Medical Education Review Article

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Trends in osteopathic medical education: a scoping review

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Abstract

Context: Following the transition to a single graduate medical education (GME) accreditation system in 2020, leaders at American Association of Colleges of Osteopathic Medicine (AACOM) were interested in learning more about the research being done about osteopathic medical education leading up to that point in time.

Objectives: The objective of this scoping review was to identify trends in undergraduate and graduate osteopathic medical education and to determine where this information was being disseminated and the institutions who were creating the content.

Methods: Searches were conducted in eight databases: PubMed (National Center for Biotechnology Information [NCBI]), MEDLINE (Ovid), Embase (Elsevier), Cumulative Index to Nursing and Allied Health Literature ([CINAHL], EBSCO), Education Research Complete (EBSCO) OSTMED.DR, Education Resources Information Center ([ERIC], Ovid), and Scopus (Elsevier). Gray literature sources were also identified. All 10 authors were involved in the search. Search terms were identified by utilizing Medical Subject Headings (MeSH), the Yale MeSH Analyzer, and through consultation with an expert searcher. Sources were excluded if they were not in English, were based outside of the United States, did not fit in the date range of being published between 2010 and 2020, and included information on COVID-19. The research team conducted title/abstract screening based on the inclusion and exclusion criteria.

Results: A total of 8,083 articles were identified and included through searches, ending in a total of 1,203 articles after full-text screening. Most sources for this osteopathic medical education review were journal articles (n=505) and conference proceedings (n=482). A total of 23 trends were identified, with the top three being residency (n=318), curriculum (n=235), and pedagogy (n=178). None of the other 23 primary trends were above 6.9 %.

Conclusions: Osteopathic medical education trends from 2010 to 2020 were primarily focused on residency, curriculum, and pedagogy. This information was disseminated evenly between published journal articles and conference presentations, and osteopathic institutions that have existed longer and have established research track records were more likely to publish and share information in this area.

Keywords: education trends; osteopathic medical education; systematic review

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and increased student capacity, the transition to a single accreditation system for residency, and advancements in technology and teaching strategies. Examining trends from 2010 to 2020 shows what areas of research are well-developed in osteopathic medical education and where there are gaps prior to the COVID-19 pandemic that significantly impacted medical education. There have been many publications focusing on specific aspects of osteopathic medical education, especially curriculum [1–3], but there have not been any reviews encapsulating a broader overview. The osteopathic community has discussed both formally and informally [4–6] how factors such as technological advances and the single accreditation system for graduate medical education (GME) [7–9] have or will impact osteopathic medical education.

A scoping review methodology allowed the authors to identify trends in undergraduate and graduate osteopathic medical education and identify gaps in the knowledge to facilitate future research. To ensure that no current or underway systematic reviews or scoping reviews on the topic were identified, a search of PubMed, the Cochrane Database of Systematic Reviews, JBI Evidence Synthesis, JBI Review Register, Open Science Framework, and the University of York Centre for Reviews and Dissemination was conducted. Preliminary searches were conducted to understand the topics and potential number of results. Several trends were found in the initial search of osteopathic medical education from 2010 to 2020: growth in osteopathic schools, trends in osteopathic schools vs allopathic schools, curriculum trends, trends specific to osteopathic manipulative medicine (OMM) or osteopathic manipulative treatment (OMT), discussion around the merging of accreditation for the American Association of Colleges of Osteopathic Medicine (AACOM) and the Association of American Medical Colleges (AAMC), preclinical trends, clinical trends, new strategies in medical education, and more recently topics that include social justice and diversity, equity, and inclusion (DEI). The authors identified 23 main categories of trends, with several having subcategories.

Methods

Search protocol

The scoping review was conducted in accordance with the JBI methodology [10, 11] for scoping reviews and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The protocol is registered in Open Science Framework (OSF) at: https://osf.io/5fhq6/.

