindered by a lack of dedicated research time, which delays specialist registration and career progression.[10,11] Also, lack of funding for data collection and analysis is an additional challenge faced by registrars. At Wits, in addition to research supervisors, MMed students are supported by dedicated academic co-ordinators in each academic clinical department. Research methodology and biostatistics course work is mandatory for MMed students within the first year of registration, which has more recently been complemented by the Wits Graduate Online Learning and Development Programme that offers a suite of research methodology courses for postgraduate students. The FHS at Wits provides financial support for publication costs of research findings, and conference attendance for first-author presentations at local and international conferences.

Specialist consultants, subspecialist fellows and subspecialist consultants

In today's clinical environment, many specialists complete further subspecialist training, thus prolonging the individual's clinical training period further. Many specialists who are interested in pursuing a clinician-scientist career pathway opt to complete further

subspecialist training. Subspecialty fellows and consultants hold joint academic appointments at universities, and should be proficient in interpreting research methodology, including assessing the validity of study designs and analytic approaches. However, unlike specialty training, subspecialty training programmes do not contain compulsory research competency components at Wits. Full-time specialists and subspecialists (either fellows or consultants) are encouraged to be research active and publish their research outputs, often initially as co-authors and then as lead authors. At the time of subspecialist training, the aim is to nurture independent research development often initiated by the individual's clinical research interests, without necessarily being a principal investigator or the main grant holder of large research projects.

Promoting the development of a critical mass of clinician-scientists

Clinician-scientists can emerge from the clinical training continuum at various stages during their medical, specialist and subspecialist training, and therefore have varying levels of clinical expertise. As depicted in the conceptual diagram (Fig. 1), an individual's pathway has an arbitrary entry point (point A). Entry into the pathway is not dependent on chronological age and begins when the individual is research aware. The pathway progresses towards point B, an arbitrary point where the research-intensive phase begins. The pathway is seldom linear and is often characterised by unexpected diversions and pauses. Individuals who temporarily step away from the pathway (blue) may re-enter at the point at which they left. Notably, everyone's trajectory is unique.

Research exposure for medical students should ensure that they are at least research aware but have opportunities to progress to the next steps of a clinician-scientist career, namely becoming research active and then research intensive, acquiring advanced research skills in the process. At a country level, the Bongani Mayosi Netcare PhD fellowship, initiated in 2018/9, revitalised the clinician-scientist agenda, with the vision of training 100 clinician-scientists per year over a 10-year period. At Wits, two flagship programmes and other initiatives have been established to support doctoral training for prospective clinician-scientists, a key strategy for building advanced research capacity.

Doctoral training programmes

The Wits MB BCh-PhD intercalated programme

In addition to the mandatory research project undertaken by all medical students, eligible MB BCh students can pursue a PhD through the Wits MB BCh-PhD intercalated programme, an initiative similar to one established at the University of Cape Town in 2011, and supported by South African Medical Research Council (SAMRC) funding.[12] The Wits MB BCh-PhD intercalated programme was initiated in 2023. Students who have completed at least the first 4 years of their MB BCh training are offered the opportunity to pause their MB BCh studies and undertake doctoral training nested in established research entities or with established academics at Wits. Two years are dedicated to full-time PhD research, after which students reintegrate into the MB BCh clinical programme to complete their medical and doctoral degrees. To date, 17 MB BCh students have participated in this programme, of whom 12 started their PhD at the end of 4th year and five after completing 6th year. This initiative aims to strengthen early pipeline development by enabling students to acquire advanced research training alongside their clinical education. The students enrolled into the intercalated programme have all their student fees towards the PhD degree covered by the university, and they also receive an annual stipend during the 2 years of their PhD studies. Also, students are encouraged to apply for other sources of funding, which has been successfully accomplished by some following the first year of their PhD studies.

