

Medical School Faculty Knowledge and Attitudes Toward Sex and Gender-Based Medicine

Abigail Duerst, MD, MPH | Anna Vanderschaegen | Juliana M. Kling, MD, MPH | Lisa Graves, MD, MCISc

PRiMER. 2025;9:17.

Published: 5/12/2025 | DOI: 10.22454/PRiMER.2025.910249

Abstract

Introduction: A person's sex and/or gender may influence the pathogenesis, presentation, and therapeutic response to disease; yet, the impact of sex and gender is not routinely evaluated in medical research, nor adequately emphasized in medical school curricula. Little is known about medical school faculty knowledge and attitudes regarding sex and gender-based medicine (SGBM).

Methods: We administered an online survey to 158 faculty members at WMU Homer Stryker M.D. School of Medicine. The survey of knowledge on SGBM was adapted from two prior surveys used in medical student and resident populations and modified for faculty participants. Hidden curriculum theory, which proposes students learn through formal curriculum as well as through passive perceptions of faculty and institutional attitudes, was used as a theoretical lens.

Results: Thirty-eight of 158 recipients completed the survey, for a 24% response rate. Respondents answered an average of 48.53% of the knowledge questions correctly; percent correct did not differ significantly between men and women faculty members ($P = .2732$). Seventy one percent of respondents indicated it was important or very important to consider sex and gender when providing patient care. Only 24% indicated they had some formal or continuing education on the topic. Respondents indicated interest in educational opportunities for SGBM in the form of online modules or lectures.

Conclusion: Though faculty respondents endorsed SGBM, few have had formal education related to the topic. Faculty development on SGBM may close knowledge gaps and facilitate integration of this curriculum. The survey tool developed through this project may be useful for other institutions engaged in similar efforts related to SGBM.

Introduction

Sex and gender influence underlying risk factors, pathogenesis, presentations, and therapeutic responses to disease states.¹⁻² The impact of sex and gender is underanalyzed in medical literature and is not universally apparent in medical school curricula. This absence has implications for patient treatment and outcomes.³⁻⁵ For example, there are significant differences in presentation of myocardial infarction, efficacy of aspirin, and response to warfarin and tissue plasminogen activator between males and females, thus considerations surrounding sex and gender are important in forming a treatment plan.⁶⁻⁷

Though advocates have made great strides in incorporating sex and gender successfully into some medical school curricula, large-scale, systematic integration of this content appears to be lacking in undergraduate and graduate medical education.⁸⁻¹⁰ Residents from multiple specialties were surveyed in a study conducted at Mayo Clinic assessing knowledge and experience with sex and gender topics. Of those surveyed, 16% reported having no instruction on how sex and gender impact their treatment of a patients and 55% reported only occasional instruction on this topic.¹¹ Though medical learners (students and residents) see the importance of sex and gender content, it is clear this information is missing throughout training physicians' learning experiences.¹²

Much of the work on sex and gender in medical education has focused on curricular reform as the solution to increasing learner knowledgeability on this topic. Currently many curricular change initiatives use a bottom-up approach, depending on learner and faculty advocates to pressure their institutions to incorporate more sex and gender-based medicine (SGBM) topics in the curriculum.¹³⁻¹⁴ Faculty and institutional attitudes toward SGBM need to be considered to create sustainable change in viewing medicine through a sex and gender lens.^{5,14}

Slow adoption of SGBM topics by medical school curriculum may be explained by Fredric Hafferty's theory of medical curricular change. According to Hafferty, a curriculum can be implicit, explicit, or hidden. This theory suggests the most effective way to change a curriculum is to first understand and influence the hidden curriculum, or the "set of influences that function at the level of organizational structure and culture."¹⁵ The faculty of an institution are main drivers of its values and culture, thus understanding faculty attitudes and knowledge may lead to insight into the hidden curriculum surrounding SGBM and how to begin to shift this paradigm to curricular inclusion of SGBM and to make this curriculum explicit.¹⁶

To our knowledge, no study has yet examined the knowledge and attitudes of medical school faculty about SGBM. This knowledge could be critical in further understanding the barriers to incorporation of this information in curriculum and research and inform future approaches. Whether faculty gender plays a role in SGBM teaching and curriculum has not been well explored. Our study sought to describe the knowledge and attitudes about sex and gender curriculum within a single medical school using a pilot survey.

