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Protocol for mixed-method systematic review of urology in medical school education

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ABSTRACT

Introduction Throughout clinical practice, most doctors will encounter patients with urological conditions. Inclusion of urological topics within medical school curriculums is important to allow doctors to effectively diagnose and manage these conditions, independently and with support from urologists. Awareness of urological education interventions and their effectiveness is essential for improving the quality and outcomes of medical student education. No systematic review of medical school education interventions on urological topics has previously been conducted. This mixed-method systematic review will assess the effectiveness of medical school education interventions on urological topics.

Methods and analysis This mixed-methods systematic review will include qualitative and quantitative studies involving education interventions or practices regarding urological topics conducted within a medical school curriculum. Studies regarding other curriculums including premedical education, junior doctor prevocational education or vocational urological training will be excluded. A search of CINAHL, ERIC, EMBASE, MEDLINE will be conducted for studies published since the year 2001. Dual independent screening of titles and abstracts prior to full text review will be undertaken for all identified results during the initial searches. Any disagreement will be settled by a third reviewer. A convergent segregated approach will be used to synthesise qualitative and quantitative data independently, with the results juxtaposed to identify shared and divergent findings between study types.

Ethics and dissemination No ethical approval was required for this review. Findings from this review will be disseminated via publication, reports and conference presentations.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This systematic review protocol follows the Joanna Briggs Institute, mixed-method systematic review protocol.
⇒ This review includes studies published globally to establish trends in a diverse and heterogeneous population of medical students.
⇒ Non-English articles will not be included in this review. This limitation may cause language bias.
⇒ There is potential for low and inconsistent quality in the reporting of effectiveness of urology medical education.
⇒ There is potential for heterogeneity of published data, which may limit the conclusions that can be drawn from this study.

418 825 cases, which was 12.5% of all cancers globally in 2020.[2] By 2025, USA is estimated to have a 30%–40% increase (52 million) in people affected by symptomatic urological conditions.[3] Many of these urological conditions are associated with increased age, and their incidence is expected to continue rising with population growth and increased life expectancy.[1 2] This increasing prevalence of urological diseases around the world translates to a significant number of people accessing healthcare for treatment. While urologists are involved in treating many of these patients, most are initially diagnosed and treated by primary care clinicians or other non-urologists.[4]

The primary objective of medical school education is to provide a generalist education, where graduates have the foundation knowledge for further training in any branch of medicine.[5] A generalist may only need to know when to refer certain conditions to be managed by a urologist. Training supervisors of urology, emergency medicine, family medicine, internal medicine and paediatrics prioritised similar urological conditions as essential knowledge for medical students. These core topics are urinary stones, haematuria, adult urinary tract infections, benign prostatic hyperplasia, urinary incontinence, prostate

INTRODUCTION

Benign and malignant urological conditions are a major contributor to morbidity and healthcare cost around the world. In 2008, the worldwide prevalence of lower urinary tract symptoms was estimated to be 45.2% of the world's population.[1] The prevalence of urological malignancies is high globally with prostate, bladder and kidney cancer the 3rd, 12th and 16th most common malignancies, respectively. Together these three types of cancer accounted for 2

cancer, prostate specific antigen (PSA) screening and testicular torsion.[6] General practitioners are increasingly expected to better understand the urological pathology of their patients; to accurately triage urological presentations; to manage low acuity urological issues and to initiate the appropriate initial workup prior to specialist referral.[7]

To prepare these medical graduates for clinical practice, the medical school curriculum needs to give adequate exposure to specialty education including urology. Despite the recognised importance of education in urological conditions within medical school curriculum, the recent trend in medical student education has been to condense early didactics and shorten preclinical curriculum.[7] A parallel issue is the variability in urological education between medical programmes, which adds further challenges to identifying and implementing evidence-based education interventions.[8]

Based on a search of Medline, Embase and Google Scholar databases, along with PROSPERO systematic review register, no systematic review into education interventions for urological topics is underway or previously been conducted. One scoping review conducted by Sam *et al*[9] mapped literature addressing current approaches to urological education. This review conducted in 2018 identified 114 studies falling within 5 domains. Studies focusing on knowledge base were most frequent (38%), other studies considered urology curriculum (19%), clinical skills education (17%), surgical skills training (13%) and student experiences (13%). It concluded that there is paucity of literature investigating implementation and outcomes of formal urology medical student education.[9]

Our systematic review will critically appraise the articles on the type of educational interventions, their effectiveness and the experience of the medical student undergoing urology education in undergraduate medical schools. There will be an updated search conducted to include the latest published studies. This will be a comprehensive analysis of both qualitative and quantitative studies requiring a mixed-method systematic review (MMSR) approach to the systematic review. Based on our analysis, we will be able to provide recommendation to improve the medical school urology education.

Review questions

This review has two objectives. First, to critically appraise the literature and synthesise evidence on the types of urology education interventions in medical school curriculum. Second, to assess effectiveness of these methods in providing urology education to medical students.

The questions this review seeks to answer are as follows:

► Among medical students, what is the outcome of education interventions on urological topics, in terms of improved knowledge or skills gained?

