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The impact of osteopathic recognition on multiple medical specialty residencies in a university-based setting

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Abstract

Context: In 2020, the allopathic and osteopathic residency programs were merged into a single residency system, with the Accreditation Council for Graduate Medical Education (ACGME) as the sole accreditor for residencies and fellowships in the United States. As a result of this merger, osteopathic recognition (OR) emerged as a unique approach to promoting osteopathic training and practice. However, there is a lack of data on the effects of OR in residency, specifically university-based residency programs.

Objectives: The objective of this study is to investigate the impact of OR on retaining and applying osteopathic principles in a mixed cohort of residents in a single-center setting.

Methods: We conducted a prospective cohort study of allopathic and osteopathic-trained residents at varying years of postgraduate training in family medicine (FM), internal medicine (IM), and combined internal medicine–pediatric residencies at a single site. Participation in both the osteopathic curriculum and study was voluntary. We distributed a presurvey before the residents participated in the curriculum for that year and a follow-up 6 months later as a postsurvey. The surveys measured confidence levels based on a Likert scale and were aligned with the Osteopathic Recognition Milestones Project (ORMP). Statistical analysis with paired t

tests and a Wilcoxon signed-rank test was conducted on participants who completed both surveys.

Results: We had 38 % (18/47) of participants complete both surveys. We observed significant improvements in confidence levels related to osteopathic principles ($p=0.036$). Residents reported statistically significant gains in their ability to conduct a literature review on osteopathic medicine ($p=0.0288$). Additionally, there was a trend toward significance in confidence levels regarding the patient's perception of touch ($p=0.0741$) and the osteopathic treatment plan ($p=0.0635$). Notably, content knowledge was significantly improved ($p=0.0313$) for all participants. Based on the postsurvey responses, we discovered that participants who not only reported higher confidence overall but also had practiced osteopathic manipulative treatment (OMT) in the last month were more likely to state they would practice osteopathic manipulative medicine (OMM) after residency.

Conclusions: We conducted a prospective cohort study to assess the effects of OR utilizing surveys aligned to the ORMP. We identified knowledge- and confidence-level gains on osteopathic principles and practice (OPP) in a single-center study. Residents in OR are more likely to utilize OMT after residency.

Keywords: medical education; OMM; OMT; osteopathic recognition

The merger of the American Association of Colleges of Osteopathic Medicine (AACOM) and the American Osteopathic Association (AOA) fully integrated the accreditation of both allopathic and osteopathic residency programs in 2020. Under the single accreditation system, the Accreditation Council for Graduate Medical Education (ACGME) is the sole accreditor of residencies and fellowships in the United States. Osteopathic recognition (OR) consists of a curriculum that favors residents' ability to provide high-quality, holistic patient care by providing an environment to develop their osteopathic skills. OR is an available status at an ACGME-accredited residency that has committed and demonstrated that the program incorporates osteopathic principles and practices (OPP). The designation of OR allows graduating DO students to maintain their unique

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osteopathic skills and educate MD graduates on OPP. Research has shown that osteopathic training improves physician-patient communication [1, 2] and patient satisfaction [3]. Osteopathic manipulative treatment (OMT) can be an important adjuvant to treatment for hospitalized postsurgery patients [4] or patients with active pneumonia [5] by improving recovery and decreasing the length of stay. There has been an increase in opportunities for OR for allopathic (MD) and osteopathic (DO) medical school graduates. In 2020, a total of 240 programs received OR in 24 specialties and subspecialties [6]. It is anticipated that OR will continue to grow because it is an appealing recognition for programs, and it is likely to attract high-quality candidates who wish to provide high-value, patient-centered care at lower institutional costs. More research is needed on the effect of OR participation in residency programs. Only a few programs have investigated the impact that an osteopathic curriculum can have on a residency program with positive results [7–11]. This study aims to evaluate the impact of a current OR curriculum on internal medicine (IM), family medicine (FM), and combined internal medicine-pediatrics (IM/Peds) residencies for both allopathic and osteopathic residents in a single-center setting.

