Publication rate of 309 MMed dissertations submitted between 1996 and 2017: Can registrars fulfil HPCSA Form 57 MED amendments?

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Background. The recent amendment to the Health Professions Council of South Africa (HPCSA) Form 57 MED allows specialist registration on publication of the compulsory MMed research assignment in an accredited journal. No data exist on the conversion rate of MMed dissertations to publication.

Objectives. To establish conversion rates of MMed dissertations to accredited publications. Associated variables arising from the publishing exercise were also investigated.

Methods. A total of 309 MMed dissertations, submitted between 1996 and 2017, were downloaded from the public domain. Each dissertation was recorded as to format, submission year, awarding university and clinical discipline. Electronic searches determined publication outcomes. Journal title, accreditation status, year of publication, registrar position on author ranking and publication type were extracted for each output. Descriptive analysis was undertaken and, where appropriate, Fisher's exact test at $p<0.05$ was used to establish statistical significance.

Results. A total of 116 dissertations were published at an overall conversion rate of 37.5%, culminating in 136 outputs. Publication-ready dissertations had a significantly higher conversion rate (60.3%) than monographs (30.5%) ($p<0.0001$). All but 6 of the 80 publishing journals were accredited. SAMJ was the journal of choice for 13% of papers. The registrar was the first author in the majority of publications. In the case of monographs, 66% were published after dissertation submission compared with 50% of publication-ready formats.

Conclusions. Conversion of the South African MMed dissertation into a journal-accredited scientific article was achieved in 60.3% of publication-ready format submissions, suggesting that the HPCSA amendment facilitating specialist registration is attainable. Retrospective reviews of dissertations provide valuable insights to improve understanding of the contentious issue of the registrar research requirement that permits specialist registration.
local (www.ndltd.org) and global (www.researchgate.net) ETD sites and library repositories of all 8 SA specialist training universities. The methods have been previously described and for the current study the following variables were recorded from each dissertation: format, year of submission, graduating university and clinical discipline. Dissertations submitted after 2017 were excluded to allow for publication lag time.

Search strategy for publications
From March to June 2019 searches were conducted using PubMed (http://www.pubmed.gov), Google Scholar (http://scholar.google.com) and Google (http://www.google.com). Keywords using the name of the registrar, title of the dissertation and graduating university served as search terms. The resulting retrieved items were compared with the dissertation content. If there was a complete or partial match, the item was downloaded (publication or abstract) for further scrutiny. A dissertation was considered published if there was congruence between the author(s), title and dissertation content and the journal article. In cases where the dissertation seemed unpublished, additional searches using the functions ‘Related articles’ and ‘Cited by’ were used to fully explore the web. In addition, social media sites (ResearchGate (www.researchgate.net), LinkedIn (www.linkedin.com)), the journal intended for publication (as stated in publication-ready dissertations) and supervisor name(s) were accessed until these avenues were exhausted. Each output was recorded for journal of publication, journal locale, journal accreditation, registrar position in publication authorship list and year of publication.

Confirmation of journal accreditation
DHET-accredited journal lists for publications in 2018 (www.dhet.gov.za/SitePages/UniversityEducation.aspx) were consulted to verify the journal status of each MMed publication.

Data analysis
Data were entered into an Excel 2016 (Microsoft, USA) spreadsheet and analysed descriptively. Comparative analyses were undertaken using a Fisher’s exact test (www.graphpad.com), with statistical significance set at p<0.05.

Ethical approval
All dissertations are within the public domain, and ethical approval for the study was obtained from the Postgraduate Education, Training, Research and Ethics Unit: Human Research Committee, Faculty of Health Sciences, Walter Sisulu University (ref. no. 032/2019).

