The development of research competence among specialist registrars in South Africa: Challenges and opportunities for research education and capacity development

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To equip physicians with the competencies that support evidence-based healthcare, curriculum frameworks for medical education often promote scholarly activity as an essential component of training. Many medical schools worldwide expect medical trainees to participate in some form of research during their undergraduate and postgraduate training. This requirement is especially important in Africa, where there is also much need to develop clinical research capacity and an evidence base that is contextualised to the specific healthcare challenges on the continent. In South Africa, the requirement for specialist trainees to complete a research project (as part of a Master of Medicine, MMed) was made mandatory from 2011 and has introduced several difficulties for many training centres. There is concern that institutions are failing to develop medical specialists who are competent in their role as scholars, particularly in their ability to conduct research. In this article, I review the South African literature that discusses the research component of medical specialist registration. In addition to summarising the challenges associated with MMed projects and recent efforts to address them, I interrogate whether the current status of MMed research education is likely to be contributing to the successful development of research competence among this unique group of postgraduates. By consolidating the current debate, I hope to encourage a point of departure between criticising the challenges and adopting proactive strategies to address them. There is a great need for medical educators to design innovative and learner-centred research education strategies that can better develop research competence among African healthcare professionals.

Afr J Health Professions Educ 2022;14(2):78-82. https://doi.org/10.7196/AJHPE.2022.v14i2.1418

Postgraduate medical training that ensures the development of professional competence is fundamental to the ability of future specialist doctors to provide safe and evidence-based care for their patients. In recent years, there has been much focus on competency-based medical education as an approach to meet these expectations.[1] Although the definition of 'competency-based medical education' can be highly variable in the literature,[2] there is an agreement that physician competence involves multiple domains of ability (as discussed in more detail by Frank *et al.*[1]) and not merely acquiring knowledge or a set of skills. Competency frameworks now form the foundation of medical curricula in many countries.[1] One of the most widely used frameworks is the CanMEDS model, which was introduced by the Royal College of Physicians and Surgeons of Canada in 1996 to guide the incorporation of competency-based education throughout the medical curriculum. This framework defines a set of seven operationalised roles that represent 'clusters of competencies' that physicians are expected to master by the end of their training.[3]

To promote evidence-based practice, the framework includes the role of being a scholar. The competencies of this role include a commitment to lifelong learning, the ability to appraise information critically, and the ability to facilitate learning and contribute to the creation of knowledge through research activities.[4] The inclusion of this role has emphasised scholarly work as an important aspect of medical training, especially to support the provision of evidence-based healthcare (EBHC). As such, many medical schools around the world expect trainees to participate in some form of research during their training.[5]

In the African context, capacity and organisational structures for the development of EBHC are still limited in many countries.[6] Previous studies have demonstrated that health research productivity varies widely across Africa and that South Africa (SA) produces the bulk of research publications emerging from the continent.[7] There exists a growing number of continuing professional development initiatives in the African region that focus on building research capacity.[8,9] It has also been acknowledged that providing a critical mass of clinical researchers is essential to address the need for improved health research capacity across the African continent.[10,11]

In SA, the requirement for completing a research project (as part of a Master of Medicine, MMed) for medical specialist registration was made mandatory from 2011.[12] It is perhaps unlikely that MMed research will contribute to a critical mass of clinical researchers because only very few specialists will enter research careers after graduating. A recent study by De Beer *et al.*[13] indicated that only 37% of general surgeons engaged in research after qualification. This may be due to the limited number of academic posts at the nine SA medical schools. Nevertheless, even for those specialists who do not continue with research after their training, scholarly experience is crucial for developing critical thinking and equipping SA doctors with competencies that support evidence-based practice.

A growing body of literature has highlighted the several difficulties this requirement has introduced for many training centres,[14-17] some of which are likely to hamper the development of medical specialists who are competent in their role as lifelong scholars, and particularly in their ability to conduct and appraise research.