Methods

Curriculum

Osteopathic training has existed at Western Michigan University Homer D. Stryker MD School of Medicine (WMED) since 2004, with initial OR approval by ACGME in 2015. The OR curriculum is accessible and voluntary to allopathic and osteopathic residents. The curriculum is comprehensive, with monthly didactics that are both faculty and resident-led, special invited-speaker lectures, hands-on instruction on the principles of manual medicine, and a resident-provided OMT clinic. Residents participate in quality improvement projects, journal clubs, board review, and billing and coding workshops. The OR curriculum begins with a 1-month boot camp at the start of the academic year that includes all IM, FM, and IM/Peds residents who have voluntarily opted into OR. Participants attend a 1-h lecture each week for a total of 4 weeks. Lessons include an introduction to osteopathic manipulative medicine (OMM), osteopathic structural exams, and a review of OMT techniques. Throughout the orientation month, MD and DO residents are assisted by senior residents in hands-on clinical sessions. Residents in OR are required to attend monthly 2-h workshops during residency. At these monthly workshops, additional lectures on various osteopathic-related topics are presented by university faculty and guest

physicians. Residents are also involved in didactic sessions that focus on specific techniques relating to the topic for each month. Each graduating resident in OR is required to present a patient case in which OMM was utilized. Osteopathic and allopathic residents within OR have scheduled patients in their resident continuity clinic to perform osteopathic manipulation under the supervision of DO faculty or MD faculty competent in OMT. Residents perform structural exams, OMT techniques, and in-office procedures such as trigger point injections supervised by faculty. Osteopathic and allopathic residents within the OR are taught to integrate OPP into all of the patients to whom they provide care, either inpatient or outpatient.

Setting

At WMED, there are three ACGME-approved OR residency programs: Internal Medicine (IM), Family Medicine (FM), and Internal Medicine-Pediatrics (IM/Peds).

Participants

Residents in the OR program were made aware of the study and allowed to participate. The study was announced at the start of the OR curriculum. Participation was voluntary, and consent was obtained. Residents were provided the option to withdraw at any time without penalty.

Confidentiality

All data and records generated during this study are kept confidential by institutional policies on subject privacy. Access is limited to the primary investigators and data managers.

Study design

An Institutional Review Board (IRB) exemption was granted for this single-center study (IRB#: WMed-2022-0867). The prospective cohort single-center study consists of residents enrolled in the OR curriculum. Surveys were created to assess the effectiveness of the OR curriculum in achieving milestones. Survey questions were based on the level 1 and 2 milestones of the Osteopathic Recognition Milestones Project (ORMP) [12]. The questions are divided into categories related to OMM, Evidence-Based Medicine, and Healthcare Delivery. The OMM category examined confidence based on Likert scores in five areas: Osteopathic Structural Exam, Osteopathic Principles, Osteopathic

Treatment Plan, Indications/Contraindications to OMT, and Documentation of Somatic Dysfunction. The Evidence-Based Medicine category examined confidence in three areas: understanding evidence-based medicine as it relates to OMM, literature review of OMM, and incorporation of OMM literature into practice. The Healthcare Delivery category examined confidence in five areas: shared decision-making, cost-effective care, recognition of care barriers, patient perception of touch, and end-of-life care. Content knowledge questions (5 in total) were incorporated into the survey. Surveys were distributed initially at the start of the academic year for residency (July 1, 2022) as a presurvey. A postsurvey was sent out 6 months later with the same questions from the presurvey. Both surveys were completed anonymously, with monthly email reminders sent to encourage participation from non-responders (Appendix A and B). Surveys were generated utilizing Research Electronic Data Capture (REDCap), and data were collected with REDCap with web-accessible surveys. Responses were anonymous. REDCap utilized its Participant Identifier feature to connect each resident physician's unique identifier to their presurvey and postsurvey responses. This ensured that the same resident physicians who completed the presurvey also completed the postsurvey. Individual resident responses were only included in further analysis if they completed both the presurvey and postsurvey.