Results
During the study, it became evident that there were differences between the monograph and publication-ready formats. The sample was subdivided along format lines, where necessary, to gain further insight regarding MMed outputs (Fig. 1). The year of submission for sampled MMed dissertations was between 1996 and 2017, with the newer publication-ready format first appearing in 2010. Publications span 1998 - 2019 and it is likely that some dissertation outputs are still in the publication pipeline. Historically, publications mirrored MMed submission, with a rise in numbers from 2009 onwards (Fig. 2). Of the 309 dissertations, 116 were published, giving an overall 37.5% conversion rate of dissertation to publication.

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Thirteen registrars published >1 output from their research, resulting in 136 outputs, broken down by publication type (Fig. 1). Of interest was the policy brief on partner violence prepared for a provincial Department of Health and Social Development.

Table 1 shows that the University of Cape Town (UCT) dominated the sample and outputs, with a dissertation conversion rate of 53%. Although Walter Sisulu University (WSU) had a better rate (57%), this comes from a low base and 1 registrar's MMed producing 4 publications. Three colleges, the College of Otorhinolaryngologists (CORl), College of Paediatricians (CPaed) and College of Orthopaedic Surgeons (COrth), had the best conversion rates of 71%, 61% and 60%, respectively. However, CORl publications are also from a very low base – this finding should be viewed with caution. More detailed data examination revealed further interesting findings. All 6 Sefako Makgatho Health Sciences University (SMU) publications came from the College of Family Physicians (CFP), illustrating the publication strength of that clinical department. Finally, publication-ready-format dissertations were absent in 3 universities: SMU, University of Pretoria (UP) and WSU.

Publications (n=135) were published in 80 journals, almost equally divided between those of local and international origin (Table 2). SAMJ accounted for 17 publications, while 10 local journals published >1 paper (Table 3). All but 6 journals, with a single publication each, were accredited by DHET (92.5%).

The registrar was the first author in the majority of publications in both dissertation formats. Notably, the registrar was absent from the author list in 2 cases and was the sole author in 5 publications (Table 4). The total number of authors per article was generally ≤4, although multiple authorships (5 - 10) were encountered. Co-authors mostly comprised supervisors and co-workers (as could be surmised from the dissertation title page and acknowledgement section).

When investigating publication year relative to dissertation submission year, monographs had the longest time to publication, with an interval ranging from 7 years presubmission to 9 years after submission, with 34% of papers published prior to and including the year of submission (Fig. 3). By contrast, publication-ready-format publications extended from 4 years presubmission to 3 years after submission, with 50% appearing before and including the year of submission. However, this difference was not significant (p=0.07).

Discussion
The primary finding of this study was that 60.3% of publication-ready dissertations were converted to publications, largely in accredited journals, thereby suggesting that the Form 57 MED proviso, viz. ‘...
discipline specific research assignment … published in accredited journal, is readily achievable via this dissertation format. A further unexpected finding was that 50% of publication-ready dissertation research was published prior to or during the dissertation submission year. This is unusual, given the prolonged publication lag times. Finally, this study is the first to reveal SA MMed dissertation publication rates since 1996. All the abovementioned results have important corollaries in the wider arena, beyond that of future Form 57 MED compliance, which merit further discussion.

Historically, publication of MMed research is not a new phenomenon. It occurred well before the advent of the HPCSA decree of 2011, dispelling the notion that current registrars fulfilling research requirements via publication is a recent development.[7] The overall SA MMed publication rate compares favourably with international conversion rates, where 3 references from the extensive literature on the topic should suffice. Master’s health sciences-related research in low- and middle-income countries have a wide publication conversion rate of 6 - 41%.[9] In the Global North, 35.3% of French radiology resident research is published,[10] as is 15.7% of Japanese paediatric residents’ research.[11] This suggests that, overall, SA registrar research publication rates are similar to those found elsewhere, with publication-ready dissertation conversion rates well above reported findings.

