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A quantitative assessment of the time to complete the Master of Medicine research thesis in a cohort of paediatrics registrars at the University of the Witwatersrand, South Africa

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Background. The Health Professions Council of South Africa implemented a compulsory research component for specialist practitioner registration through the Master of Medicine (MMed) degree in 2011, eliciting both commendation and critique. Chief among the concerns is the extended time required for MMed completion. This study explores the duration of each component of the MMed research thesis and discusses the potential problematic areas in terms of its timeous completion, about which there is currently a lack of data, with particular regard to the South African (SA) setting.
Objectives. To quantitatively delineate the various components of the MMed research thesis process, identify potential barriers to its completion, and formulate a recommended evidence-based proposed timeline allowing for successful and timeous completion of the MMed.
Methods. We conducted a retrospective review of MMed degrees completed by paediatrics registrars at the University of the Witwatersrand, Johannesburg, SA, from 1 January 2011 to 31 December 2018, and an electronic survey of former MMed students, detailing the duration of each of the components of the MMed research thesis process.
Results. The survey had a 70.5% response rate (n=148 respondents, of whom 141 fully completed the survey). The median (interquartile range) time to complete the MMed research thesis was 30 (21 - 42) months. While 78.0% of respondents deemed 4 years adequate for completion, 15.6% reported durations exceeding 4 years, and 2.1% had not completed the MMed. The components of the research thesis with the longest duration in terms of completion included development of a first draft of the research protocol, data analysis, and development of the first draft of the final report. Factors reportedly associated with successful completion of the thesis were a supportive supervisor and the provision of a research rotation.
Conclusion. A significant portion of candidates do not complete the MMed research thesis within the 4-year training period, hindering specialist registration. The major contributing factors appear to be related to candidates' inexperience regarding the research process and lack of exposure to it, as well as some of the administrative procedures involved. Utilisation of the recommendations and structured timeline will help identify problematic areas timeously and ensure successful completion of the thesis.

Keywords: Paediatrics, MMed, research thesis, duration

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In 2011, the Health Professions Council of South Africa (HPCSA),[1] in accordance with the 10th priority for health development in the National Health Research Summit Strategic Plan,[2] introduced a compulsory research component to the specialisation process. This mandatory research component takes the form of the Master of Medicine (MMed) degree, in which candidates must produce a supervised research thesis. The impact of this additional criterion in an already challenging process, especially in a resource-limited setting, needs careful consideration. Internationally, similar stipulations by foundations such as the Accreditation Council for Graduate Medical Education have been implemented.[3]

The obligatory research component has been met with criticism with regard to the adequacy of current training practices and the further time constraints it imposes on an arduous specialisation programme. Furthermore, the implications it may have on clinical training as well as the pedagogical roles and responsibilities of the stakeholders and supervisors involved have been questioned.[4] The World Health Organization estimated that there would be a shortage of 18 million healthcare human resources worldwide by the year 2030, with this deficiency concentrated in resource-limited settings.[5] The additional requirements for specialist registration have therefore been questioned.

The merits of the academic activities involved in research may include development of the essential skills of appraising academic literature, development of critical thinking abilities, and exposure to different fields of medicine, ultimately culminating in enhanced patient care and outcomes through the practice of evidence-based medicine.[3,6] Moreover, the process fosters an academic culture among junior specialists, as well as increasing the rates of academic publications from various institutions.[7]

In general, it has been found that addition of a research component to a degree results in slower degree progression, and inadequate time is often reported as a significant barrier to completion of research activities during specialisation.[8,9] According to the regulatory bodies,

the HPCSA and the South African Committee for Higher Education, the research component should equate to a minimum of 600 notional hours of work, ~75 working days.[10] This estimate has been heavily disputed, however, with some researchers suggesting that the process could require up to 10 000 hours of work.[11] A previous study with unpublished data suggested that 900 notional hours or 24 working weeks were required for completion of the MMed thesis,[12] while another study proposed that the estimated average gross time for completion was ~31.6 months.[12]

Previous studies, however, have relied purely on electronic databases, with no input from students, so only limited aspects of the MMed process were considered. Previous estimates were broad and possibly inaccurate. Additionally, it has been suggested that supervising a research project takes ~10% of the time that the student has to commit to complete the degree.[11] Furthermore, it has been recommended that research supervisors should, as a minimum requirement, have successfully completed a course in research methodology in order to ensure productive research.[13] The implications of this research component are therefore far-reaching, influencing not only the students but a broader population of research supervisors and institutions as well.