► What do medical students and their educators perceive as the benefits, challenges, meaningfulness and appropriateness of education interventions on urological topics to be?

Inclusion criteria

Population

This review will consider studies that include medical students or educators of medical students.

Intervention

The quantitative component of this review will consider studies that evaluate education interventions for urological topics.

Outcomes

The quantitative component of this review will consider studies that include the following:

► Time allocated to urological education.

► Types of education interventions used for teaching urological topics.

► Student outcomes, including measures of knowledge improvement and skill competence.

Phenomena of interest

The qualitative component of this review will consider studies that explore the experiences of students receiving urological education interventions and/or the experiences of educators providing urological education interventions, in terms of perceived benefits, meaningfulness and appropriateness.

Context

The qualitative component of this review will consider studies that investigate interventions and outcomes in the context of medical school education. This study will exclude interventions conducted with premedical students, or doctors at any stage of postgraduate training.

Types of studies

This review will consider qualitative, quantitative and mixed-methods studies published in the last 20 years. Qualitative studies will include, but not be limited to, those with study designs such as phenomenology, grounded theory, ethnography, action research and feminist research. Quantitative studies will include experimental studies and cohort studies, both prospective and retrospective in design. Sources that do not contain original research (narrative reviews, editorials, commentaries, opinion papers and letters), along with those not published in English will be excluded.

METHOD

This systematic review will follow the Joanna Briggs Institute Manual for Evidence Synthesis approach to MMSR along with the Preferred Reporting Items for Systematic Review and Meta-analysis Protocols (PRISMA) checklist.[10] This systematic review will be prospectively registered with PROSPERO. Design and methods used for this systematic review will comply with Centre of Reviews and Dissemination Guidelines[11] and will be reported in line with PRISMA guidance.[12] Any pertinent amendments made to the protocol will be published along with the results of

the systematic review. There will be no public or patient involvement in this review.

Search strategy

This systematic review will use a three-step search strategy. A limited preliminary search of MEDLINE (EBSCO) was conducted to identify studies of interest. These results were analysed to identify descriptive terms from the titles and abstracts along with Medical Subject Terms (MeSH), which were used to develop a comprehensive search strategy. With the assistance of an experience information specialist, this search was conducted in MEDLINE (EBSCO). This strategy will be adapted for CINHAL (EBSCO) ERIC and EMBASE (EBSCO) databases (see online supplemental appendix 1). The final search strategies will be peer-reviewed using the Peer-Review of Electronic Search Strategies guidelines.[13] Third, the reference list of all included studies will be manually reviewed for additional sources meeting inclusion criteria.

Study selection

Following completion of the search, all identified citations will be uploaded into the Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia) with duplicates removed. Screening for inclusion will be conducted in two phases. The first phase will involve screening titles and abstracts from initial search results. The second phase will involve reviewing full-text articles against the previous stated inclusion criteria. Both phases of screening will be conducted by two independent reviewers. In cases of disagreement that are unable to be resolved by consensus, a third senior will adjudicate.

All sources that are excluded from the study during the full-text review for not meeting inclusion criteria will be recorded and reported in an appendix to the finalised systematic review. The PRISMA flow diagram will be presented to summarise the process for study selection.[10]

Assessment of methodological quality

Included studies will be assessed by two independent reviewers, where disputes unable to be settled by consensus will be adjudicated by a third reviewer. Quantitative papers (and quantitative component of mixed-methods papers) will be assessed at the study level. Methodological quality of all studies will be assessed using the Mixed Methods Appraisal Tool (MMAT), which is a validated critical appraisal instrument for assessing methodological quality of qualitative, quantitative (randomised, non-randomised and descriptive studies) and mixed-methods studies.[14]

The MMAT consists of two screening criteria applicable to all studies, along with five criteria unique to each study type assessed; qualitative, randomised controlled, non-randomised controlled, quantitative descriptive and mixed methods. The shared screening questions assess studies for their empirical nature; not answering yes may indicate studies are not appropriate for inclusion within this systematic review. Studies are then assessed using the criteria relevant to their study design. In the case

of mixed-methods studies, they are assessed against the mixed-methods, qualitative and all appropriate quantitative criteria. A three-point scale is used for assessing each criteria; yes, cannot tell and no.

Studies that answer no or cannot tell to either screening question will be reviewed by a third senior reviewer for the appropriateness of their inclusion in this review. All other studies will be included in the results synthesis regardless of the methodological quality assessment.

Data extraction

Prior to commencing the review, the study team will meet to finalise the data charting tool, which will be stored within the Covidence software package. A draft version of the tool to be used for qualitative, quantitative and mixed-methods studies is included in online supplemental appendix 2. Data will be extracted from included full-text sources by two independent reviewers. Any disagreements that arise during the data extraction process that are unable to be resolved via consensus will be adjudicated by a third senior reviewer. Where studies are missing data, authors will be contacted to request missing or additional data.

Development of the data extraction tool is an iterative process. This tool may under modifications during the review process as the content of included studies is extracted. Any modifications to the extraction tool will be documented and reported in the final systematic review. To ensure the completeness of information included for sources, the authors of papers will be contacted to request additional data when required.