Therefore, the purpose of this conceptual article is to review and consolidate the literature that discusses MMed research and interrogate whether the current approach to research support and training is likely to be contributing to the successful development of scholarly competence among specialist trainees. I shall first summarise the various challenges associated with MMed research and then review recent efforts to improve research training and support for this unique group of postgraduates. Finally, I shall argue that current challenges offer medical educators and research capacity development services a unique opportunity to design innovative and learner-centred research education strategies that can better develop research competence among medical professionals.

Mandatory research component for medical specialist registration in SA

Before 2010, there were two routes to specialist registration in SA. One route was to do a full-time MMed, which included the requirement to complete a research project at only some institutions. Universities awarded the degree after a successful internal examination. The other route used a prescribed syllabus set out by the relevant College of Medicine, followed by the successful completion of the College Fellowship examinations. The Fellowship syllabus included training on research methodology, statistics, and clinical trial design but did not include the requirement for a research project. The Health Professions Council of SA (HPCSA) expressed concern that the two programmes lacked uniformity across different institutions in terms of curricula, assessments, and exit outcomes, including for research knowledge and skills.[12] Therefore, in 2010, the HPCSA defined new requirements for specialist registration, which included the need for trainees to demonstrate research competence by completing a research project.[12]

There has been some agreement among MMed candidates and teaching staff that the research component is an essential part of the specialist training curriculum and has the potential to improve evidence-based practice.[13–15,18] However, it has also received much critical resistance from various stakeholders. Trainees are reported to feel 'resentful' of the directive,[19] and there has been consistent hope that the HPCSA might reconsider its decision.[20] The regulation requiring research completion was subject to legal action in 2015, when those trainees who had not met this requirement were denied HPCSA specialist registration.[21] The challenge was upheld, and trainees were granted a further two years to complete their research.[18] That trainees would resort to such drastic and adversarial action perhaps highlights the extent of their frustration and the challenges associated with the research component of specialist training.

Challenges associated with the MMed research requirement

There are several challenges experienced by trainees, including inadequate research experience, limited supervision capacity, insufficient time protected from clinical service obligations, non-uniformity of MMed research requirements, and the absence of clear MMed research education strategies and outcomes across institutions. I shall now review each of these challenges in more detail.

Limited research experience among trainees

Because the MMed research component forms part of a master's degree, the unspoken expectation is that MMed candidates should have the ability to think about and conduct their research at a level equivalent to those candidates undertaking master's degrees in other fields. However, recent literature has highlighted that specialist trainees often lack the knowledge and skills required to complete a successful academic project.[16] This limited research expertise at the outset of specialist training is perhaps unsurprising, given that many current SA undergraduate curricula do not include mandatory exposure to research and historically placed little emphasis on evidence-based medicine.[22] Most institutions offer medical students the opportunity to conduct only a small, elective research project during their undergraduate training. Overall, this means that the SA specialist trainee 'is not the standard master's research postgraduate' and has unique research training needs.[19]

Limited MMed research supervision capacity

The supervision strategy used for MMed research is the traditional master-apprentice model in which a supervisor guides the student through the process of research. Unfortunately, one of the greatest challenges faced across training institutions relates to the limited supervision capacity for MMed research projects. As discussed by Aldous *et al.*,[20] many specialists do not fulfil the regulatory requirements for supervision, as set out by the SA Council for Higher Education. Any specialists who pursued the College Fellowship examinations before 2010 are not considered to have a suitable 'qualification in a relevant field of study higher than, or at least at the same level as, the exit level of the postgraduate programme' they intend to supervise.[23] Historically, very few SA clinicians held doctorates. Therefore, it is possible that the current staff contingent at many medical schools still comprises a limited number of 'suitably qualified' supervisors,[20] although this number will grow as institutions graduate more MMed candidates.[14]

An important consideration is that even when specialists have master's or doctoral degrees, this experience does not necessarily translate into research excellence.[14] Rout *et al.*[24] note that many MMed research supervisors are 'relatively inexperienced and may be as much in the dark as the students.' Furthermore, having a postgraduate degree does not guarantee having developed into a successful research supervisor.[14] Although efforts to develop research supervision capacity are beyond the scope of the current review, there is a need for professional development programmes that can adequately equip specialists with the necessary pedagogical and research skills to adequately supervise MMed research projects.

