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Prevalence and Sources of Gender Microaggressions in Orthopedic Surgery: Evidence from Saudi Female Surgeons

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Abstract

Microaggressions are subtle, often unintentional behaviors that may occur in verbal, nonverbal, or environmental forms and communicate negative or demeaning messages toward individuals belonging to marginalized social groups. This study aims to estimate the frequency with which female Saudi orthopedic surgeons experience microaggressions. This online cross-sectional study focused on female orthopedic surgeons from different regions of the Kingdom of Saudi Arabia. The questionnaire was created using Google Forms and circulated through social media platforms such as Twitter, Instagram, and WhatsApp by trained data collectors.

A total of 96 female Saudi orthopedic surgeons participated in the survey. The mean age was 27.46 ± 12.20 years. Most participants were either residents (52.63%) or specialists (23.16%). The majority (92.63%) were still in training or in early career stages, and most (93.68%) completed their residency within Saudi Arabia. Nearly three-fifths (61.05%) reported being exposed to microaggressions as targets, while 76.84% did not consider themselves to have engaged in such behavior; however, 23.16% admitted having done so. Patients or their relatives were identified as involved in 43.16% of cases. Male surgeons and male support staff were reported in 51.58% and 23.16% of incidents, respectively. In addition, other male physicians were implicated in 33.68% of cases. Female surgeons were reported as involved in 22.11% of incidents, whereas female support staff accounted for 29.47%. These findings may support the development of interventions to enhance inclusivity and support within orthopedic surgery, ultimately encouraging healthier professional interactions and fairer opportunities for all practitioners.

Keywords: Gender, Microaggressions, Orthopedic, Surgery, Saudi Arabia

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Introduction

The concept of “microaggression,” introduced by Chester Pierce in 1970, refers to “subtle, stunning, often automatic, and nonverbal exchanges which are put-downs” [1]. Later work has expanded this definition to include verbal, nonverbal, and environmental behaviors that function as slights, insults, or dismissive acts—whether deliberate or, more commonly, unintended—yet still convey negative, hostile, or derogatory meanings toward individuals based on their membership in marginalized social groups [2]. These behaviors are frequently shaped by implicit or explicit biases and stereotypes related to gender, race, ethnicity, sexuality, religion, or disability [3, 4]. Studies have shown that repeated exposure to microaggressions over time can result in harmful outcomes such as reduced trust, weakened professional relationships, lower quality of care, diminished self-esteem and confidence, cultural mistrust, pessimistic worldviews, impaired behavioral regulation, psychological distress, anxiety, and depression [5, 6].



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A 32-item anonymous survey conducted among members of Women in Orthopedics in the United States (US)—an exclusive online group of female orthopedic surgeons in training or practice—found that 74% reported experiencing microaggressions during their training. In comparison, 13% acknowledged engaging in such behaviors toward others [7]. These results provide important evidence regarding both exposure to and participation in microaggressions among female orthopedic surgeons. Women and individuals from underrepresented groups are among the most frequently affected by workplace bullying and harassment [8, 9].

Although the proportion of women entering medical school has increased, orthopedic surgery continues to show a persistent gender imbalance [10]. In the United States, only 5% of practicing orthopedic surgeons were female in 2015, representing the lowest proportion across all medical and surgical specialties. While multiple factors likely contribute to this imbalance, the workplace environment appears to play a role, and microaggressions may discourage women from pursuing orthopedic surgery as a career path [11]. Similarly, a cross-sectional study in Saudi Arabia demonstrated a clear gender gap in orthopedics, with females representing 14.6% (37) of surgeons, compared with 85.4% (217) males [12].

In light of the ongoing underrepresentation of women in orthopedic surgery, this study aims to assess the prevalence of microaggressions experienced by female Saudi orthopedic surgeons. This study hypothesizes that microaggressions are commonly encountered among Saudi women in orthopedics and may represent one of the contributing factors to their limited representation in this surgical specialty.

Materials and Methods

Study design

This investigation employed an online cross-sectional design and included female orthopedic surgeons from various regions of the Kingdom of Saudi Arabia. Data were collected using a Google Forms questionnaire distributed via social media platforms, including Twitter, Instagram, and WhatsApp, by trained data collectors. To ensure contextual suitability for orthopedic training in Saudi Arabia, the instrument was adapted from a previously validated survey used in US orthopedic residency programs by Samora *et al.* [7].