There is a paucity of data regarding the amount of time required for completion of the MMed research thesis, including all its components, as well as potential barriers to its successful completion. Proposed guidelines and schedules that should be followed for its timeous completion within the specialisation programme are currently lacking. This study aimed to answer the question of how long it actually takes to complete the MMed thesis. The findings would assist in better preparing registrars, supervisors and the institutions involved on how to approach this endeavour.

We aimed to provide a detailed quantitative description of the timeline of the MMed research thesis process, including the various components from conceptualisation to final submission and publication. The primary objective was to determine the actual average time for completion of the thesis, in a cohort of paediatrics registrars. The secondary objectives were to determine the average duration of each of the individual components of the MMed thesis process, identify potential areas that may delay completion of the thesis, and finally develop a suggested timeline that may be used as a guideline for the completion of the various components of the process, thereby ensuring its timeous completion.

Methods

We performed a quantitative assessment of the time taken to complete the MMed research thesis by a cohort of paediatrics registrars at the University of the Witwatersrand, South Africa (SA), during the period 1 January 2011 - 31 December 2018.

Study design

A retrospective review of MMed degrees was performed, including a simultaneous analysis of the University of the Witwatersrand's Research and Submissions Database and an electronic survey (https://www.surveymonkey.com/r/PaedsQTcSurvey) of past MMed students for the period 1 January 2011 - 31 December 2018. The survey was conducted from 1 October 2023 to 31 November 2023. This dual input allowed for a comprehensive assessment of the MMed process, building on previous studies that considered only singular datasets with a lack of input from research candidates and provided information on activities without specific submission deadlines.[12]

This particular period was selected because it incorporates the period when the HPSCA introduced the compulsory stipulation of completing the MMed research thesis for specialist registration. It terminates 4 years prior to commencement of the present study, thereby including only those registrars who have been afforded sufficient time to complete the registrar training programme – ensuring the collection of complete data. The intended target audience for this research includes all registrars embarking on the specialisation process, the research supervisors, and the regulatory establishments involved, such as universities and the HPCSA. Based on the above criteria, an estimated population of 200 registrars who were registered during the stipulated period were eligible to participate in the study.

Study setting and population

Inclusion criteria. The study population was all paediatrics registrars registered at the University of the Witwatersrand for the period 1 January 2011 - 31 December 2018. This included those who had started their training in previous years but were registered as trainees during this period, so the research component was not necessarily compulsory for all respondents. This population was selected because it forms part of a wider departmental project aimed at streamlining the MMed process and ensuring timeous and successful completion of specialisation.

Exclusion criteria. Registrars who had not yet completed the research component of the MMed but were still within the 4-year specialisation period were excluded. Those who did not complete the survey or did not fall within within the time period as per the inclusion criteria were also excluded.

After completion, the data were captured onto an electronic database system in the form of a cloud-based software system (SurveyMonkey, USA, https://www.surveymonkey.com/home/) and Excel 2019, version 2408 (Microsoft, USA). The data were de-identified before analysis, ensuring confidentiality.

Statistical analysis

All plots, descriptive statistics and inferential statistics were performed using the statistical programming language R (v4.3.1) (R Foundation for Statistical Computing, Austria). Continuous data were summarised as medians (25th percentile, 75th percentile, minimum and maximum). Categorical data were summarised as counts (percentage) and modes. Duration data for the questions related to the duration of a component of the research thesis, and were ordinal (the categories were <1 month, 1 - 3 months, 4 - 6 months and >6 months). Data from the question concerning whether an activity was viewed as a barrier to the timeous completion of the MMed research thesis were binary (categories were 'yes' and 'no' answers).

Ethical considerations

The study was approved by the Human Research Ethics Committee of the University of the Witwatersrand (ref. no. M220908).

Results

There was a total of 148 respondents to the survey from an estimated potential study population of ~210 (response rate ~70.5%). Of these respondents, 141 fully completed the survey, and the information was verified from the data collected from the electronic records; 7 respondents were excluded because the information was incomplete or the inclusion criteria were not fulfilled.