The search strategy aimed to locate both published and unpublished primary articles, reviews, opinion papers, and gray literature. An initial limited search of PubMed (National Center for Biotechnology Information [NCBI]), MEDLINE (Ovid), Scopus (Elsevier), and OSTMED.DR (Edward Via College of Osteopathic Medicine and VTLS, Inc.) was undertaken to identify articles on the topic utilizing the search string "osteopathic medical education." After identifying a few key articles, the authors utilized the Yale Medical Subject Headings (MeSH) Analyzer to help identify additional terms and expand the search. The text words contained in the titles and abstracts of relevant articles, and the index terms utilized to describe the articles were utilized to develop a full search strategy for PubMed. The authors split into groups to work on each part of the review question: participants, concept, and context to review and evaluate terms for each category. Once this process was complete, the entire team reconvened to reach a consensus on the terms and to draft the search strategy. The authors consulted with an expert searcher for further guidance and peer review of the strategy utilizing Peer Review of Electronic Search Strategies (PRESS) guidelines. After further revision, the search for PubMed (NCBI) was conducted on May 7, 2021. Translated searches for Cumulative Index to Nursing and Allied Health Literature (CINAHL, EBSCO), Education Research Complete (EBSCO), Embase (Elsevier), OSTMED.DR (Edward Via College of Osteopathic Medicine and VTLS, Inc.), Education Resources Information Center (ERIC, Ovid), MEDLINE (Ovid), and Scopus (Elsevier) were developed by the authors. Gray literature sources were identified through Google Scholar (Alphabet Inc.) and MedNar (Deep Web Technologies) utilizing key terms. All 10 authors (KH, MD, AG, MM, DOR, HP, MR, DS, JS, and SW) participated in the search. KH and MM completed the full-text screening to identify trends, bringing in MD to resolve any conflicts. These searches were conducted during July and August 2021. All search strategies are documented in a supplemental file (Supplementary Material, Appendix 1).

Citation files from each database containing pertinent metadata and abstracts were exported and uploaded into PICO Portal version 1.0.2021.0626/2020-2021 (New York, NY) for deduplication and title abstract review. Although the authors initially intended to utilize Sciwheel for uploading citation files and deduplication, upon further inspection, Sciwheel only offered at that time an automatic deduplication, which would not have worked for tracking numbers for the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart and PRISMA-ScR guidelines. Studies were filtered to those based in the United States because osteopathic medical education is not standardized worldwide. Studies published between 2010 and 2020 were included, stopping at 2020 to exclude literature on the COVID-19 pandemic and its impact on educational trends