Data management

A REDCap database was utilized to collect and store data in the WMED REDCap platform. The WMED Information Technology Department manages the platform. Only research study members are granted access to the system. All transactions are securely delivered to the REDCap application utilizing secure sockets layer (SSL) (SHA-1 with RSA Encryption).

Statistical analysis

Data analysis was completed in R version 4.3.0. Power analysis was conducted for matched-pair *t* tests on a summed scale for a moderate to large detectable effect size and assumed a loss rate of 30 % based on survey noncompletion and withdrawal from OR. The study was powered to 0.8 and utilized Cohen's *d* of 0.5, 0.3, and 0.1 for effect size to calculate the sample size with dropout. It was determined that $n=18$ after dropout was needed to achieve a power of 0.8 to detect a moderate to large effect size. This was calculated utilizing the *pwr* package in R.

The presurvey and postsurvey Likert scale scores from the 13 survey questions relating to the ORMP were analyzed. Additional scores were created based on the total Likert

scoring for an individual survey presurvey and postsurvey and the total categorical Likert scale presurvey and postsurvey. The difference between presurvey and postsurvey was initially visualized with histograms to examine the distribution. Boxplots were generated from the paired samples for each question, showing the median and interquartile range. The approximate normality of each data variable was assessed graphically, and the Shapiro test was utilized to determine normality. If the scale is approximately normal, then a matched-pair *t*-test was utilized to answer inferentially whether there was a change in the confidence toward osteopathic principles for patient care, examination, diagnosis, and treatment. A Wilcoxon signed-rank test for significance was utilized if the data distribution did not appear normal. The matched-pairs rank biserial correlation coefficient (*RC*) was calculated between paired groups utilizing the *rcompanion* library in R to assess effect size or the magnitude of difference between respective presurvey and postsurvey.

Results

In total, 38.3 % (18/47) of residents completed the presurvey and postsurvey, while 51.1 % (24/47) completed the presurvey. The residents who only completed the presurvey were excluded from further analysis. None of the residents only completed the postsurvey. Half (50.0 %) of the residents were PGY1 (9/18), and the other half (50 %) were senior residents PGY2 (6/18, 33.3 %) and PGY3 (3/18, 16.7 %). IM residents represented 55.6 % (10/18) of the cohort, but there was fair representation from IM/Peds with 27.3 % (5/18) respondents and FM respondents at 16.7 % (3/18). Before residency, 33.3 % (6/18) of respondents had no experience with OMT. The prior month, 38.9 % (7/18) of respondents performed no OMM. In the postsurvey, 16.7 % (3/18) did not perform OMM in the prior month. In addition, 72.2 % (13/18) of the respondents plan to utilize OMT in their clinical practice after graduation; see Table 1 for complete data and Table 2 for statistical analysis related to this section.

Improvement in confidence was noted across all five areas within the OMM category (Figure 1, Table 2). Osteopathic Principles (Q1, $p=0.0036$) observed a significant difference in confidence. The Osteopathic Structural Exam (Q2, $p=0.1425$) and Osteopathic Treatment Plan (Q3, $p=0.0635$). There is a bimodal distribution regarding the Osteopathic Structural Exam, but overall, the median score increased. Regarding the Osteopathic Treatment Plan, the reported confidence was generally higher. The Indications/Contraindications to OMT in the presurvey question saw an almost even distribution in reported confidence levels. In the postsurvey, the reported confidence narrowed in

Table 1: Survey respondent data.