Methods

We developed a pilot survey with 39 questions adapted from two previously published survey tools used in medical student and resident populations by one of the study authors.¹⁰⁻¹¹ Since no validated questionnaire existed to test our hypothesis, we developed a new questionnaire. This instrument was refined and validated through an iterative process with input from faculty members who were not part of the study team. The survey consisted of demographic and attitude questions including gender, 17 multiple-choice, knowledge-based questions, and 11 true or false knowledge-based questions. Knowledge questions covered examples of sex and gender differences across systems and specialties.

The survey (available upon request) was administered to all clinical faculty members employed by Western Michigan University Homer Stryker M.D. School of Medicine (WMed). WMed is a private institution located in Kalamazoo, Michigan that has implemented SGBM coursework into the undergraduate curriculum beginning in 2017. The survey was administered by email with an additional follow-up email sent 2 weeks later. We collected and stored responses using REDCap software. This study was approved by the Institutional Review Board of WMU Homer Stryker M.D. School of Medicine (WMed-2021-0764).

Results

Of 158 pilot surveys, 38 were completed yielding a response rate of 24.05%. Respondents answered an average of 48.53% of the knowledge questions correctly. We performed a two independent samples *t* test to determine if the overall knowledge score differed between men and women faculty members. With a corresponding *P* value of 0.2732, there is insufficient evidence that the mean percent knowledge score differs depending on gender.

When asked how important considering sex and gender is when providing patient care, 39.47% of respondents chose very important, 31.58% chose important, and 2.63% chose neutral. Table 1 shows survey question responses. Only 25% of respondents indicated they had some formal or continuing education on SGBM topics. Faculty respondents considered SGBM to be important, with 71% indicating it was important or very important to consider sex and gender when providing patient care. However, only 25% indicated they had some formal or continuing education on the topic.

Conclusions

The pilot survey adapted for faculty was demonstrated as a tool to assess faculty knowledge and attitudes towards SGBM. This complements previous surveys that have examined SGBM in resident and medical student populations. Faculty answered nearly half of the knowledge questions correctly, indicating an opportunity for faculty education surrounding these topics, and they considered the topic to be important. SGBM knowledge did not differ between men and women faculty members, suggesting that this gap is an educational rather than gender-based gap. Few faculty members had formal or continuing education on the topic despite reporting this as an important topic. With high interest levels and relatively low professional exposure and opportunities to improve knowledge, faculty continuing professional development should be considered as an area of focus to advance adoption of an SGBM medical school curriculum. Our study consisted of survey-based research limited to a single institution at a single point in time with a limited response rate. Further exploration of faculty knowledge gaps is needed with a greater response rate and encompassing more than a single medical school to determine generalizability of these findings. Nonetheless, a pilot developed survey has the potential to identify needed professional development to address gaps.

Tables and Figures

**Table 1: Survey Multiple Choice and True/False Knowledge Questions
With Percentage of Participants Answering Correctly**