The study population consisted of female orthopedic trainees in Saudi Arabia currently undergoing training who completed a self-administered survey. Exclusion criteria included male respondents, trainees from other surgical specialties, individuals receiving training outside Saudi Arabia, and those who declined participation or submitted incomplete questionnaires. All participants provided informed written consent before enrollment.

Sample size calculation was performed using G*Power software, assuming a 95% confidence interval, a 50% expected response rate, and a $\pm 5\%$ precision level. Based on an anticipated prevalence of microaggressions of 74% [7], the minimum required sample size was 82 participants. A convenience non-probability sampling method was applied, recruiting all eligible participants during the study timeframe.

Data collection

The survey instrument was designed to capture detailed information regarding participants' experiences during orthopedic residency and clinical practice, with a focus on gender-related microaggressions and discriminatory encounters. The questionnaire began by collecting demographic and training-related information, including the year of residency completion and whether training was conducted in Saudi Arabia.

Participants were then asked about their current employment setting and subspecialty, with predefined response options such as academic institution, private sector, hospital employment, military service, and others, along with an option to specify additional categories under "Other."

The questionnaire further assessed exposure to microaggressions within orthopedic practice by asking respondents whether they had experienced such behaviors as victims, perpetrators, or observers. To determine perceived sources of microaggressions, participants ranked potential contributors, including patients and their families, male and female nursing or support staff, male and female surgeons, and other male or female physicians.

The survey also explored specific experiences of discrimination during residency or fellowship training. Participants were instructed to select all applicable items from a list that included being doubted due to gender, statements discouraging women from pursuing orthopedic surgery, exposure to demeaning educational content, and negative commentary regarding pregnancy and family planning. Additional items included receiving gender-based remarks about appearance or conduct, being assigned tasks not given to male counterparts, and losing training opportunities due to gender bias.

The instrument also examined participation in academic and social environments, including exclusion from professional gatherings due to gender and representation of women in conference speaking roles. It further assessed experiences of mistaken identity, such as being confused with nurses, industry representatives, or physician assistants, as well as differential treatment by staff based on gender.

Finally, the survey evaluated access to workplace facilities and resources by gender, including the availability of separate changing rooms or physician lounges, breastfeeding support services, and appropriately sized lead protective equipment in operating rooms.

Ethical approval

The study protocol was reviewed and approved by the ethical committee of King Khalid University. Written informed consent was obtained from all participants before data collection. The study was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki.

Statistical analysis

Normality of the dataset was assessed using the Shapiro–Wilk test. Continuous variables with normal distribution were summarized using mean and standard deviation. Categorical variables were described using counts and percentages. Statistical analyses were conducted using SPSS (Statistical Package for the Social Sciences), version 26. Associations between variables were examined using chi-square testing, with statistical significance defined as $p < 0.05$.

Results and Discussion

A total of 96 female orthopedic surgeons from Saudi Arabia participated in this survey. The average age of respondents was 27.46 ± 12.20 years. The sample was mainly composed of residents (52.63%) and specialists (23.16%). Most respondents (92.63%) were either still undergoing training or were in the early stages of their professional careers, and nearly all (93.68%) completed their residency within Saudi Arabia. Additionally, 38.95% were actively in training at the time of the study, whereas 37.89% were employed in hospital-based roles. Regarding subspecialty distribution, General Orthopedics was the most frequently reported area (31.58%), although a sizeable proportion (43.16%) had not yet chosen a subspecialty. Almost the entire cohort (98.95%) reported practicing within Saudi Arabia (**Table 1**). **Table 1** further highlights the geographic distribution, with the Central Region accounting for the largest share (32.65%), followed by the Eastern Region (26.32%).

Table 1. Demographic and practice insights of Saudi female orthopedic practitioners: current positions, specialties, and regional distribution.