Post-submission time to publication of journal articles is highly variable, with a wide range of 1 - 7 years for Turkish general surgeon residents[11] and 16 - 21 months for Thai paediatric residents.[12] Comparisons are difficult, because of novel reporting in the current study of presubmission publication, which does not feature in the perused literature. Presubmission publication is advantageous: registrars, once their training is concluded, have little interest in devoting time to writing an article and tackling ensuing journal submission procedures. This complicates and delays publication,[13] and it is often left to overburdened supervisors to finalise the writing-to-publication procedure (or not). It is therefore desirable to have the entire publication process finalised before MMed dissertation submission so that the registrar is involved throughout.

Research articles formed the bulk of published outputs, with a sprinkling of editorials, case studies and reviews. Of particular note was the policy brief arising from a dissertation on family violence. Obuku et al.[14] have noted the poor use of postgraduate research to inform policy or practice guidelines and suggest that this is an area deserving of further enquiry. Given the variety of disciplines and research topics among the dissertations sampled, it comes as no surprise that 80 journals were involved in publishing the 135 research articles. The way in which journals are rated or accredited varies among countries and makes comparisons difficult. Our finding of 92.5% accredited-journal usage is not atypical, where 3 studies report 100% publication in Medline-indexed,[9] PubMed-indexed[2] or peer-reviewed journals.[3] By way of contrast, others report lows of 18%[15] and 22%[16] in indexed and Science Citation Index (SCI) journals, respectively. Ultimately, local journals were responsible for just over half of all publications, higher than the national SA publication average of 33% for such journals.[10] SAMJ published the most research papers (13%), endorsing its status as an SA ‘mega-journal’[20]

Author ranking is ethically controversial; the orthodoxy is that the individual who conducts the study and has given the greatest input should be credited as the first author. Unfortunately, power imbalances may disrupt this order.[8] Ethical conduct appears to be upheld in SA, where the registrar undertaking the research was the first author in 92% of publication-ready dissertation academic papers and 86% of monograph publications. Elsewhere, figures of 23 - 99%,[10] 13%[16] and 78.9%[11] indicate variable practices when assigning first authorship to the registrar, trainee or resident.

Study limitations
Not all SA specialty-training universities upload MMed dissertations onto repositories and ETD databases, and most universities experience delayed uploading, which limits dissertation availability. Other researchers have recouled similar obstacles
to reviewing trainee/resident dissertations for study.\textsuperscript{2,9} Obuku \textit{et al}.\textsuperscript{14} went one step further and calculated a median 3.8-year uploading delay to a Ugandan university repository. In keeping with these authors, it is felt that such delays and omissions have not materially affected sampling strategy or detrimentally influenced current study findings.

\begin{table}
\centering
\caption{Breakdown of MMed dissertations by university and college\textsuperscript{*}}
\begin{tabular}{lcccc}
\hline
 & \textbf{MMed dissertations, n} & \textbf{Published monograph format, n} & \textbf{Published publication-ready format, n} & \textbf{Published output, n} & \textbf{Conversion rate of dissertation to publication, \%} \\
\hline
\textbf{University} & & & & & \\
UCT & 91 & 13 & 35 & 56 & 53 \\
Wits & 69 & 17 & 3 & 22 & 29 \\
SU & 45 & 13 & 2 & 15 & 33 \\
UKZN & 43 & 15 & 3 & 24 & 42 \\
SMU\textsuperscript{†} & 30 & 6 & - & 6 & 20 \\
UP & 13 & 3 & - & 3 & 23 \\
UFS & 11 & 1 & 1 & 2 & 18 \\
WSU & 7 & 4 & - & 8 & 57 \\
\textbf{College\textsuperscript{‡}} & & & & & \\
COG & 58 & 15 & - & 18 & 26 \\
CPHM & 36 & 7 & 6 & 16 & 36 \\
CFP & 36 & 12 & 1 & 16 & 36 \\
CA & 29 & 4 & 4 & 11 & 28 \\
CPaed & 23 & 10 & 4 & 17 & 61 \\
CS & 17 & 6 & 2 & 10 & 47 \\
CP & 15 & - & 2 & 2 & 13 \\
COrth & 15 & 2 & 7 & 11 & 60 \\
CRO & 16 & 4 & 2 & 6 & 38 \\
CPath & 12 & 2 & 3 & 6 & 42 \\
CPsych & 11 & - & 1 & 1 & 9 \\
COpth & 7 & 2 & 1 & 3 & 43 \\
COl & 7 & 1 & 4 & 5 & 71 \\
CNeurosurg & 6 & 1 & - & 1 & 17 \\
CPlast & 4 & 1 & 3 & 4 & 100 \\
CForPath & 3 & - & - & 0 & 0 \\
CEM & 3 & - & 2 & 2 & 67 \\
CDerm & 2 & - & - & 0 & 0 \\
CNeurul & 2 & - & 1 & 2 & 50 \\
CNP & 2 & - & - & 0 & 0 \\
CPS & 2 & 2 & - & 3 & 100 \\
CMG & 1 & - & 1 & 1 & 100 \\
CR & 1 & - & - & 0 & 0 \\
CU & 1 & 1 & - & 1 & 100 \\
\hline
\end{tabular}
\end{table}