Demographic features	Women, n (%)	Men, n (%)	Overall, n (%)
Frequency	16 (55.17)	13 (44.83)	
Multiple choice questions			
The terms sex and gender...			
Should be distinguished when discussing the biological basis of disease	13 (44.83)	12 (41.38)	25 (86.21)
Most cancer-related deaths in men worldwide are caused by...			
Lung cancer	14 (48.28)	10 (34.48)	24 (82.76)
Most cancer-related deaths in women in the US are caused by...			
Lung cancer	11 (37.93)	5 (17.24)	16 (55.17)
Lower esophageal cancer affects both sexes and is...			
More prevalent in males	8 (28.57)	5 (17.86)	13 (46.43)
Pre-eclampsia in pregnancy predisposes...			
The mother to cardiovascular disease later in life	9 (31.03)	4 (13.79)	13 (44.83)
In medical complications of alcoholism:			
Females display more severe cognitive and motor impairment with lower alcohol exposure compared with males	8 (27.59)	5 (17.24)	13 (44.83)
It has been proposed that irritable bowel syndrome (IBS) maintains a sex specificity based on which of the following factors?			
All of the above	3 (10.71)	7 (25.00)	10 (35.71)
Idiopathic pulmonary hypertension is a rare but fatal disorder the occurrence of which shows			
Greater prevalence in females	6 (20.69)	3 (10.34)	9 (31.03)
Women with angina symptoms often go untreated because:			
Physicians are often confused by atypical early symptoms and tend to overlook them	3 (10.34)	5 (17.24)	8 (27.59)
In development of heart failure			
Females tend to have eccentric myocardial hypertrophy	1 (3.45)	2 (6.90)	3 (10.34)
Hepatic enzymes play a role in physiologic digestive processes and in detoxification. Which of the following statement(s) is true?			
All of the above	1 (3.45)	2 (6.90)	3 (10.34)
Hepatitis B and C are very common infectious diseases worldwide. Chronic infections can lead to liver diseases, liver failure or hepatocellular carcinomas. Who is at greater risk and why?			
Males since estrogen appears to act as a protective factor	2 (6.90)	1 (3.45)	3 (10.34)
Progressive loss of kidney function occurs faster in			
Males	2 (6.90)	0 (0.00)	2 (6.90)
Orphan lung disease such as lymphangioleiomyomatosis occur			
Equally prevalent in males and females	1 (3.45)	0 (0.00)	1 (3.45)
Practice guidelines are often developed based on results of clinical trials. Analyzing clinical studies by sex can include...			
All of the above	1 (3.45)	0 (0.00)	1 (3.45)

Table 1, continued

Demographic features	Women, n (%)	Men, n (%)	Overall, n (%)
True or false and agree or disagree questions			
All drugs are equally effective whether given at the luteal or follicular phase of the menstrual cycle.			
FALSE	16 (57.14)	12 (42.86)	28 (100.0)
The Cochrane database has as much evidence about treatment outcomes for women as for men.			
FALSE	15 (53.37)	12 (42.86)	27 96.43
Multiple sclerosis is as common in men as in women, but men have a worse prognosis.			
FALSE	13 (46.43)	11 (39.29)	24 (85.71)
Difference in fat distribution between males and females affect circulating concentrations of pharmacological therapy.			
TRUE	14 (50.00)	10 (35.71)	24 (85.71)
In general, current prevention/treatment management strategies take into consideration biological differences between males and females.			
FALSE	14 (50.00)	10 (35.71)	24 (85.71)
Eight of the last 10 drugs withdrawn from the market in the US had more side effects in males.			
FALSE	12 (42.86)	8 (28.57)	20 (71.43)
Gastric secretion is higher in males than females.			
TRUE	8 (28.57)	6 (21.43)	14 (50.00)
Depression is more common in women, but treatment is more successful for men.			
TRUE	8 (28.57)	4 (14.29)	12 (42.86)
Alcoholism is more common in men, but treatment is more successful for women.			
TRUE	7 (25.00)	5 (17.86)	12 (42.86)
More men than women die of cardiovascular disease in the US each year.			
Disagree	5 (17.24)	4 (13.79)	9 (31.03)
Females respond to the flu vaccine by developing higher titers of antibodies than males.			
Agree	1 (3.45)	0 (0.00)	1 (3.45)

Acknowledgments

Presentations: Some early work from this paper was presented as a poster at the Sex and Gender Health Education Summit (virtual) November 12-14, 2021.