Variable	Category	Percent	Frequency
Current professional rank	Consultant	8.42	8
	Fellow	6.32	6
	Other	9.47	9
	Resident	52.63	50
	Specialist	23.16	22
Residency completion status	Completed	7.37	7
	Not completed yet	92.63	88
Country of residency for training	Inside Saudi Arabia	93.68	89
	Outside Saudi Arabia	6.32	6
Current work setting	Academic institution	10.53	10
	In the training program	38.95	37
	Hospital employee	37.89	36
	Military sector	5.26	5
	Other	1.05	1
Orthopedic specialty	Private practice	6.32	6
	General orthopedics	31.58	30
	Hand/upper extremity	1.05	1
	Other specialty	1.05	1
	Pediatric orthopedics	9.47	9
	Spine	3.16	3
	Sports medicine	3.16	3
	Not yet specialized	43.16	41
	Total joints	1.05	1
	Trauma	5.26	5
Currently practicing orthopedics in Saudi Arabia	Tumor	1.05	1
	No	1.05	1
	Yes	98.95	94
Geographic region	Central region	32.65	31

Eastern region	26.32	25
Northern region	6.32	6
Not in Saudi Arabia	1.05	1
Southern region	15.79	15
Western region	17.89	17

As illustrated in **Figure 1**, 61.05% of respondents reported experiencing microaggressions, while 38.95% reported no such experiences. A majority (76.84%) denied engaging in microaggressive behavior, while 23.16% admitted doing so. In addition, 32.63% described themselves as passive observers of such incidents, whereas 67.37% reported no witnessing of microaggressions.

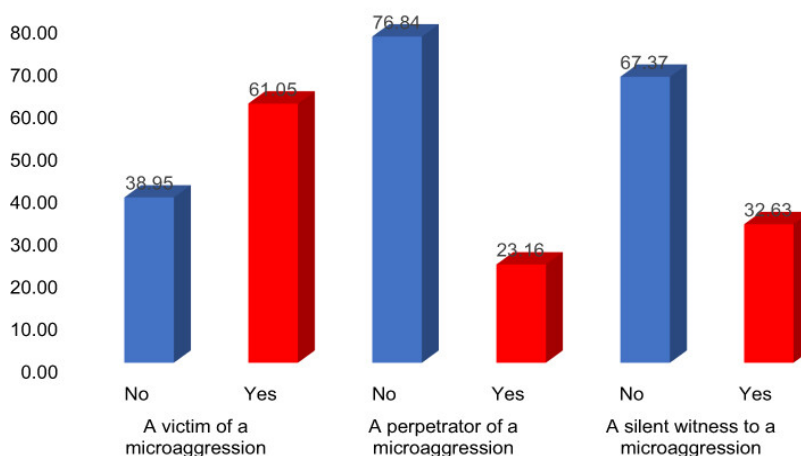


Figure 1. Microaggression experiences: incidences of being a victim, perpetrator, and silent witness among Saudi female orthopedics.

Table 2 shows that the tendency to report being a silent witness differed significantly by geographic region, with the Central Region showing the highest proportion (34.48%) compared with the Northern Region (5.17%) ($P = 0.025$). Regional differences were also observed for victimization and perpetration; however, these did not reach statistical significance.

Table 2. Exposure to microaggressions among female orthopedics practicing in KSA

Variable	Response	Western region (n, %)	Southern region (n, %)	Northern region (n, %)	Eastern region (n, %)	Central region (n, %)	P-value	χ^2
Victim of microaggression	No	3 (8.33%)	10 (27.78%)	3 (8.33%)	9 (25.00%)	11 (30.56%)	0.072	8.68
	Yes	14 (24.14%)	5 (8.62%)	3 (5.17%)	16 (27.59%)	20 (34.48%)		
Silent witness to microaggression	No	12 (19.05%)	8 (12.70%)	4 (6.35%)	12 (19.05%)	27 (42.86%)	0.025	11.12
	Yes	5 (16.13%)	7 (22.58%)	2 (6.45%)	13 (41.94%)	4 (12.90%)		
Perpetrator of microaggression	No	13 (18.06%)	10 (13.89%)	3 (4.17%)	21 (29.17%)	25 (34.72%)	0.374	4.24
	Yes	4 (18.18%)	5 (22.73%)	3 (13.64%)	4 (18.18%)	6 (27.27%)		

Regarding sources of microaggressions, patients or their families were identified in 43.16% of cases. Male surgeons were reported in 51.58%, while male support staff were implicated in 23.16%. Other male physicians accounted for 33.68% of reported instances. Among female-related categories, female surgeons were involved in 22.11% of cases, and female support staff in 29.47%. Other female physicians were mentioned in 11.58%. Overall, most respondents (between 56.84% and 88.42% across categories) reported no involvement of these groups in microaggressive behavior, while reported involvement ranged from 11.58% to 43.16% (**Table 3**).