ID	PGY, years	Specialty	OMM experience, years	Pre-OR OMT month prior (no. of times)	Post-OR OMT month prior (no. of times)	OMT after residency
1	3	IM/Peds	1–2	3	3	Yes
2	1	IM/Peds	0	3	3	Yes
3	1	IM	3–4	2	3	No
4	1	IM	0	1	1	No
5	2	IM	3–4	3	4	Yes
6	1	IM	0	1	1	No
7	2	FM	3–4	4	4	Yes
8	1	FM	3–4	3	4	Yes
9	2	IM/Peds	3–4	3	3	Yes
10	3	FM	1–2	2	2	No
11	1	IM	1–2	1	3	Yes
12	1	IM	0	1	2	Yes
13	2	IM	1–2	4	2	Yes
14	3	IM	3–4	3	2	Yes
15	1	IM/Peds	3–4	1	3	Yes
16	2	IM/Peds	0	1	2	Yes
17	2	IM	3–4	2	3	Yes
18	1	IM	0	1	1	No

FM, family medicine; ID, identifier; IM, internal medicine; IM/Peds, internal medicine-pediatrics; OMM, osteopathic manipulative medicine; OMT, osteopathic manipulative treatment; OR, osteopathic recognition; PGY, postgraduate year.

Table 2: Presurvey and postsurvey analysis by question.

Question	p-Value	95 % CI		Effect size	95 % CI	
1	0.1425	–1.4999	0.5000	–0.5830	–1.0000	0.1990
2	0.0036	–1.5000	–1.0000	–0.8790	–1.0000	–0.5560
3	0.0635	–1.5000	0.0000	–0.5900	–1.0000	–0.0221
4	0.3557	–1.0000	0.5000	–0.2950	–0.8360	0.2920
5	0.1353	–1.9999	0.5000	–0.4730	–1.0000	0.1360
6	0.0289	–1.5000	0.0000	–0.6700	–1.0000	–0.2000
7	0.4023	–1.4999	0.5000	–0.2880	–0.8640	0.3610
8	0.6130	–1.5000	0.5001	–0.1820	–0.8000	0.4360
9	0.5459	–1.5000	1.0000	–0.2050	–0.7950	0.4180
10	0.7790	–1.5001	1.0000	–0.1030	–0.7810	0.5130
11	0.6264	–1.5000	1.0000	–0.2000	–1.0000	0.5360
12	0.0742	–2.0000	0.0001	–0.5600	–0.9340	0.0663
13	0.4538	–1.5001	1.0000	–0.2420	–0.8180	0.3750

CI, confidence interval.

distribution with an increase in overall median confidence that was not statistically significant (Q4, $p=0.3557$). The Documentation of Somatic Dysfunction area showed a widening distribution of responses between the presurvey and postsurvey. The median confidence increased but was insignificant (Q10, $p=0.779$).

The Evidence-Based Medicine (Figure 2, Table 2) category showed improvement in confidence across all three areas assessed. The data points in the confidence of Understanding Evidence-Based Medicine showed a narrower spread with a higher median that was not significant (Figure 2, Q5, $p=0.1353$).

There was a widening of data points with a significant difference in confidence regarding completing a Literature Review of OMM (Figure 2, Q6, $p=0.02888$). For Incorporating OMM Literature into Practice, there was some increase in the spread to higher confidence levels with a minor increase in the median that was not statistically different (Figure 2, Q7, $p=0.4023$).

The Healthcare Delivery category (Figure 3, Table 2) showed variable changes across the areas surveyed. The Shared Decision-Making area showed a widening distribution of points to higher confidence between the presurvey and

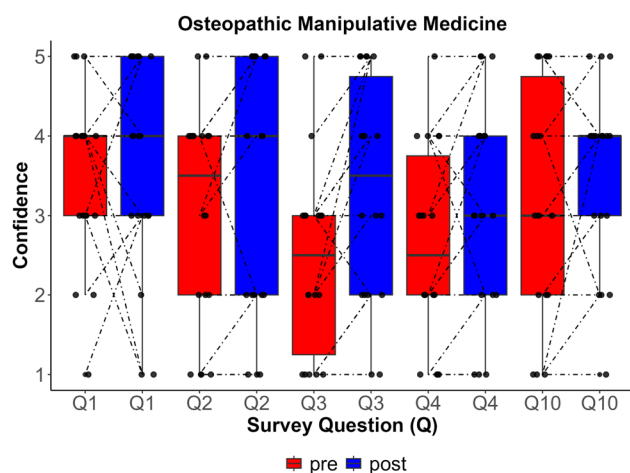


Figure 1: Comparison of the five survey questions in the osteopathic manipulative medicine (OMM) category. Black dots represent individual responses. Dashed lines represent changes between presurvey and postsurvey for each individual. The presurvey is colored red, and the postsurvey is colored blue. The median is noted as the horizontal line within each boxplot. The vertical lines represent the range of data for each survey question.