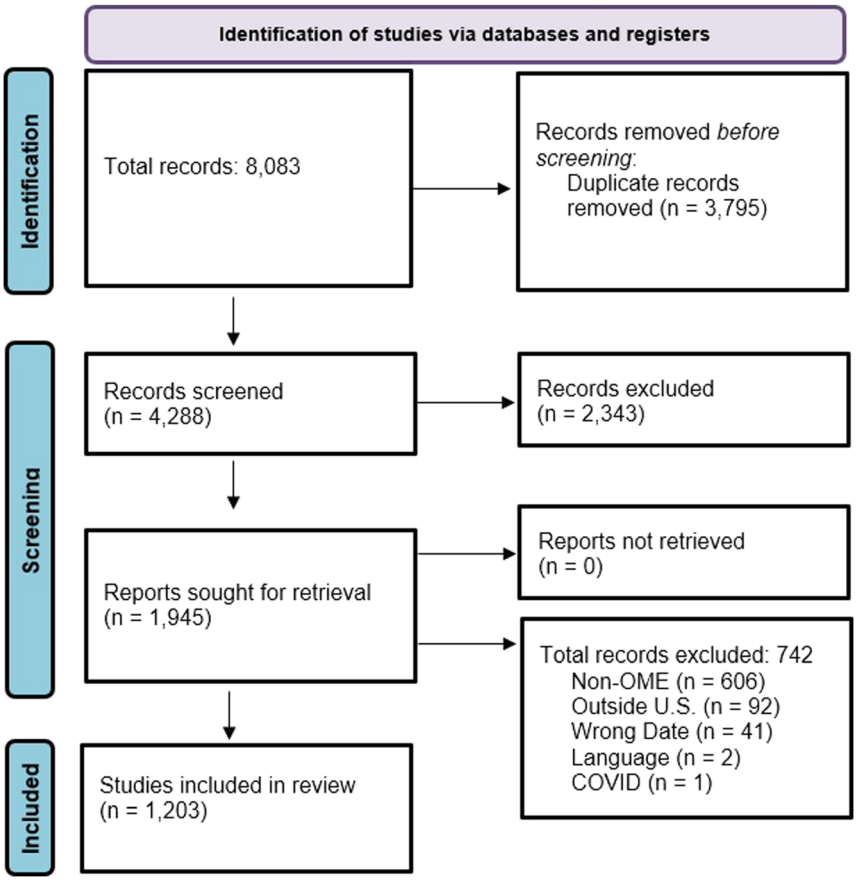

Figure 1: Search results and the study inclusion process.

because those results would necessitate a separate review. Additionally, the authors set the start of the range to 2010 to reflect recent technological advancements.

The databases searched included PubMed (National Center for Biotechnology Information [NCBI]), MEDLINE (Ovid), Cumulative Index to Nursing and Allied Health Literature ([CINAHL], EBSCO), Embase (Elsevier), Education Resources Information Center ([ERIC] via Ovid), OSTMED.DR (Edward Via College of Osteopathic Medicine and VTLS, Inc.), Google Scholar (Alphabet Inc.), Scopus (Elsevier), and American Association of Colleges of Osteopathic Medicine (AACOM, all available conference abstracts). The authors were unable to locate the 2012, 2013, 2014, and 2016 AACOM conference abstracts. Sources of unpublished studies and gray literature included Scopus (Elsevier), Google Scholar, the website of AACOM, and MedNar (Deep Web Technologies).

Evidence selection

Following the search, all identified citations were collated and uploaded to PICO Portal (2022, PICO Portal, New York, NY), and duplicates were removed. Following a pilot test, titles and abstracts were screened by two independent reviewers for assessment against the inclusion criteria for the review. The inclusion criteria are documented in a supplemental file (Supplementary Material, Appendix 2). Potentially relevant sources were retrieved in full, and their citation details were imported into Google Drive. The full text of the selected citations was assessed in detail against the inclusion criteria by two or more independent reviewers. Because osteopathic physicians have full practice and equivalent rights to a medical doctor in the United States while internationally, and the designations of Doctor of Osteopathic Medicine (DO) vary considerably, this review excluded research at institutions not accredited in the United States. Reasons for excluding sources of evidence that did not meet the inclusion criteria at the full-text screening stage were recorded and reported in the scoping review. Any disagreements that arose between the reviewers at each stage of the selection process were resolved with additional reviewers. The search results and the study inclusion process are reported in the PRISMA-ScR flow diagram (Figure 1).

Table 1: The types of publications included in the scoping review of osteopathic medical education literature, 2010–2020.

Article type	no. %
Peer-reviewed journal	505 (42.0 %)
Conference abstract	482 (40.1 %)
Opinion/editorial	143 (11.9 %)
Policy paper or magazine article	63 (5.2 %)
Thesis/dissertation	10 (0.8 %)

Table 2: The publication numbers of the top five publishing colleges of osteopathic medicine identified in the scoping review of medical education literature, 2010–2020.

Colleges	no. %
Heritage College of Osteopathic Medicine	69 (5.7 %)
A.T. Still University Kirksville College of Osteopathic Medicine	59 (4.9 %)
The University of North Texas Health Science Center College of Osteopathic Medicine	41 (3.4 %)
West Virginia School of Osteopathic Medicine	39 (3.2 %)
University of New England College of Osteopathic Medicine	34 (2.8 %)

Data extraction

Data were extracted from papers included in the scoping review by the authors utilizing Google Sheets. The data extracted included specific details about the participants, concept, context, and key findings relevant to the review question. The extraction form is provided (Supplementary Material, Appendix 3). The final data extraction tool was modified and revised as necessary during the process of extracting data from each included evidence source. Modifications included the removal of data fields for date of review, journal, record number, subject, methodology, assessment tool, major findings, include/exclude, study complete, and extraction complete. Any disagreements that arose between the reviewers were resolved through discussion or with an additional reviewer.