Table 3. Roles in microaggressions: identifying individuals most commonly involved in a medical environment.

Source of microaggression	Percent	Number	Response
Patient/patient's family	56.84	54	No
	43.16	41	Yes
Male surgeons	48.42	46	No
	51.58	49	Yes
Male support staff	76.84	73	No
	23.16	22	Yes
Other male physicians	66.32	63	No

	33.68	32	Yes
Female surgeons	77.89	74	No
	22.11	21	Yes
Female support staff	70.53	67	No
	29.47	28	Yes
Other female physicians	88.42	84	No
	11.58	11	Yes

Table 4 summarizes gender-based experiences during orthopedic residency and fellowship, highlighting multiple forms of bias and stereotyping. Many participants reported negative remarks related to pregnancy and family planning (37.89%), having their competence and strength questioned because of gender (65.26%), and being directly told that women should not enter orthopedic surgery (48.42%). A large proportion experienced exposure to derogatory teaching material in academic settings (76.84%) and criticism of physical appearance (44.21%). Furthermore, 69.47% reported negative comments regarding personality or behavior, and 53.68% indicated being assigned tasks not typically given to male colleagues.

Additional findings point to professional disadvantages, including omission of professional titles during introductions (18.95%), being treated as representative figures for all female orthopedic surgeons (30.53%), limited female representation in conference speaking roles (18.95%), and missed training opportunities attributed to gender bias (14.74%).

Table 4. Gender-related experiences during orthopedic residency/fellowship training: a survey on discrimination and stereotyping.

Item	Percent	Frequency	Response
Negative discussion of pregnancy/family planning	62.11	59	No
	37.89	36	Yes
Strength/ability questioned due to gender	34.74	33	No
	65.26	62	Yes
Told women are not good orthopedic surgeons	51.58	49	No
	48.42	46	Yes
Told women should not be orthopedic surgeons	22.11	21	No
	77.89	74	Yes
Demaneing material in lectures/CME/formal presentations	100.00	95	No
	76.84	73	Yes
Negative comments about appearance	23.16	22	No
	44.21	42	Yes
Negative remarks about voice/behavior/personality due to gender	55.79	53	No
	69.47	66	Yes
Asked to perform gender-specific tasks not requested of men (e.g., removing earrings pre-op)	30.53	29	No
	53.68	51	Yes
Title excluded in introductions/correspondence	46.32	44	No
	81.05	77	No
Assumed to represent all female orthopedic surgeons	18.95	18	Yes
	69.47	66	No
Underrepresentation of women on conference podiums is noticed	30.53	29	Yes
	81.05	77	No
Missed training opportunities due to gender	18.95	18	Yes
	85.26	81	No
Excluded from social events due to gender	14.74	14	Yes
	100.00	95	No
Treated differently by staff due to gender	66.32	63	Yes
	33.68	32	No
Mistaken for nurse/rep/PA in hospital setting	100.00	95	Yes
	66.32	63	No
Mistaken for nurse/rep/PA by patient or family	33.68	32	Yes
	53.68	51	No
	46.32	44	Yes
	100.00	95	No
	34.74	33	Yes
	65.26	62	No
	100.00	95	Yes

Mistaken for nurse/rep/PA at meetings	69.47	66	No
	30.53	29	Yes
Orders/technique/clinical decisions questioned due to gender	69.47	66	No
	30.53	29	Yes

Regarding social and workplace interactions, respondents reported exclusion from social events (66.32%), differential treatment by staff members (33.68%), and frequent misidentification as nurses, sales representatives, or physician assistants (46.32%–65.26%) based on gender. Moreover, 30.53% stated that their clinical decisions, techniques, or orders were questioned specifically because of their gender.