Corresponding Author

Lisa Graves, MD, MCISc

Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, MI

lisa.graves@wmed.edu

Author Affiliations

Abigail Duerst, MD, MPH - Department of Psychiatry and Behavioral Health Medical College of Wisconsin
Affiliated Hospitals, Milwaukee, WI

Anna Vanderschaegen - WMU Homer Stryker M.D. School of Medicine, Kalamazoo, MI

Juliana M. Kling, MD, MPH - Division of Women's Health Internal Medicine, Mayo Clinic, Scottsdale/Phoenix AZ

Lisa Graves, MD, MCISc - Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, MI

References

1. Bartz D, Chitnis T, Kaiser UB, et al. Clinical advances in sex- and gender-informed medicine to improve the health of all: a review. *JAMA Intern Med*. 2020;180(4):574-583. doi:10.1001/jamainternmed.2019.7194
2. Soldin OP, Mattison DR. Sex differences in pharmacokinetics and pharmacodynamics. *Clin Pharmacokinet*. 2009;48(3):143-157. doi:10.2165/00003088-200948030-00001
3. Beery AK, Zucker I. Sex bias in neuroscience and biomedical research. *Neurosci Biobehav Rev*. 2011;35(3):565-572. doi:10.1016/j.neubiorev.2010.07.002
4. Geller SE, Koch A, Pellettieri B, Carnes, M. Inclusion, analysis, and reporting of sex and race/ethnicity in clinical trials: have we made progress? *Journal of women's health*. 2002;20(3):315-320.
5. McGregor AJ, Templeton K, Kleinman MR, Jenkins MR. Advancing sex and gender competency in medicine: sex & gender women's health collaborative. *Biol Sex Differ*. 2013;4(1):11. doi:10.1186/2042-6410-4-11
6. Legato MJ, Johnson PA, Manson JE. Consideration of sex differences in medicine to improve health care and patient outcomes. *JAMA*. 2016;316(18):1865-1866. doi:10.1001/jama.2016.13995
7. Ventura-Clapier R, Dworatzek E, Seeland U, et al. Sex in basic research: concepts in the cardiovascular field. *Cardiovasc Res*. 2017;113(7):711-724. doi:10.1093/cvr/cvx066
8. Dhawan S, Bakir M, Jones E, Kilpatrick S, Merz CN. Sex and gender medicine in physician clinical training: results of a large, single-center survey. *Biol Sex Differ*. 2016;7(S1)(suppl 1):37. doi:10.1186/s13293-016-0096-4
9. Jenkins MR, Herrmann A, Tashjian A, et al. Sex and gender in medical education: a national student survey. *Biol Sex Differ*. 2016;7(S1)(suppl 1):45. doi:10.1186/s13293-016-0094-6
10. Miller VM, Flynn PM, Lindor KD. Evaluating sex and gender competencies in the medical curriculum: a case study. *Gend Med*. 2012;9(3):180-186.e3. doi:10.1016/j.genm.2012.01.006
11. Kling JM, Rose SH, Kransdorf LN, Viggiano TR, Miller VM. Evaluation of sex- and gender-based medicine training in post-graduate medical education: a cross-sectional survey study. *Biol Sex Differ*. 2016;7(S1)(suppl 1):38. doi:10.1186/s13293-016-0097-3
12. Rydberg A, Buras MR, Quillen J, Miller V, Kling JM. Sex and gender specific health topics in medical student learners: pulse check eight years later. *Biol Sex Differ*. 2021;12(1):53. doi:10.1186/s13293-021-00397-w
13. Tannenbaum C, Moineau G. Innovative levers for sustainable integration of gender medicine into medical school curricula. *Biol Sex Differ*. 2016;7(S1)(suppl 1):41. doi:10.1186/s13293-016-0103-9
14. van der Meulen F, Fluit C, Albers M, Laan R, Lagro-Janssen A. Successfully sustaining sex and gender issues in undergraduate medical education: a case study. *Adv Health Sci Educ Theory Pract*. 2017;22(5):1057-1070. doi:10.1007/s10459-016-9742-1
15. Hafferty FW. Beyond curriculum reform: confronting medicine's hidden curriculum. *Acad Med*. 1998;73(4):403-407. doi:10.1097/00001888-199804000-00013
16. Vaidyanathan B. Professional socialization in medicine. *AMA J Ethics*. 2015;17(2):164-170.