Limited time to conduct and supervise MMed research

The limited time available to conduct and supervise research is often foremost in debates surrounding the MMed degree. Like any other research for degree purposes, the MMed research project from planning to execution to final write-up requires 'an enormous investment of time' for both candidates and their supervisors.[14] The MMed research project accounts for 25% of the specialist training curriculum; that is, 120 credits and a concomitant 1 200 notional hours.[25] However, when the HPCSA introduced the requirement for completing a research project, specialist training time was not increased to accommodate the additional time required to conduct research.[15,20] Insufficient time protected from clinical service obligations causes a tense employee-student dynamic during training. Furthermore, the added workload and severe time constraints relating to an

already overburdened academic curriculum and heavy clinical workloads likely account for why the MMed once represented the qualification with the lowest completion rate.[26] There are several consequences of MMed research non-completion, including delayed specialist registration. This, in turn, could reduce the number of specialists available for appointments which could ultimately undermine healthcare service delivery.[17,19] Recently, Grossman[19] demonstrated that most registrars could finish their research projects within the four-year specialist training programme, but this is often at the expense of being able to engage fully with final exam preparation.

Uncertainty about research education goals, strategies and outcomes

As emphasised by Frank *et al*.,[2] medical curricula that follow frameworks for competency-based education should explicitly define the required competencies of graduates and ensure that these are taught, assessed, and acquired. However, there is some disagreement in the literature about how research competence should be developed and assessed among SA specialist trainees.

The only requirements for MMed research laid out by the HPCSA include (*i*) the completion of a relevant research project; (*ii*) the demonstration of appropriate theoretical knowledge; (*iii*) the compilation of a research protocol according to required norms; (*iv*) regular progress reports; and (*v*) the presentation of results in the format of a dissertation according to acceptable scientific norms.[12] Because the HPCSA is not a training body, it is ultimately incumbent upon the universities to interpret these requirements, provide MMed research training and supervision, manage assessment, and ensure the acquisition of research competence among trainees.[15]

In general, and much like specialist training before 2010, there appears to be no uniform teaching and learning strategy for MMed research between institutions and disciplines. This includes a lack of clear guidelines on the nature and scope of research and research training, outcomes, and assessment.[15,17] It follows that trainees and their supervisors tend to have a poor understanding of research expectations and 'there is no clear target at which students might aim when assaying what is expected of them.'[22]

Rout *et al*.[17] insist that the best way to demonstrate research competence is by generating a dissertation or publication, because these allow for assessment of the 'transformative aspects of learning (critical reasoning, synthetic reasoning, scientific thinking, and inquiry-led problem-solving).' Grossman suggests that dissertations in the form of publication-ready manuscripts should be the preferred option for MMed research because they reduce time-to-completion and improve conversion rates to accredited publications.[19,27] However, others have argued that MMed research 'was never intended to result in a publication, but to produce an examinable document that demonstrates a practical understanding of the research process'[17] and therefore emphasises that undertaking original research should be encouraged but not mandatory.[15] Of most significant concern is that despite meeting the dissertation requirement, many specialists 'still cannot meaningfully critique published medical literature, or explain the meaning of a *p*-value or a 95% confidence interval.'[22]

In response to this debate, some authors have called for alternatives to the dissertation to assess research competency.[15,22] For example, Rodseth *et al*.[22] suggest that some type of formal examination process should assess scholarly competence. Extending this concept, Biccard *et al*.[15] recommend the introduction of a national research educational programme, structured as a course-work master's programme. While these suggestions have merit, the examination of a dissertation is a mandatory component of master's-level training, as laid out by the South African Department of Higher Education and Training.[25] Therefore, despite non-uniformity regarding other aspects of MMed research, the requirement for output in the form of an examinable manuscript should provide at least one point of agreement across training sites. Debates and uncertainty around an appropriate educational strategy for MMed research could have negative implications for research supervision, the research experience, and the overall value of MMed research as a component of the specialist training programme.