Figure 2 illustrates inequalities related to gender in access to locker room facilities and workplace accommodations among female orthopedic surgeons. A total of 41.1% of participants reported reduced access to locker room resources because of their gender. In comparison, 38.9% indicated that they were not provided with separate female locker rooms or physician lounges comparable to those available to male colleagues. In addition, 26.3% reported the absence of appropriate facilities for breastfeeding during working hours. Furthermore, 51.6% stated that they were not provided with lead protection equipment properly fitted to their body size in the operating room. The results also show that 31.6% observed signage that equated the nurses' locker room with the women's locker room.

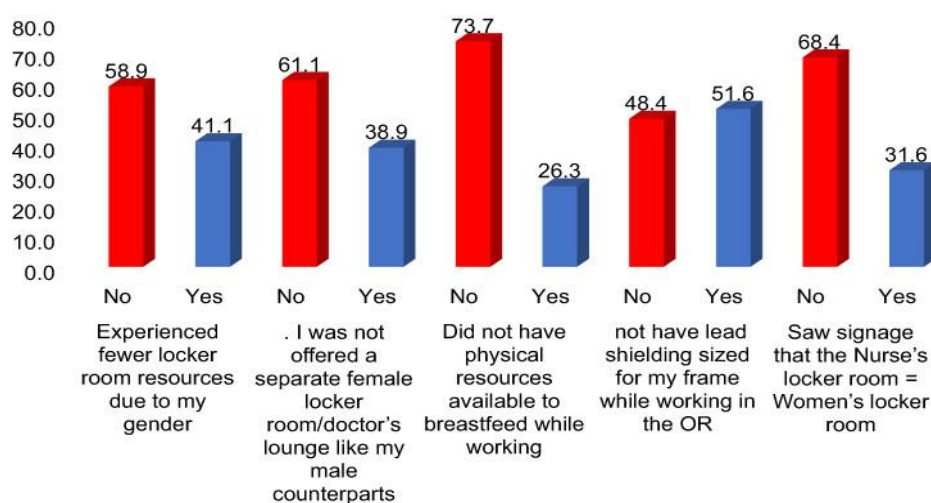


Figure 2. Gender-related experiences during orthopedic residency/fellowship training.

The results of this study showed that 61.05% of female orthopedic trainees reported being subjected to microaggressions as victims, whereas 38.95% stated they had not experienced such events. In addition, 76.84% did not consider themselves perpetrators of microaggressive behavior, while 23.16% admitted engaging in it. A notable proportion (32.63%) described themselves as passive observers of such incidents.

Regarding sources of microaggressions, patients or their families were implicated in 43.16% of cases, followed by male surgeons (51.58%), male support staff (23.16%), and other male physicians (33.68%). The findings further revealed a range of gender-related challenges during orthopedic residency and fellowship training, including negative conversations about pregnancy and family planning, doubts about physical strength and capability due to gender, and direct statements discouraging women from entering orthopedic surgery. A large proportion of respondents also reported exposure to demeaning educational content in lectures and presentations, as well as negative remarks about appearance.

Additional issues included limited representation of women at academic meetings and loss of training opportunities attributed to gender. Social experiences included exclusion from events and frequent misidentification with other professional roles due to gender. Moreover, disparities in workplace accommodations were evident, including reduced access to locker room facilities, a lack of separate female-designated spaces, and insufficient breastfeeding resources.

Similarly, findings from a survey conducted among members of the American Academy of Orthopedic Surgeons indicated that female surgeons experienced higher rates of discrimination, harassment, and bullying compared with their male counterparts, reported at 81% versus 35%, respectively [11]. Comparable results were reported by Samora *et al.* (74%) [7]. In contrast, a lower prevalence of microaggressions was observed among German healthcare professionals, where 38.1% reported witnessing discrimination and 13.5% reported direct personal experiences of discrimination in their workplace settings [13].

In the present study, participants most frequently identified male surgeons as the main sources of microaggressive behavior, followed by patients and their families. The prominent role of male surgeons as reported perpetrators suggests the presence of gender-related imbalance within orthopedic surgery. It highlights the need to address implicit biases within this male-

dominated specialty. Samora *et al.* [7] similarly found that patients and their families were the most common perpetrators, followed by male surgeons and female staff members.