Data synthesis and integration

This review will follow a convergent segregated approach to synthesis and integration according to the JBI methodology for MMSR.[15] This will involve independent quantitative and qualitative synthesis, followed by integration of the parallel quantitative and qualitative findings.

Quantitative synthesis

Studies will, where possible, be pooled in statistical meta-analysis, conducted using the metafor package within R Studio.[16] Effect size will be expressed as either odds ratio (for dichotomous data) and weighted (or standardised). The final postintervention mean differences (for continuous data) and their 95% CIs will be calculated for analysis. Statistical analysis will be performed using a random model for the data that has been extracted. Subgroup analysis will be conducted where there is sufficient data to investigate specific types of education interventions. Sensitivity analyses will be conducted to test decisions on methodological quality. Heterogeneity will be assessed statistically using the standard χ^2 and I^2 tests. A funnel plot will be generated to assess publication bias if there are 10 or more studies included in a meta-analysis. Statistical tests for funnel plot asymmetry (Egger's test, Begg's test and Harbord's test) will be performed where appropriate. Where statistical pooling is not possible, the findings will

be presented in a narrative format, including tables and figures to aid in data presentation as appropriate.

Qualitative synthesis

Qualitative research findings will, where possible be pooled using a meta-aggregation approach. This will involve the aggregation of findings to generate a set of statements that represent the aggregation, through assembling the findings and categorising them based on similarity of meaning. These categories will then be subjected to further synthesis producing a comprehensive set of findings that can be used as a basis for evidence-based practice. Where textual pooling is not possible, the findings will be presented in a narrative form. Only unequivocal and credible findings will be included in the final synthesis.

Integration of quantitative and qualitative evidence:

The findings of each synthesis method included in this review will be integrated using configurational comparative method. This will involve the juxtaposition of quantitative and qualitative evidence, to form a structured argument that consists of the whole configured analysis. Where configuration is not possible, the findings will be presented in narrative form.

Recommendations for practice

The findings of this review will provide a comprehensive evidence base on education interventions for urological topics, within medical student curriculum. This will provide a guide for medical schools to improve the quality and effectiveness of their curriculum. It may highlight weaknesses in current education interventions or the evidence supporting them, which may lead to future targeted research in this education field.

Patient and public involvement

Patients and/or the public were not involved in the development of the research question, design of the protocol or dissemination plans of this research.

Ethics and dissemination

No ethical approval was required, as this review involves the synthesis of already available resources. Findings from this review will be disseminated via publication, reports and conference presentations.

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REFERENCES

1 Irwin DE, Kopp ZS, Agatep B, *et al*. Worldwide prevalence estimates of lower urinary tract symptoms, overactive bladder, urinary incontinence and bladder outlet obstruction. *BJU Int* 2011;108:1132–8.
2 Sung H, Ferlay J, Siegel RL, *et al*. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021;71:209–49.
3 Litman HJ, McKinlay JB. The future magnitude of urological symptoms in the USA: projections using the Boston area community health survey. *BJU Int* 2007;100:820–5.
4 Solvang M, Elnegaard S, Jarbøl DE. Urological symptoms among 23,240 men in the general danish population - concerns about symptoms, their persistence and influence on primary care contacts. *Scand J Prim Health Care* 2018;36:227–36.
5 Teichman JM, Weiss BD, Solomon D. Urological needs assessment for primary care practice: implications for undergraduate medical education. *J Urol* 1999;161:1282–5.
6 Kerfoot BP, Turek PJ. What every graduating medical student should know about urology: the stakeholder viewpoint. *Urology* 2008;71:549–53.
7 Casilla-Lennon M, Motamedinia P. Urology in undergraduate medical education. *Curr Urol Rep* 2019;20:69.
8 Cohen SA. The AUA curriculum for medical students: current resources and developments. *Curr Urol Rep* 2019;20:86.
9 Sam P, Heermans JT, Schmidt CM, *et al*. Current state of urologic medical school education: a scoping review. *Urology* 2019;123:59–63.
10 Moher D, Shamseer L, Clarke M, *et al*. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4:1.
11 Tacconelli E. Systematic reviews: CRD's guidance for undertaking reviews in health care. *Lancet Infect Dis* 2010;10:226.
12 Moher D, Liberati A, Tetzlaff J, *et al*. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 2009;339:b2535–336.
13 McGowan J, Sampson M, Salzwedel DM, *et al*. PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *J Clin Epidemiol* 2016;75:40–6.
14 Hong QN, Fàbregues S, Bartlett G, *et al*. The mixed methods appraisal tool (MMAT) version 2018 for information professionals and researchers. *Education for Information* 2018;34:285–91.
15 Aromataris EMZ. JBI manual for evidence synthesis. JBI, 2020. Available: https://synthesismanualjbiglobal, https://doiorg/1046658/JBIMES-20-01
16 Viechtbauer W. Conducting Meta-Analyses in *R* with the metafor Package. *J Stat Softw* 2010;36:1–48.