Table 3: The trends of the 1,203 articles identified in the scoping review of the osteopathic medical education literature, 2010–2020.

Trends identified[a]	no. %
Admissions	23 (1.9 %)
Boards	72 (6.0 %)
Curriculum	235 (19.5 %)
Diversity, Equity, and Inclusion Osteopathic Medical Education Populations (DEI-OME-Populations)	16 (1.3 %)
Diversity, Equity, and Inclusion Teaching (DEI-Teaching)	71 (5.9 %)
Entrustable Professional Activities (EPAs)	35 (2.9 %)
Faculty	14 (1.2 %)
Interprofessional Education (IPE)	83 (6.9 %)
Match	51 (4.2 %)
Mentoring-advising	30 (2.5 %)
Osteopathic Manipulative Medicine/Osteopathic Manipulative Treatment (OMM/OMT)	64 (5.3 %)
Other	63 (5.2 %)
Pathway programs	15 (1.2 %)
Pedagogy	178 (14.8 %)
Professionalism	58 (4.8 %)
Residency	318 (26.4 %)
Rural	25 (2.1 %)
Scholarly activity	52 (4.3 %)
Simulation	40 (3.3 %)
Single accreditation	63 (5.2 %)
Student Performance Predictions (SPP)	20 (1.7 %)
Wellness	62 (5.2 %)
Workforce	18 (1.5 %)

[a]Full list of trends and subtrends available in Supplementary Material, Appendix 4.

Results

A total of 8,083 articles were identified and included through searches of all listed databases and resources. A total of 3,795 duplicates were identified and removed. Thus, 4,288 titles and abstracts were screened, and 2,343 articles were excluded. As a result, a total of 1,945 articles were included and moved on to full-text screening. A total of 1,203 articles were included after full-text screening. KH and MM reviewed the remaining articles to identify trends in the areas of publication type, osteopathic schools creating the content, and topics covered in these sources.

The publication types (Table 1) were almost evenly split between articles from peer-reviewed journals (42.0 %; n=505) and conference abstracts (40.1 %; n=482). Other publication types included opinion/editorials (11.9 %; n=143), publications such as policy papers and magazine articles (5.2 %; n=63), and theses/dissertations (0.8 %; n=10). Table 2 identifies the top publishing colleges of osteopathic medicine that authored presentations or publications.

This scoping review identified 23 primary trends in osteopathic medical education (Table 3), many of which had subtrends (Supplementary Material, Appendix 4). Each source could have multiple trends, so the trend numbers exceed the number of sources. The top three trends were residency (26.4 %; n=318), curriculum (19.5 %; n=235), and pedagogy (14.8 %; n=178).

The residency trend (n=318) covered anything pertaining to GME, excluding fellowships. There were 39 residency subtrends, such as accreditation, osteopathic recognition, and information related to specific types of residency programs like pediatrics. Within the residency trend, the top

three subtrends were family medicine (n=43), emergency medicine (n=39), and specialty selection (n=21).

The curriculum trend (n=235) pertained to the content covered in the curriculum. There were 22 curriculum subtrends, such as redesign, specialty exposure, and health systems science. Within the curriculum trend, the top three subtrends were clinical skills (n=27), assessment (n=19), and clerkship specialty (n=16).

The pedagogy trend (n=178) referred to different instructional methods to teach the curriculum. There were 19 pedagogy subtrends, such as content delivery method, learner characteristics, and teaching methods like case-based learning. Within the pedagogy trend, the top three subtrends were anatomy (n=22), active learning not otherwise specified (n=20), and technology (n=20).

Discussion

While the primary objective of this scoping review was to examine the significant trends in osteopathic medical education, it also highlighted interesting aspects related to research being conducted in this area, including gaps, and how that research is being disseminated. The authors found the body of literature wide-ranging, with 23 primary trends and dozens of secondary trends identified in just the one decade that this review covered.