The total time for completion of the MMed research thesis, according to year of registrarship commencement, is presented in Table 1. The median (interquartile range) duration of work on the thesis was 30 (21 - 42) months; 22 respondents (15.6%) reported that it had taken >4 years to complete the thesis, while 3 respondents (2.1%), although having completed the registrarship training period

Table 1. Time to complete the MMed research thesis, according to year of registrarship commencement (*N*=141 respondents)

Year of registrarship registration	Duration (months)
2011	24
2012	38
2013	30
2014	24
2015	32
2016	36
2017	27
2018	37
All years	
Median (IQR)	30 (21 - 42)
Range	4 - 94

IQR = interquartile range.

of 4 years, still had not completed the thesis. Of the respondents, 78.0% deemed 4 years to be sufficient time for completion of the MMed thesis, 8.5% viewed this time period as inadequate for its completion, and 13.5% were unsure.

Supplementary Fig. 1 (available online at https://www.samedical.org/file/2283) summarises data on the length of time for completion of the various research components of the MMed thesis, for all the 141 respondents (arranged per total duration). The width of each coloured block represents the time taken for an activity (as per the time categories), while the colours demonstrate the component/activity of the research.

The consolidated data for the duration of each component of the research process, represented as the modes for each of the various aspects for all the respondents, are presented in Fig. 1. It is noted that for most of the components the time to completion was within the period 1 - 3 months.

The components with the reported shortest duration for most candidates (components with a majority mode of <1 month's duration) included length of time to find a research supervisor, length of time to receive input from the supervisor for protocol, and length of time for supervisor input for the first draft of the final report.

The components with the longest duration in terms of completion included length of time to develop a first draft of the research protocol (51.1% of respondents reported a duration of ≥4 months), length of time for data analysis (48.6% of respondents reported a duration of ≥4 months), and length of time for development of the first draft of the final report (55.0% of respondents reported a duration of ≥4 months).

Additionally, it was demonstrated that 24.1% of students required ≥4 months to receive protocol approval. Similarly, 19.8% of ethics applications took ≥4 months to receive final approval, with ~15% of participants indicating that they considered this a potential barrier to timeous completion of the MMed thesis.

In general, the frequency with which an activity was cited as a barrier to MMed thesis completion was related to the length of time being in excess of 4 months for the activity (Fig. 2). Write-up of the final report (47.5%), data analysis (37.6%), collection of data (32.6%) and the final marking process (32.6%) were identified by respondents as the most common areas that contributed as barriers to timeous completion of the MMed thesis.

Allocation of dedicated research time with a reduction in terms of clinical responsibilities, as well as the presence of a supportive and knowledgeable research supervisor, were the most frequently reported beneficial factors in terms of completion of the MMed thesis. Lack of training in research, as well as the type of the research being conducted, were identified as factors that negatively impacted on timeous completion of the thesis.

Discussion

The present study showed that the majority of candidates complete the MMed research thesis within the requisite time period, the median time for completion in this cohort being 30 months, which was similar to an estimation provided in a previous review of this nature.[12] This estimated duration, being within the 4 year specialisation process, is further supported by the vast majority of respondents reporting that they deemed 4 years to be sufficient time for the MMed thesis completion. These data from the candidates' perspective were previously unavailable. Similarly, a recent study reported that the majority of currently registered surgical registrars in SA were confident that they would complete the MMed within the requisite training-period.[14]

Great variation in terms of the duration of completion of each activity exists, and the process appears to be individualised in respect of each candidate's individual experience. No obvious identifiable trends were noted in this particular regard. Furthermore, there were no significant identifiable trends between the different years and the time taken for completion of the MMed. The observation that the time taken for completion of the MMed had not substantially improved over the study period is concerning. Stakeholders such as the universities may need to review their strategies to address this issue. Considerations may include lack of streamlining of the administrative processes involved, persistence of inadequate training of candidates with regard to research, and difficulty with data analysis and interpretation. It is of concern that a significant proportion of candidates, just under a fifth (~18%), were unable to complete the research in the allocated time period and were therefore unable to complete the specialisation process. Precise data of this nature were previously unavailable, and this finding highlights the genuine need for further evaluation and consideration of the reasons for this delay. This process will aid in potentially identifying areas of possible intervention to assist and support these candidates.