postsurveys. However, the change was not significant (Figure 3, Q8, $p=0.613$). The Cost-Effective Care area had a narrowing distribution of data points in the postsurvey compared to the presurvey. The median was relatively unchanged and was not significant (Figure 3 Q9, $p=0.5459$). The Recognition of Care Barriers area also showed a narrowing in the points' distribution to higher confidence levels compared to the presurveys and postsurveys. However, the median was unchanged and not

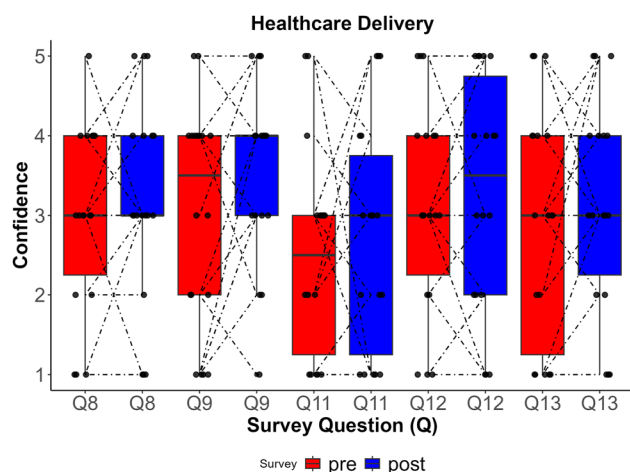


Figure 3: Comparison of the five survey questions in the healthcare delivery category. Black dots represent individual responses. Dashed lines represent changes between presurvey and postsurvey for each individual. The presurvey is colored red, and the postsurvey is colored blue. The median is noted as the horizontal line within each boxplot. The vertical lines represent the range of data for each survey question.

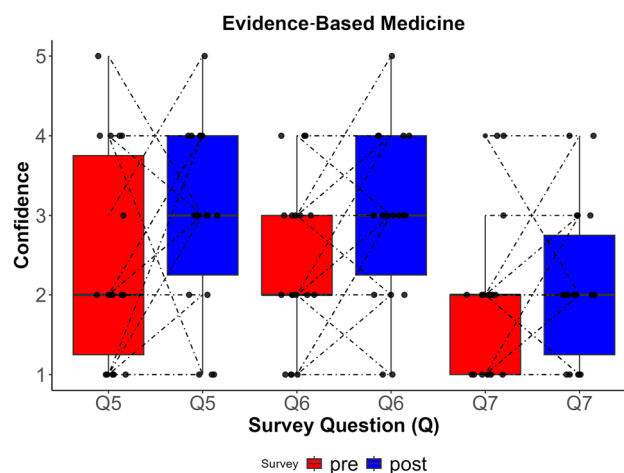


Figure 2: Comparison of the three survey questions in the evidence-based medicine category. Black dots represent individual responses. Dashed lines represent changes between presurvey and postsurvey for each individual. The presurvey is colored red, and the postsurvey is colored blue. The median is noted as the horizontal line within each boxplot. The vertical lines represent the range of data for each survey question.

significant (Figure 3, Q11, $p=0.6264$). Regarding the area of Patient Perception to Touch, there was also a narrowing of the distribution of data points to higher levels of confidence between the presurvey and postsurvey. There was a median increase in confidence (Figure 3, Q12, $p=0.07415$). The distribution widened but remained at lower confidence regarding the End of Life Care. The median confidence was higher in the postsurvey than in the presurvey but was not significant (Figure 3, Q13, $p=0.4538$).