The top trend identified in this scoping review was related to osteopathic residencies and residents, representing 26.4 % of the body of work examined. Discussion focused on single accreditation is included under a separate trend, although there is some inevitable overlap between the two. With the historical emphasis on family medicine for osteopathic physicians [12], it was not surprising that this was the top subtrend in the residency category. Articles and presentations covered topics such as the training of family medicine residents [13], the attitudes toward and use of OMT in residency environment [14], and the work environment and its impact on resident well-being [15].

The second major trend included topics related to the curriculum in osteopathic medical education, representing 19.5 % of the information pulled in this scoping review. Articles and presentations focused on assessing student performance across the curriculum, curricular design and redesign, and specific content to include the curriculum. The top subtrend in the curriculum category included information about integrating clinical skills, such as ultrasonography, into osteopathic medical education settings.

The final significant trend, representing 14.8 % of the literature examined in the scoping review, was topics related to pedagogy in osteopathic medical education. These sources examined specific teaching strategies, such as different approaches to teaching anatomy, teaching clinical skills, and utilizing technology in teaching. The top trend in the pedagogy category was articles and presentations related to active learning techniques, such as utilizing Socratic circles [16], interactive small groups [17], and gamification [6]. Other active approaches were categorized separately, such as problem-based and team-based learning.

Although it did not make it to the list of top trends, there were many papers and presentations on transitioning to a single GME accreditation system. This process started in 2015 and went through 2020 [7], which covered half of the time period this review examined and was a significant shift in the world of GME. Most sources expressed optimism [18], whereas some wondered what this would mean for osteopathic distinctiveness [19].

The primary trends with the lowest percentages were Diversity, Equity, and Inclusion in Osteopathic Medical Education (DEI-OME) Populations (1.3 %), Faculty (1.2 %), and Pathway Programs (1.2 %). These are the areas in which additional research could be conducted and published.

Beyond the previously mentioned trends, the authors of this scoping review wanted to learn more about who was researching and creating this content and where this information was being disseminated. The authors found that much of the literature in this area was being created by osteopathic education institutions that have been around for many years and have established research programs. Hopefully, there would be a broader representation of schools if a similar review were to be conducted in the future due to the opening of new osteopathic institutions that did not exist during the years that this scoping review covered.

A finding that needs further examination is where information about osteopathic medical education was disseminated. This scoping review found an almost even split between journal articles (42.0 %) and conference presentations/posters (40.1 %). The authors of the review could not access 4 years of AACOM Educating Leaders conference abstracts. It can be assumed that conference representation would go up with that additional data. The fact that funding for research at osteopathic institutions is much lower than that at allopathic schools, and a lack of emphasis placed on building a research culture [20] may contribute to sharing information through conferences instead of peer-reviewed journals. This could limit the reach of the important work that educators are doing in osteopathic settings. A review comparing trends in osteopathic

medical education to allopathic medical education during this same time period would be beneficial.

When reviewing the articles during data extraction, KH and MM completed a separate analysis of topics from 2017 to 2020 to see if any emerging trends differed from what had already been identified. There was a slight increase in the number of articles and conference presentations on teaching content related to DEI during this time. The pedagogy trend saw a consistent decrease, whereas sources related to student wellness increased from only 1.6 % of all articles in 2017 to 12.4 % in 2020.

Limitations

Four years of conference abstracts from AACOM's Educating Leaders annual conference (2012, 2013, 2014, and 2016) could not be retrieved, which alters the publication type, publication year, and trend results. Osteopathic physicians/educators were consulted because relevant stakeholders but were not part of the scoping review team. Included studies were limited to those published in English.

Conclusions

This scoping review provided a comprehensive examination of the significant trends in osteopathic medical education over the course of a decade before the COVID-19 pandemic. The authors identified 23 primary trends and numerous secondary trends, offering insights into the evolving landscape of osteopathic education. The dominance of topics related to residency, curriculum, and pedagogy demonstrate a focus on the more practical aspects of education.

Additionally, the distribution of information about osteopathic medical education raised concerns, with an almost equal split between journal articles and conference presentations. Although there is active scholarship in this field, the reach may be limited due to the heavy representation from conferences. Leaders in osteopathic education and scholarship should identify strategies to increase osteopathic-specific education research in published journals.

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