The consequences of poor research competence

The ultimate purpose of clinical research is to contribute evidence that can inform clinical decision-making and public health practices. However, Rodseth et al.[22] argue that MMed research seems to lead to 'a constant stream of inconclusive, and often irrelevant research that adds to publication pollution and undermines research reliability.' Concern has been raised that many MMed projects include surveys, audits or small observational studies[22] that are 'inadequately powered to draw meaningful conclusions.'[15] Biccard et al.[15] emphasise that 'poorly conducted research does more harm than good' because not only is 'bad research' a waste of resources in terms of time, effort and money, but it also raises ethical concerns owing to the pointless exposure of research participants to risk and inconvenience.[15] Furthermore, should MMed candidates manage to publish poor-quality research, this could have negative consequences for health policy, government spending on health services provision, and patient health outcomes. Stakeholders involved in the MMed research process need to be mindful that they are not advancing clinical care or the research competencies of trainees by allowing them to undertake and publish 'shoddy science'. MMed candidates are increasingly encouraged to publish their research but institutions should also carefully consider whether this might set a precedent for rewarding poor-quality research. Arguably, it is in the institutions' interest to encourage and support high-quality MMed research if they are to uphold their status as centres of research excellence. If the research project is to remain a mandatory component of specialist training, then there is an urgent need for institutions to revise current research education strategies and the institutional research culture that inevitably guides research practices.

Strategies to develop research competence among MMed candidates

Frank *et al*.[2] emphasise that curriculum planning should be 'explicitly tied' to the needs of students. MMed candidates represent a unique cohort of postgraduate researchers; they face distinct challenges and have very specific research training needs compared with the 'typical' master's student.[19] In particular, MMed candidates require 'intensive instruction on fundamental research principles' and the training available should be 'specific to their field, relevant to their needs and appropriate to the stage of their research journey.'[19] Training institutions have attempted to expand existing research training and support services to better accommodate registrars, but Grossman[19] highlights that 'inflexible, generic, scheduled faculty research techniques courses fail the andragogic needs' of MMed candidates. Therefore, medical faculties need to develop student-centred research support and supervisory models that can better meet the training needs of specialist trainees.

In terms of supervisory models, Rout *et al*.[17] suggested using a collaborative cohort model (CCM) as opposed to the traditional apprentice-

master model of supervision. This model involves joint supervision between a disciplinary supervisor (who may be relatively research-naïve) who takes responsibility for the clinical aspects of the research and one research process supervisor (who may be unfamiliar with the disciplinary context) who enhances the scientific process.[14] Aldous *et al.*[20] found that this model of supervision, in conjunction with an innovative modular approach to research, could ensure timely research completion.

Despite their success, Aldous *et al.*[20] experienced logistical challenges, including the need to repeat some training sessions owing to the constraints of clinical workloads. There is still a great need to find solutions to the constraints of time and registrar non-attendance at contact-based lectures and workshops. Technology-aided teaching approaches may prove to be useful in this context. For example, the blended learning model, which involves a complementary mixture of online learning and face-to-face contact sessions, lends itself to the development of structured or modular progression through the research process and has the added advantage of introducing flexibility into the teaching and learning environment. Blended learning has proven to be useful for research education elsewhere,[28,29] and has the potential to address some of the challenges associated with MMed research in SA.

The success of research training and support strategies ultimately relies on students being able to access these services. There have been calls for the Department of Health to recognise the academic requirements of specialist training and allocate time for this to both trainees and their supervisors.[14] How exactly this should be implemented remains unclear. Anecdotally, I know of some disciplines that allocate their trainees a two-week block for research activities. While this decision is well-intentioned, merely providing protected research time does not guarantee success, especially if candidates lack explicit direction and guidance on how to use this time effectively. Therefore, although the provision of protected research time will begin to address MMed research training challenges, there is also a need to provide more structured support during this time.

Supervisors are well placed to provide this support and arguably play a critical part in teaching or role modelling the 'ways of being and doing' in the research community. For this to be effective, supervisors themselves need to feel equipped to function as legitimate members of the scholarly community. The current debate around MMed research tends to focus on the plight of the trainees, but the experiences and professional development of research supervisors also warrant attention. There is a need for greater discussion around ways that institutions can better support MMed research supervisors.