The three components of the research process pertaining to the research supervisor, namely identification of a research supervisor, receiving input from the supervisor for the research protocol and final write-up, did not typically present as obstacles to timeous completion of the MMed thesis. These components were generally successfully completed and were infrequently reported as plausible impediments. This finding may reflect adequacy of training of the supervisors engaged in the MMed process. Some previous studies indicated that problems such as insufficient numbers of supervisors from which to select and apparent inadequate supervision by supervisors contributed to delays in the MMed[13,14] – a finding that was not reflected in the present study.

The components with the longest time taken for completion included processes such as development of the research protocol, data analysis, and development of the first draft of the final report. These components were viewed as candidate-dependent factors, and the prolonged duration may be a reflection of inadequacy in training in and development of the skills required for the research process, including scientific writing and data analysis. These areas have commonly been reported as barriers to progression to completion of the MMed. The present study further corroborates previous findings that lack of research training was viewed as a major barrier to the performance of research.[12,13] In this regard, the Faculty of Health Sciences at the University of the Witwatersrand has recently

developed and introduced compulsory academic courses on proposal development, data analysis and statistics for higher degree candidates. Internationally, similar training programmes have been introduced, and it has been reported that this intervention has significantly improved research productivity.[15] Monitoring of trends in terms of improvement of the duration of these components would potentially indicate the benefits of such courses, reflecting an improvement in development of the skills required for research. The full impact of this intervention will require ongoing analysis and assessment, as the current data have not shown improvements in the time to complete the MMed in recent years.

Additionally, factors such as being overwhelmed with clinical responsibility, procrastination, and overestimation of personal capabilities may be other important individual candidate factors that may contribute to the protraction of MMed completion. Students may have succumbed to the well-described 'planning fallacy', according to which the duration of any activity is often underestimated, despite previous experience.[16] This pitfall can potentially be overcome by the provision of a structured timeline for the various activities involved in the MMed thesis process.

Obtaining ethical clearance and approval of the final protocol were identified as additional potential bottlenecks, with ~25% of protocols taking ≥4 months to receive approval and ~20% of candidates requiring ≥4 months to receive final ethical approval. It has been shown that delays of >3 months to receive feedback from the ethics review committee occurred at another SA university. This situation was further compounded by delays with regard to revisions that needed to be done to gain final ethical approval.[17] Such problems are not unique to the SA setting, and similar delays have been noted internationally, as indicated in studies conducted in countries such as the UK.[18] The reasons for these delays may once again be multifactorial, and may reflect concerns regarding the quality of the protocols being developed and submitted by candidates, the rigorous stipulations and requirements for the protocol and ethics committee approval, the extensive and challenging application process, and the regularity of the meetings/reviews of the respective committees.[17]