It is important to recognize that the training environment of medical trainees—including students and residents—is strongly influenced by their interactions with patients, families, supervisors, nurses, colleagues, and other healthcare professionals. These interactions can provide important opportunities for mentorship and professional development, shaping future career trajectories. However, the same interactions may also contribute to experiences of discomfort, stress, mistreatment, harassment, or discrimination [14].

In the present study, participants reported experiencing gender-related discrimination, including issues surrounding pregnancy and family planning, questioning of their physical strength and professional capability due to gender, and discouraging attitudes toward women entering orthopedic surgery. A systematic review by Morrison *et al.* [15] found that many women either experienced or witnessed discrimination related to pregnancy and motherhood, which influenced career decisions, with 67% reporting postponement of childbearing due to their orthopedic career trajectory.

The current findings also indicated limited representation of women in academic meetings and reduced access to training opportunities attributed to gender bias. Social experiences included exclusion from social gatherings and repeated misidentification with other professional roles based on gender. In addition, disparities in workplace facilities were evident, including reduced locker room access, the absence of dedicated female spaces, and insufficient breastfeeding support resources.

Indeed, female medical students are often subtly directed toward specialties perceived as more “female-oriented,” such as family medicine and pediatrics, while being discouraged from pursuing surgical careers due to socially constructed gender expectations regarding lifestyle and work–life balance [16, 17]. Such patterns of gender disparity frequently extend beyond training into residency and later consultant practice [18, 19].

Unfortunately, women in medicine continue to experience unequal recognition compared with their male colleagues, particularly in leadership positions and compensation structures [19]. These inequities may be linked to early specialty steering, where women are disproportionately guided toward fields that are traditionally undervalued and lower paid due to female predominance. Overall, these findings underscore the importance of addressing gender-based challenges within orthopedic training systems. Establishing an inclusive environment that recognizes diversity and values contributions regardless of gender is essential [19]. Health-Sustainability provides an important framework for incorporating sustainable development principles into high-performance strategies required of healthcare leaders in response to contemporary global challenges [20].

Coping mechanisms are essential in mitigating the cumulative psychological burden and protecting emotional well-being. One helpful strategy is to seek informal debriefing and emotional support from colleagues or family members. In addition, engagement with peers who have had similar experiences or participation in structured support groups may help address and “repair” the effects of microaggressions by offering validation and shared understanding. Freeman and Stewart² propose a victim-centered approach rather than focusing primarily on perpetrators, emphasizing validation of victims’ experiences, avoiding minimization of harm, and acknowledging the wide range of adverse effects experienced. They argue that none of the so-called “microaggressions” should be considered trivial from the perspective of those affected.

This study’s strengths lie in its focused examination of microaggressions and gender-related challenges among female orthopedic surgeons in Saudi Arabia, using a mixed-methods framework and including participants from varied backgrounds. However, several limitations should be acknowledged, including potential response bias due to self-reporting, selection bias associated with non-probability convenience sampling, and limited external validity. The cross-sectional nature of the study also prevents inference of causal relationships, while assumptions regarding microaggression prevalence and the use of an online survey may introduce additional bias. Furthermore, retrospective recall bias and the cultural specificity of the sample may limit the generalizability of the findings beyond the Saudi context. Finally, the relatively small sample size reflects the limited number of female orthopedic surgeons practicing in Saudi Arabia.

Conclusion

Based on the study findings, it is recommended that awareness and sensitivity training programs be implemented to address microaggressions and gender-related challenges faced by Saudi female orthopedic trainees. Establishing structured mentorship and support systems is also essential to guide and encourage female trainees throughout their careers, alongside targeted initiatives to improve gender representation in the specialty. Leadership development opportunities should be introduced to empower female trainees and enhance their participation in leadership roles. Policy-level reforms are needed to ensure equitable access to opportunities and resources for female trainees.

Additionally, fostering a supportive institutional culture, promoting research in this area, and encouraging collaboration and professional networking are key strategies to address these challenges. Longitudinal research is also needed to track progress over time and evaluate interventions. Institutions must demonstrate sustained commitment to equity and inclusivity for all

trainees. Collectively, these measures would contribute to meaningful progress toward a more equitable and supportive training environment for female orthopedic surgeons.

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Conflict of interest: None

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Ethics statement: None

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