Finally, there might also be merit in exploring the 'calibration of standards, and expectations across institutions' as well as the uniform standards of marking 'consistent with the educational goals of the master's research programme and the rigours of scientific discourse.'[17] Further to this aspect is the need for those involved in the research process, including research supervisors, to make explicit the unwritten and perhaps 'hidden' outcomes of MMed research, including its possible value in strengthening EBHC.

Conclusion

In this review, I have attempted to consolidate the current debate around SA MMed research. By providing this summary, I hope to encourage a point of departure between criticism of the challenges and adopting proactive strategies to address them. Failing to meet the research education needs of specialist trainees and their supervisors could have deleterious consequences for the quality of academic literature, the research excellence of training institutions, and the practice of EBHC, both locally and abroad. Although there have been some efforts to provide research training and support that cater to the unique needs of MMed candidates and their supervisors, there is still much opportunity for innovation in SA clinical research education. Within the broader African context, there is some evidence of the development and evaluation of programmes that seek to build research capacity among health professionals.[6,8,9] However, there is still limited focus on the educational impact of research experience during medical training and the effectiveness of research capacity development initiatives provided within African medical schools.

Declaration. None.

Acknowledgements. I wish to acknowledge colleagues within the Centre for Health Professions Education who supported this review and generously provided their insight regarding postgraduate learning and teaching.

Author contributions. Sole author.

Funding. None.

Conflicts of interest. None.