Clinician PhD programmes

Since 2011, various externally funded programmes have been administered by the FHS at Wits to support clinicians pursuing doctoral studies (Table 1). More recently, the FHS has directly supported these doctoral programmes. The clinician PhD programme is primarily targeted at clinicians who have completed at least specialty training. The programme aims to mitigate the financial disincentive associated with leaving full-time

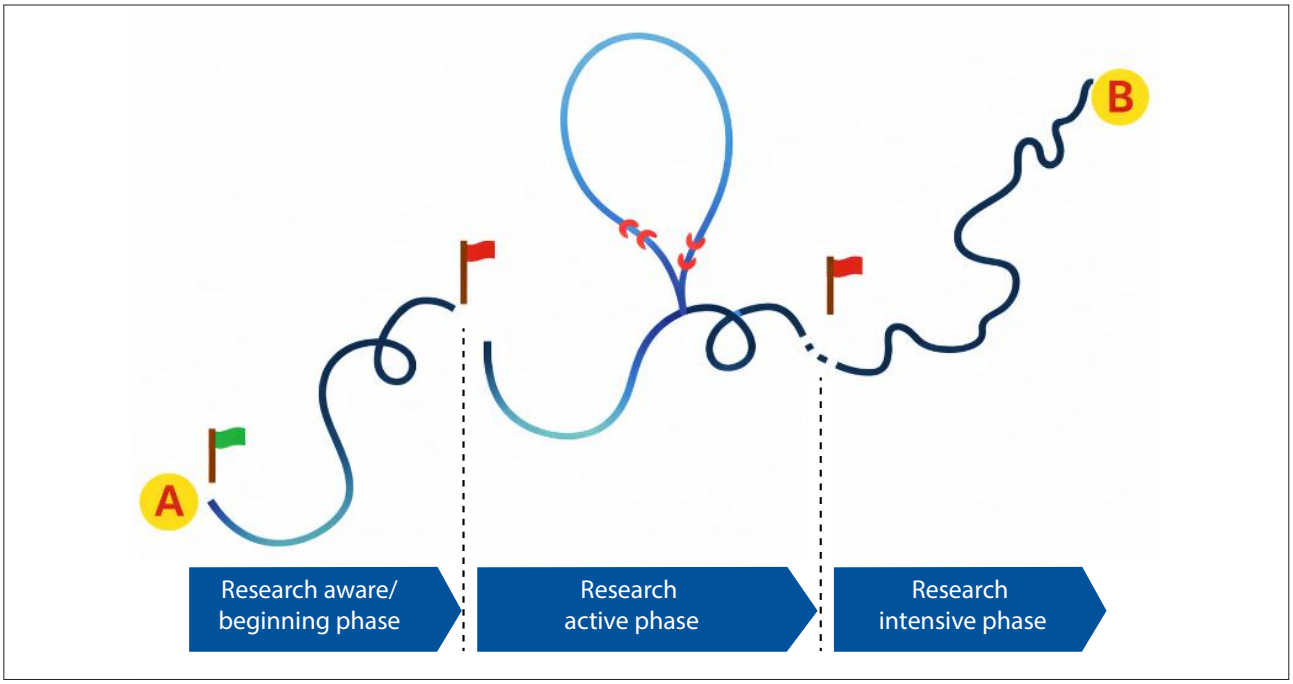


Fig. 1. Pathway of a clinician-scientist.

Table 1. Clinician PhD programmes in the Faculty of Health Sciences at the University of the Witwatersrand

Programme sponsor	Years active	Fellowships awarded, *n*	Candidates graduated, *n* (%)	Failed to complete, *n* (%)	Ongoing, *n* (%)
Carnegie Corporation	2011 - 2017	19	16 (84)	3 (16)	-
University of the Witwatersrand/South African Medical Research Council	2017 - 2019	4	3 (75)	1 (25)	-
M & J Miller Foundation/Cassandra Miller-Butterworth	2017 - 2023	2	2 (100)	-	-
University of the Witwatersrand	2021 to date	8	2 (25)	-	6 (75)

clinical practice by offering tax-exempt stipends commensurate with non-overtime junior consultant salaries paid in the state sector. Completion rates for the 33 award recipients have been high, indicating strong individual commitment and programme design. By providing the initial funding through the FHS doctoral programme, Wits candidates have become more competitive in securing fellowships such as the SAMRC Clinician Researcher, Bongani Mayosi Netcare PhD, and Discovery Foundation PhD Academic Award.