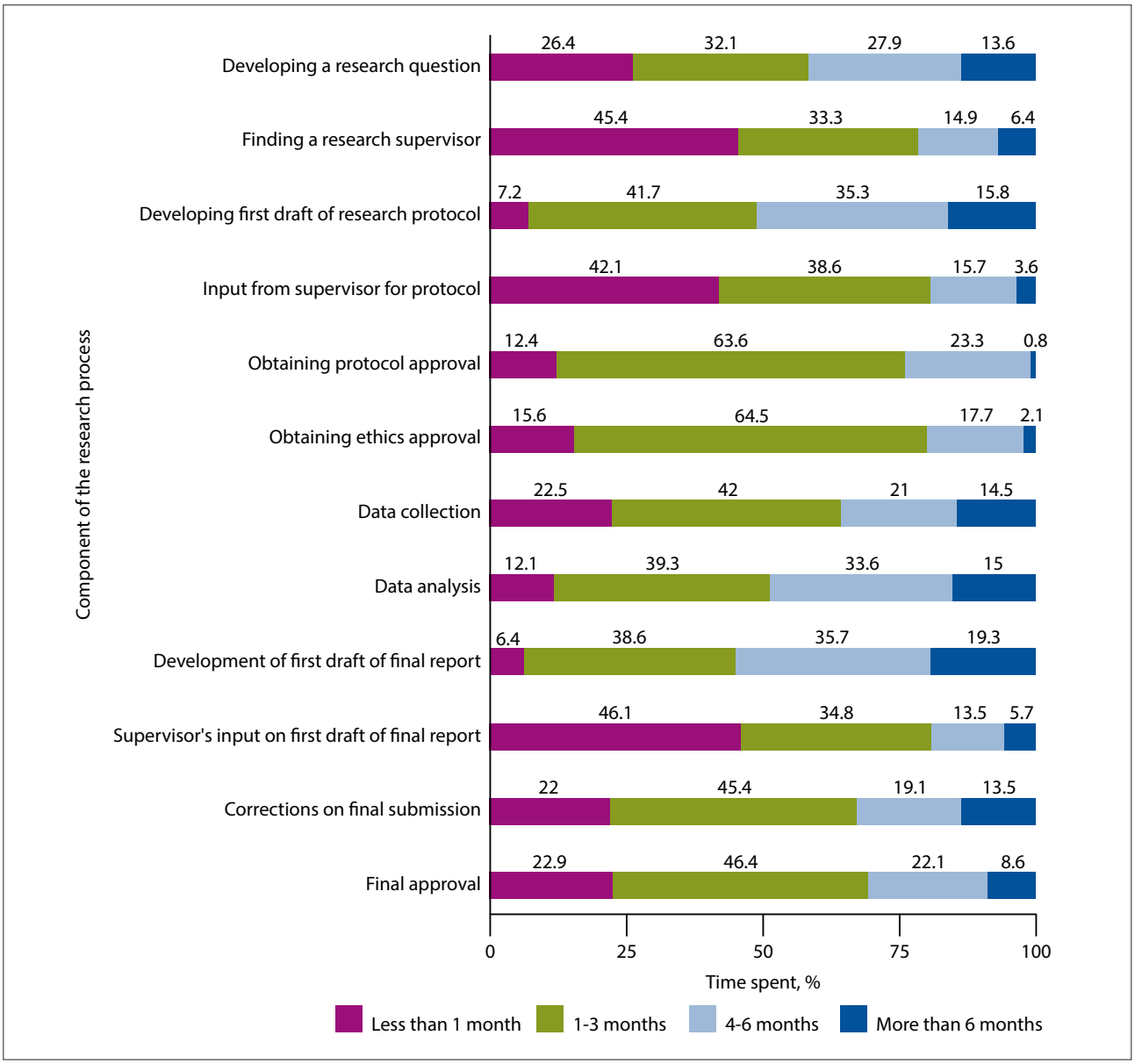


Fig. 1. Duration of each component of the research component of the MMed research thesis. Each coloured block (and text overlays) demonstrates the percentage of time spent across four time periods (<1 month, 1 - 3 months, 4 - 6 months, >6 months) for each research component.