An identical short quiz was administered presurvey and postsurvey to assess content knowledge attainment. In the presurvey quiz, 33.3 % (6/18) of residents scored at or below a 60 %. On the postsurvey quiz, 11.1 % (2/18) of residents scored at or below 60 %. The mean quiz scores improved, presurvey quiz (mean=3.67, standard deviation [SD]= 1.14) and postsurvey quiz (mean=4.22, SD=0.65), which was significant ($p=0.0313$, Wilcoxon signed-rank test).

Discussion

Previous studies have identified a widespread interest in manual medicine with less desire for ongoing instruction [13]. This OR curriculum is voluntary and provides instruction to residents who are interested in learning osteopathic principles. Additionally, research has identified that residents value osteopathic mentors and that the presence of a mentor will likely carry forward the practice of osteopathic principles postresidency [14]. Residents who completed

postgraduate training have more positive attitudes toward OMT and are likelier to perform or refer patients for OMT [15]. Any OR curriculum must be accessible to a wide breadth of experience for DOs with formal training in medical school and MDs interested in learning manual medicine. MD residents have stated an interest in learning OMT skills [10]. A study in a pediatric center identified that 58 % of MD residents were interested in learning more about OMT and that residents within OR significantly positively impacted osteopathic perception and practice [11]. Several studies have implemented an osteopathic curriculum for MD residents [7, 11, 16], which improved interest and attitudes toward osteopathic practice. The attitudes of allopathic and osteopathic residents about OMT [9, 13, 14] were assessed, and it was identified that attitudes can be improved with a formal curriculum. Collectively, these studies highlight an improvement in attitudes toward osteopathic practice with the utilization of a formal curriculum and identify increasing interest among allopathic practitioners in learning more about osteopathic principles.

The OR program described here has significantly impacted residents' understanding of OMT and the belief that OMT is a robust treatment strategy. The survey uniquely implemented the Likert scale to assess resident confidence for level 1 and level 2 osteopathic milestones. The OMM category was found to have the most overall change in confidence, with significant improvement in knowledge of Osteopathic Principles and gains in the Osteopathic Structural Exam and Osteopathic Treatment Plan. Gains in confidence in Osteopathic Principles have been seen in similar studies [8]. Interestingly, there is a bimodal distribution in the Osteopathic Structural Exam, suggesting that survey respondents either felt confident or not confident in performing a structural examination. A further direction for the curriculum could be to continue and refine Osteopathic Structural Exam techniques in the didactic sessions. The study did not observe significant improvement in confidence in the knowledge of Indications and Contraindications to OMT covered in the didactic sessions. Documentation of Somatic Dysfunction did not change either, but this could be because a defined template is utilized in the electronic medical record, which residents are made aware of during orientation. The widening distribution into higher confidence levels shows that some residents improved in confidence. Still, it is difficult to discern if the presurvey confidence was impacted by prior knowledge of the electronic medical record template that residents routinely utilize in practice.

The Evidence-Based Medicine category showed statistically significant increased confidence in performing a literature review related to OMM, likely due to the incorporation of resident-run didactics and the need to complete a literature review to present those didactics. The Understanding of Evidence-Based Medicine did show a higher confidence levels

among participants. Evidence-based medicine topics are taught outside the OR curriculum, which may have impacted survey respondents' confidence. There were no substantial differences in incorporating OMM literature into practice. The curriculum could be enhanced by further incorporating evidence-based medicine practice into the curriculum, which could include formal instruction on conducting a literature review, appraisal of a research study, and incorporation of results of a study into practice.

The category of Healthcare Delivery represented five areas that, for the most part, were taught within the respective curriculum of each residency as opposed to topics directly in the OR didactics. Interestingly, one of the areas, the Patient Perception of Touch, did show a narrowing of the distribution of data points to a higher level of confidence overall. This finding agrees with previous studies that osteopathic medicine makes one more comfortable with touch and interaction with patients [17]. The other areas in the category of Healthcare Delivery included Shared Decision Making, Cost-Effective Care, Recognition of Care Barriers, and End of Life Care, which represents avenues for further curriculum development.