Opportunities for emerging and mid-career clinician-scientists

A major deterrent to research-trained clinicians transitioning from full-time clinical practice to a predominantly research-focused career has been the lack of secure career pathways and associated financial stability. For clinicians pursuing clinical research, grant funding to support both investigator salaries and research programmes is highly competitive and uncertain. Also, clinician-scientist salaries are usually lower than salaries paid to clinicians who engage in full-time private clinical practice. To address these challenges, as of 2023, Wits established 12 dedicated posts for clinician-scientists, including emerging and mid-career scientists, with remuneration aligned to that of their public sector clinician counterparts. These positions provide clinician-scientists protected time (at least 80%) to focus on their research endeavours, with a view to securing sufficient funding to support their salaries and those of their research staff within 5 years. Additionally, these posts offer clinician-scientists an opportunity to catalyse collaborative research within their host clinical departments. The Wits Health Consortium provides further support for these clinician-scientists through assistance with grant management, human resources and funder reporting, thereby strengthening the enabling environment required to sustain research-intensive clinical careers.

Challenges for clinician-scientists

The pathway for clinician-scientists has numerous challenges at various career stages. Traditionally, becoming a clinician-scientist can take approximately 20 years, including undergraduate medical degree, postgraduate specialisation, and completion of higher research degree training.[4,9] Key enabling factors for sustaining clinician-scientist careers include appropriate financial remuneration and salary support, as well as protected research time to ensure meaningful engagement in research alongside clinical responsibilities. Institutional support is also essential, including clearly defined career pathways and access to research opportunities. The ability to secure competitive project funding, supported by adequate research infrastructure and logistical support, further underpins long-term success. In addition, career mentorship, as well as opportunities for collaboration and networking, play a critical role in fostering development, retention and impact across the clinician-scientist career continuum.

The way forward

Fostering an environment that supports the growth of clinician-scientists requires a multipronged approach. While the strategies employed at Wits provide models for enhancing research expertise among clinicians, further work is necessary both at the institutional and national levels. In instances where research exposure is largely informal, such as for interns, community service doctors and medical officers, interventions should be introduced and researchers encouraged to identify small projects that can be conducted within the available time and abilities of these clinicians. Enhancing monitoring and evaluation, together with integrating early-career clinicians into the university's research ecosystem, will help accelerate the impact of these initiatives.

Financial sustainability for clinician-scientists warrants particular attention. Evaluating models in other regions may support local application. Most clinician-scientists at a global level are not on tenure and are supported through 'soft' or grant funding. Given the extended training required to become a clinician-scientist, many are in the latter half of their careers and may require institutional support, much like researchers in non-clinical fields.[3]

Sustaining research activity among clinicians and strengthening the clinician-scientist pipeline will require consideration of current public sector and university employment models. Protected research time remains difficult to secure in most academic health facilities, owing to service delivery demands, and may require the introduction of financial models to offset a proportion of full-time equivalent service delivery activity with externally funded research. While negotiation of such models would be optimal, interim strategies for fostering increased research activity may include grant-funded honorary appointments of additional clinicians to assist with clinical service demands. A structured decision-making algorithm may assist clinicians who are interested in research careers in navigating these complexities (Fig. 2).

Aspirant clinician-scientists are encouraged to read the recent reports commissioned by the Academy of Medical Sciences in the UK that describe the establishment of clinician-scientist pathways in LMIC settings.[9] Particular support is needed to ensure that early- and mid-career clinician-scientists can devote the time necessary for their research endeavours to produce a publication output that fosters success in independent peer review processes such as the SA NRF evaluation and rating, and time that supports competitive grant funding applications. The most important measures of success, however, are the opportunities for discovery, innovation, and improvements in the care and safety of patients.