\begin{table}
\centering
\caption{Local v. international journals for 135 publications emanating from 72 monographs and 44 publication-ready dissertations\textsuperscript{*}}
\begin{tabular}{lccc}
\hline
 & \textbf{Published monographs, n} & \textbf{Published publication ready, n} & \textbf{Publications, n (\%)} \\
\hline
\textbf{Local} & 41 & 29 & 70 (52) \\
Overseas & 43 & 20 & 63 (47) \\
Unknown & 2 & - & 2 (1) \\
\hline
\end{tabular}
\end{table}

\textsuperscript{*}Of the total of 309 dissertations, 236 were monographs and 73 were in publication-ready format. In certain cases, the total published outputs are greater than the sum of published dissertations (monograph or publication-ready format), as several registrars had >1 output per dissertation.

\textsuperscript{†}Due to mergers, the numbers reported here are the totals obtained from adding MMed dissertations appearing in MEDUNSA, University of Limpopo and SMU repositories.

\textsuperscript{‡}www.cmsa.co.za

\textsuperscript{7}University of Cape Town; Wits = University of the Witwatersrand; SU = Stellenbosch University; UKZN = University of KwaZulu-Natal; SMU = Sefako Makgatho Health Sciences University; UP = University of Pretoria; UFS = University of the Free State; WSSU = Walter Sisulu University; COG = College of Obstetricians and Gynaecologists; CPHM = College of Public Health Medicine; CFP = College of Family Physicians; CA = College of Anaesthetists; CPath = College of Pathologists; CS = College of Surgeons; CP = College of Physicians; COrth = College of Orthopaedic Surgeons; CRO = College of Radiation Oncologists; CFPsych = College of Psychiatrists; COpth = College of Ophthalmologists; COl = College of Otorhinolaryngologists; CNeurosurg = College of Neurosurgeons; CPlast = College of Plastic Surgeons; CForPath = College of Forensic Pathologists; CEM = College of Emergency Medicine; CDerm = College of Dermatologists; CNeurul = College of Neurologists; CNP = College of Nuclear Physicians; CPS = College of Paediatric Surgeons; CMG = College of Medical Geneticists; CR = College of Radiologists; CU = College of Urologists.

\textsuperscript{8}Thirteen candidates published >1 article. Total publications: n=135, as 1 output was a policy brief.
The number of journal articles retrieved probably under-report the dissertation conversion rate, firstly owing to protracted publication processes, and secondly, the 23-year span of this investigation possibly hampered the finding of earlier records. Similar problems have been described when extracting publications for a 1996 - 2010 review.[13] Therefore, publishing lag time and loss of dated records must be acknowledged when evaluating the current results. Finally, the contribution of unexamined journal publications (the third MMed option) has not formed part of this study. While this omission will contribute to an underestimation of overall MMed publication outputs, the conversion rate of dissertations to publications in this option cannot be established in the absence of journal rejection data, crucial to calculating conversion rates.