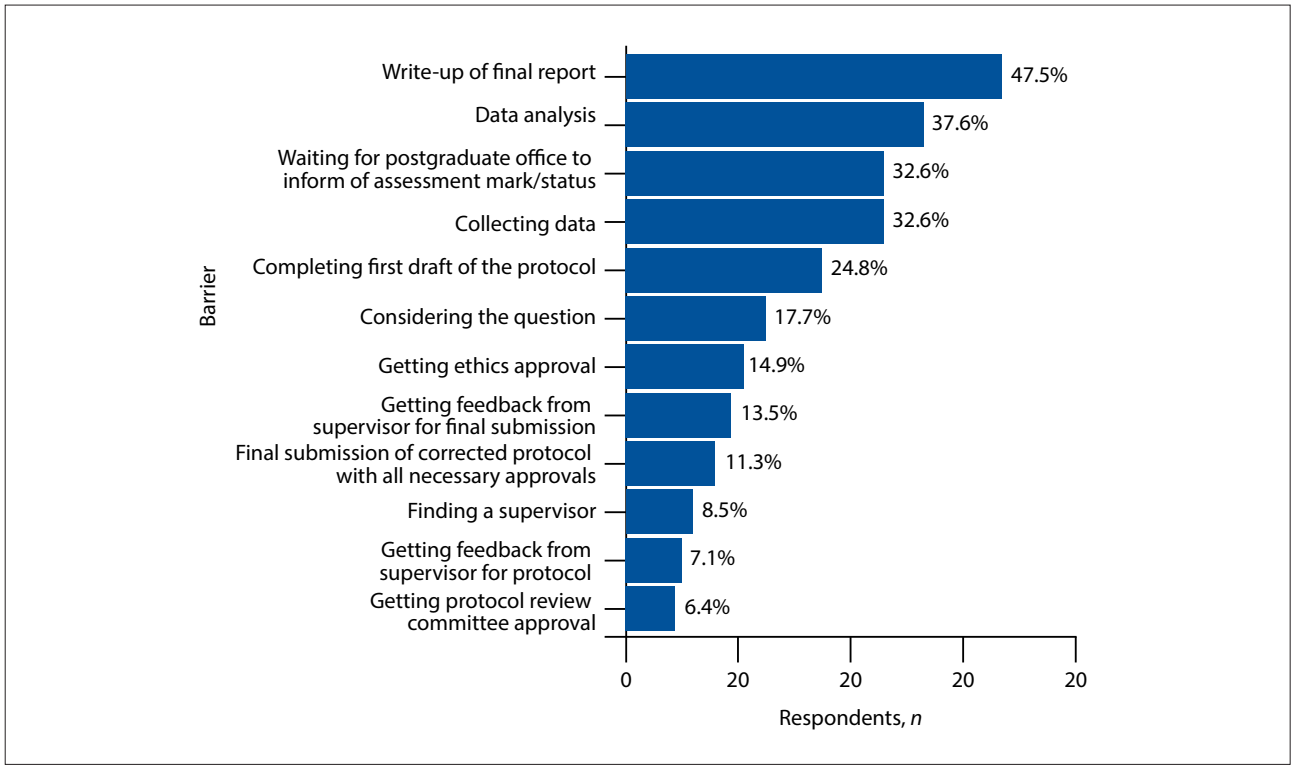


Fig. 2. Frequency (%) of respondents rating a category as a barrier to progress to timeous completion of the MMed research thesis.

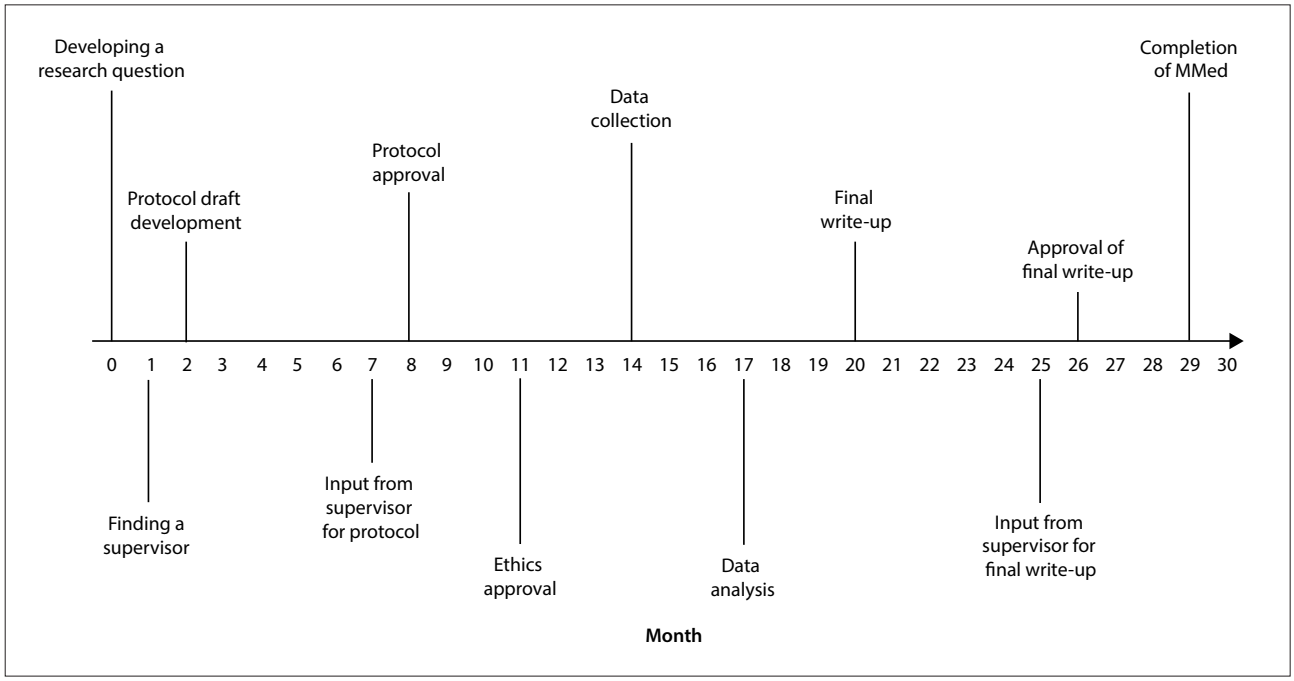


Fig. 3. Proposed timeline for each component of the MMed research thesis process for completion within a 30-month period.