Conclusion

Structural support, whether institutional or national, is critical for enhancing research excellence among clinicians. Individuals in clinical training or careers, who would benefit from additional mentorship, protected time and institutional support, should

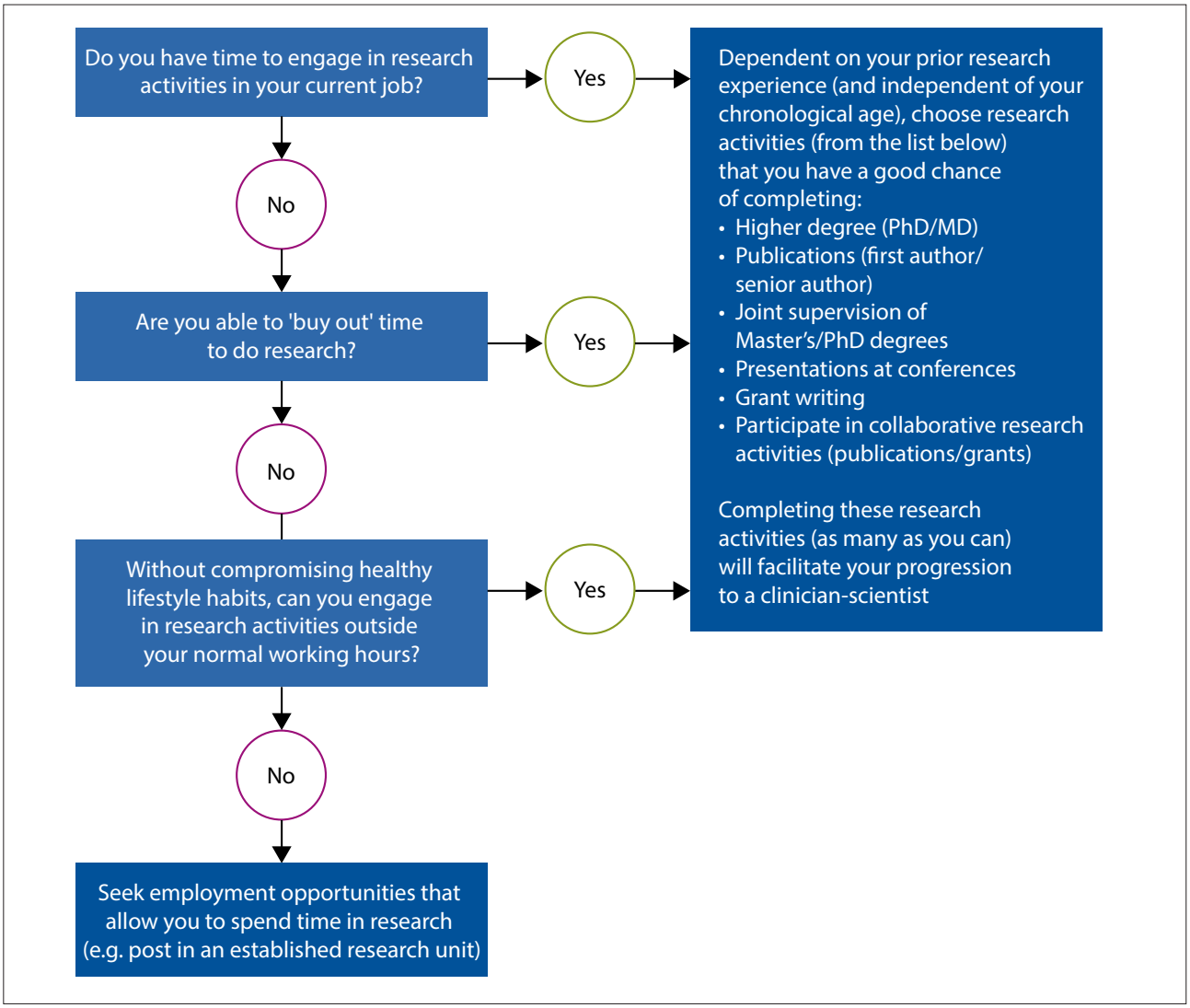


Fig. 2. Decision-making algorithm for research time.

be identified, mentored and supported, while senior-career clinician-scientists should be capacitated to devote a large proportion of their time to research, taking into account the issues of tenure and clinical service. The strategies implemented at Wits provide a blueprint to achieve these goals, but they need to be supported, strengthened, and extended to other universities if SA is to increase its clinician-scientist numbers and improve its clinical research outputs.

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