Conclusions
Conversion of the SA MMed dissertation into a scientific-accredited journal article as per Form 57 MED has been achieved in 60.3% of publication-ready-format submissions, suggesting that this format would be the preferred option for future MMed research for specialist registration.

Production of research is a core business of universities globally. Apart from the production and dissemination of knowledge, publication is deemed as making the research ‘worthy’ and crucial in acquiring DHET research subsidies. This study highlights the handsome (and growing) contribution the MMed degree has made in acquiring DHET research subsidies. This study highlights the handsome (and growing) contribution the MMed degree has made in acquiring DHET research subsidies.

Table 3. Journals in which MMed dissertations were published

<table>
<thead>
<tr>
<th>Journal*</th>
<th>Local/ international</th>
<th>Publications, n</th>
</tr>
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<tbody>
<tr>
<td>South African Medical Journal</td>
<td>L</td>
<td>17</td>
</tr>
<tr>
<td>South African Orthopaedic Journal</td>
<td>L</td>
<td>7</td>
</tr>
<tr>
<td>Southern African Journal of Anaesthesia and Analgesia</td>
<td>L</td>
<td>7</td>
</tr>
<tr>
<td>South African Journal of Surgery</td>
<td>L</td>
<td>7</td>
</tr>
<tr>
<td>African Journal of Primary Health Care and Family Medicine</td>
<td>L</td>
<td>7</td>
</tr>
<tr>
<td>Cardiovascular Journal of Africa</td>
<td>L</td>
<td>4</td>
</tr>
<tr>
<td>International Journal of Gynaecology and Obstetrics</td>
<td>I</td>
<td>4</td>
</tr>
<tr>
<td>South African Journal of Obstetrics and Gynaecology</td>
<td>L</td>
<td>4</td>
</tr>
<tr>
<td>South African Journal of Child Health</td>
<td>L</td>
<td>4</td>
</tr>
<tr>
<td>African Journal of AIDS Research</td>
<td>L</td>
<td>2</td>
</tr>
<tr>
<td>PLoS ONE</td>
<td>I</td>
<td>2</td>
</tr>
<tr>
<td>South African Family Practice</td>
<td>L</td>
<td>2</td>
</tr>
<tr>
<td>Pediatric Infectious Disease Journal</td>
<td>I</td>
<td>2</td>
</tr>
<tr>
<td>Other journals (single publication)</td>
<td>L/I</td>
<td>66</td>
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L = local; I = international.
*Thirteen journals were most frequently used (≥2) (n=80/135 publications). Total publications: n=135, as 1 output was a policy brief.

Table 4. Registrar author ranking and listed authors (n) for the 136 outputs emanating from 72 monographs and 44 publication-ready dissertations

<table>
<thead>
<tr>
<th>Registrar position in author list</th>
<th>Publication ready, n*</th>
<th>Monograph, n*</th>
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<tr>
<td>Registrar not listed</td>
<td>0</td>
<td>2</td>
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<tr>
<td>1st author, n (%)</td>
<td>46 (92)</td>
<td>74 (86)</td>
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<tr>
<td>2nd author</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>3rd author</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Authors listed</td>
<td>5</td>
<td>5</td>
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<td>1</td>
<td>12</td>
<td>28</td>
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<td>2</td>
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<td>10</td>
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</table>

*Unless otherwise specified.

The research field level is merited to identify the drivers that fashion, form and mentor successful research environments.

It seems that retrospective reviews, such as this article, are admirably suited as publishable registrar research topics to examine issues on research productivity, dissertation quality, education outcomes and favoured research fields. Such inquiries could provide valuable insights as to the way forward to improve understanding of the contentious issue of the research requirement for registrars, which permits specialist registration.

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