The cohort in this study was mixed, containing both allopathic and osteopathic residents with varying degrees of experience before enrollment. Degree designation was not collected in the surveys, which would have been an interesting data point as allopathic residents can gain knowledge and confidence in OMT principles with training [16]. It would have been interesting to compare the attitudes of allopathic and osteopathic residents about OMT. Future studies should also quantify resident participation in attendance and look at the effect of OR on the education of MD and DO residents. The respondents represent residents at various stages of training and medical specialty. We are one of the first studies to present data from a medicine and medicine-pediatrics cohort, representing 83.3 % of the respondents (15/18). One-third (33.3 %) of the respondents had no experience with OMT, and 38.9 % (7/18) had not performed OMT over the previous month. Overall, OMM is positively perceived by the respondents, with 72.2 % (13/18) planning to utilize the skillset that they are developing in clinical practice post-residency. As the curriculum is further refined, it is essential that residents in an OR curriculum routinely perform OMT and build confidence in osteopathic practice, both of which should be central to any OR curriculum. OR programs bridge the gap between MD and DO residents, offering distinct advantages for both resident groups. OR improves residents' understanding of OMM, OMT, and treatment plan development. This study suggests that OR may even enhance their comfort with patient interaction based on survey feedback. OR provides a supportive environment for DO residents to refine their OMT skills and practice alongside MD colleagues.

This collaborative learning fosters a mutual understanding and potentially influences MD perspectives on OMT's value, paving the way for a more integrated approach to patient care.

This study has several limitations that affect the generalizability of its findings and call for further research. The small sample size and low response rate limit the generalization of these results to a broader population. Given the sample size, our study was powered to detect a large effect size, or variables that have a large magnitude of difference. A larger sample size would power the study to detect small effects, which may not have been appreciated in this study. Additionally, the study did not distinguish between MD and DO residents' experiences within the program. Because DOs likely have a stronger foundation in OMT, analyzing the data by primary training would provide a more nuanced understanding of the curriculum's impact. Furthermore, the absence of a control group from a residency program without OR makes it challenging to isolate the specific effects of the OR curriculum. Residents' improvements might be due to general residency training rather than the OR program. Incorporating the Clinical Osteopathic Recognition Training Exam (CORTEX), a formative standardized test, might provide further insight into gains in knowledge as participants progress through the curriculum. There is no standardized assessment tool that assesses the OR curriculum's effectiveness in achieving ORMP milestones. Future research should ensure that the chosen survey instruments are validated for reliability and accuracy in measuring the desired outcomes. Finally, the single-center design limits generalizability because resident experiences and program structures might vary across institutions. Future studies with a larger, more diverse sample, consideration of primary training, a control group, validated surveys, and a multicenter design, are needed to strengthen the understanding of the OR curriculum's impact on resident education and future practice.

Conclusions

This study shows that OR can enhance the knowledge of resident physicians on OPP. Overall, improvements were seen in confidence, knowledge, and attitudes related to OMM. Most survey respondents intend to incorporate OMT into their practice postresidency. As more residency programs attain OR, ACGME, Commission on Osteopathic College Accreditation (COCA), AACOM, and osteopathic leaders should continue collaborating to design an inclusive osteopathic curriculum to ensure that DO residents maintain their OMT skills and practice them alongside their MD co-residents. We did not directly identify degree designations within this study, which

should be a focus of future studies. Further research is needed with a larger cohort in multiple centers utilizing a validated survey to investigate the impact of OR on achieving ACGME osteopathic residency milestones with residents across different specialties and training backgrounds.

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Data availability: Table 1 contains survey respondent data. Responses to survey questions are in Figures 1–3. Data is available upon request.

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- Supplementary Material:** This article contains supplementary material (<https://doi.org/10.1515/jom-2023-0165>).