Moreover, challenges in terms of approval from other regulatory bodies involved in the research, such as the National Health Laboratory Service, were further factors reported by candidates that contributed to the delays noted in this study. Review and implementation of practices and standards to streamline the above processes may assist with improvement in terms of the duration of the MMed.

Self-reported factors that candidates considered advantageous in terms of successful completion of the MMed research thesis included having a dedicated research rotation in which clinical responsibilities are decreased, as well as having a committed and supportive research supervisor. This finding reflects the difficulty of conducting research while at the same time ensuring that clinical responsibilities are fulfilled.

Internationally, and across a multitude of clinical disciplines, the implementation of a research-orientated rotation appears to have highly favourable results in terms of completion of an MMed thesis (or equivalent).[19] The presence of a supportive and knowledgeable

supervisor was a commonly cited beneficial factor, once again highlighting the need for adequate supervisor training and ensuring the supervisor's commitment to the research process. A helpful supervisor, together with an easily accessible database and adequate records, was the most frequently cited beneficial factor in this study in terms of successful completion of the MMed thesis. Furthermore, the inverses of these factors were frequently quoted as hindrances to the completion of the thesis. This finding has important implications for students, supervisors and institutions alike with regard to research training, MMed topic selection, supervisor experience and selection, and the structure of the specialisation process.

Study limitations

Most of the information obtained from the respondents relied on their memory and estimation of time periods, which may have led to some recall bias and to inaccuracies in the data collected. The study population included only paediatrics registrars, which is a regulated and probably representative sample; however, this may limit extrapolation of the findings to other departments.

Recommendations

A set of recommendations and a structured timeline (Fig. 3) are proposed. Based on the data obtained, this is a suggestion in terms of a workable timeframe that should ultimately assist students, supervisors and universities in ensuring a scheduled approach to each activity. Furthermore, problematic areas should be identified early to allow intervention, and accordingly lead to the efficacious completion of the MMed research thesis within an approximate 30-month period. This same modular approach to the thesis has been recommended previously,[10] but a precise timeline and beneficial factors were not provided. It is important to note that the strict suggested timeline allows ample time for variation and accounts for unexpected delays. It should also be noted that no single activity should have a duration of ≥6 months, and if this is happening, it should be recognised early and appropriate interventions should be applied. Importantly, not all processes follow a linear progression, and certain activities may in fact occur simultaneously.

Furthermore, from a procedural perspective, possible interventions to assist with streamlining the research process would include development and implementation of training of candidates with regard to research proposal development, scientific writing and data analysis. The importance of engaging dedicated and experienced supervisors and the value of their support and much-needed guidance should not be underestimated. The introduction of a time period during which there can be a reduction of clinical responsibilities, thereby allowing candidates to focus more comprehensively on the MMed thesis, is an important consideration. This approach has been shown to provide economical and efficient research processes in other disciplines.[20]

Implementation of the above strategies should result in a more efficient process and may ultimately result in completion of the MMed in a further reduced timeline, as indicated by the candidates. These various factors and areas of possible intervention should be extensively considered by institutions and the various stakeholders to assist with expedited completion of the MMed.

Conclusion

It is evident that successful and timeous completion of the MMed research thesis as a requirement for the specialisation process is complex and may at times be challenging. The majority of candidates are successful in completing it within the 4 years of training time. However, it is concerning that almost one in five candidates do not complete the MMed during this period and are consequently unable to register as a medical specialist. The major contributing factors appear to be related to inexperience and lack of exposure of candidates in terms of the research process, as well as some of the administrative procedures involved. We believe that utilisation of the above recommendations and proposed structured schedule has the potential to streamline the process and ensure successful and timeous completion of the MMed.

Data availability. The deidentified data from the present study are available from the corresponding author (JP) on reasonable request. Any restrictions or additional information regarding data access can be discussed with the corresponding author.

Declaration. The research for this study was done in partial fulfilment of the requirements for JP's MMed (Paed) degree at the University of the Witwatersrand.

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Author contributions. JP: conception, write-up, data collection, data anlaysis, review, collaboration and submission; AC: conception, write-up, data collection, review, collaboration and submission.

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