1. Frank JR, Mungroo R, Ahmad Y, et al. Toward a definition of competency-based education in medicine : A systematic review of published definitions. Med Teach 2010;32(8):631-637. https://doi.org/10.3109/0142159X.2010.500898
2. Frank JR, Snell LS, Ten Cate O, et al. Competency-based medical education : Theory to practice. Med Teach 2010;32(8):638-645. https://doi.org/10.3109/0142159X.2010.501190
3. Tuhan I. Mastering CanMEDS roles in psychiatric residency: A resident's perspective. Can J Psychiatry 2003;48(4):222-224.
4. Frank JR, Snell L, Sherbino J. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015. http://canmeds.royalcollege.ca/en/framework (accessed 18 March 2020).
5. Solaja O, Skinner T, McGregor T, Siemens R. CanMEDS scholars: A national survey on urology residents' attitudes towards research during training. Can Urol Assoc J 2018;12(4):E191-E196. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5905553/ (accessed 19 May 2020).
6. Forland F, Rohwer AC, Klatser P, Boer K, Mayanja-Kizza H. Strengthening evidence-based healthcare in Africa. Evid Based Med 2013;18(6):204-206. https://doi.org/10.1136/eb-2012-101143
7. Uthman OA, Wiysonge CS, Ota MO, et al. Increasing the value of health research in the WHO African Region beyond 2015 - reflecting on the past, celebrating the present and building the future: A bibliometric analysis. BMJ Open 2015;5(3):1-8. https://doi.org/10.1136/bmjopen-2014-006340
8. Young T, Naude C, Brodovcky T, Esterhuizen T. Building capacity in clinical epidemiology in Africa: Experiences from Masters programmes. BMC Med Educ 2017;17(1):1-10. https://doi.org/10.1186/s12909-017-0885-4
9. Nachega JB, Uthman OA, Ho YS, et al. Current status and future prospects of epidemiology and public health training and research in the WHO African region. Int J Epidemiol 2012;41(6):1829-1846. https://doi.org/10.1093/ije/dys189
10. Ezeh AC, Izugbara CO, Kabiru CW, et al. Building capacity for public and population health research in Africa: The consortium for advanced research training in Africa (CARTA) model. Glob Health Action 2010;3(1). https://doi.org/10.3402/gha.v3i0.5693
11. IJsselmuiden C, Marais DL, Becerra-Posada F, Ghannem H. Africa's neglected area of human resources for health research - the way forward. S Afr Med J 2012;102(4):228-233. https://doi.org/10.7196/SAMJ.5377
12. Health Professionals Council of South Africa. Subcommittee for Postgraduate Education and Training. New requirements for the registration of specialists in South Africa. 2010. https://isystems.hpcsa.co.za/uploads/editor/UserFiles/downloads/medical_dental/PETM (accessed 14 March 2020).
13. De Beer MM, Karusseit VOL, Pienaar BH. Perspectives of South African general surgeons regarding their postgraduate training. S Afr J Surg 2014;52(3):67-71. https://doi.org/10.7196/SAJS.1993
14. Rout C, Sommerville T, Aldous C. MMed cohort supervision: A path out of the swamp? 2015;105(4):275-276. https://doi.org/10.7196/SAMJ.9338
15. Biccard BM, Dyer RA, Swanevelder JL, Coetzee JF, Shafer SL. Is the HPCSA requirement for a research dissertation for specialist registration the best option? S Afr J Anaesth Analg 2017;23(4):4-6. http://www.sajaa.co.za/index.php/sajaa/article/view/2027/0.
16. Patel N, Naidoo P, Smith M, Loveland J, Govender T, Klopper J. South African surgical registrar perceptions of the research project component of training: Hope for the future? S Afr Med J 2016;106(2):169-171. https://doi.org/10.7196/SAMJ.2016.v106i2.10310
17. Rout C, Aldous C, Hift R. Response to concerns expressed in the journal regarding the HPCSA requirement for registrar (MMed) research. S Afr J Anaesth Analg 2018;24(2):48-49.
18. Szabo CP, Ramlall S. Research competency and specialist registration: Quo vadis? S Afr Med J 2016;106(12):1183-1185. https://doi.org/10.7196/SAMJ.2016.v106i12.11217
19. Grossman ES. How long does it take a registrar to complete the compulsory research project enabling specialist registration? S Afr Med J 2019;109(4):254-258. https://doi.org/10.7196/SAMJ.2019.v109i4.13377
20. Aldous C, Clarke D, Van Wyk J, Rout C. Avoiding the distant elephant: A model to approach the research component of specialisation. BMC Med Educ 2016;16(1):4-9. https://doi.org/10.1186/s12909-016-0661-x
21. Padayachee K. 'Specialist' doctors in fight with council. The Mercury. https://www.pressreader.com/south-africa/the-mercury-south-africa/20160503/281668254176128. 3 May 2016.
22. Rodseth RN, Wise R, Bishop D. Polluting the well. S Afr J Anaesth Analg 2017;23(6):9976.
23. Council for Higher Education. Criteria for programme accreditation. http://nr-online.che.ac.za/html_documents/CHE_accreditation_criteria_Nov2004.pdf. 2004 (accessed 18 March 2020).
24. Rout C, Aldous C, Hift R. Response to concerns expressed in the journal regarding the HPCSA requirement for registrar (MMed) research. S Afr J Anaesth Analg 2018;24(2):48-50. http://sajaa.co.za/index.php/sajaa/article/view/2087

25. Council for Higher Education. The higher education qualifications sub-framework. 2013. https://www.ru.ac.za/media/rhodesuniversity/content/institutionalplanning/documents/HEQSF_2013.pdf. (accessed 18 March 2020).
26. Mbali C. Education: Revisiting the purpose of a master's. Mail and Guardian; 4 October 2011. https://mg.co.za/article/2011-10-04-revisiting-the-purpose-of-a-masters/
27. Grossman ES. Publication rate of 309 MMed dissertations submitted between 1996 and 2017: Can registrars fulfil HPCSA Form 57 MED amendments? S Afr Med J 2020;110(4):302-307. https://doi.org/10.7196/SAMJ.2020.V110I4.14339
28. Evans KH, Thompson AC, O'Brien C, et al. An innovative blended preclinical curriculum in clinical epidemiology and biostatistics: Impact on student satisfaction and performance. Acad Med 2016;91(5):696-700. https://doi.org/10.1097/ACM.0000000000001085
29. Moromizato T, Garcia-Larsen V, Soeteman D, et al. Addressing the gap in clinical research education: Implementation of the Introduction to Clinical Research Training-Japan program. J Gen Fam Med 2018;19(6):188-190. https://doi.org/10.1002/jgf2.204

Accepted 24 February 2021.