

RESEARCH LETTER

A comparative analysis on fertility success among physician specialties

Estimates suggest that one in four female physicians will suffer from infertility, well above the estimated incidence in the general population.¹ Physicians are exposed to a variety of psychological and physical occupational hazards. Specifically, emergency physicians (EPs) serve as the initial point of contact for the most critically ill and injured. Adding to these stressors are the requirements of 24-h staffing of the emergency department (ED) with varying shift start times and durations. This increases not only the physical demands of the occupation, but also the psychological stressors of their job. Prior research has recognized both physical and psychological stressors on women's fertility.^{2,3} Asynchrony in circadian processes alters many physiological systems, including female reproduction.⁴ Previous work has shown that the frequency of menses disorders in ED personnel is higher than that of others,⁵ yet little is known about how the high-stress ED environment impacts female fertility. As the number of female medical students surpasses males, more and more women are working in demanding clinical specialties and strenuous environments that may influence fertility. Physician specialties incur differing time pressures, peer support, compassion fatigue, and occupational culture that may also affect the ability to conceive. The present study examines history of fertility success in the high-stress occupation of physicians in general and specifically examines if the prevalence of fertility problems is greater among EPs than physicians from other specialties.

The population sampled were female physicians working in all subspecialties at the largest health care system in South Carolina. Data were collected from December 2019 to April 2020. An online Qualtrics-based epoch-based survey was designed to assess all physician attempts to conceive, beginning from medical school to the present date.⁶ The institutional review board determined this study to be exempt. Participation was voluntary. The researchers received all employed female physician's professional email addresses and contacted participants through their work email account. The invitation email explained the purpose of the study and assured both confidentiality and anonymity of their results. Participants were provided a link to a survey that first contained an information letter describing the study and indicated demographic information would be obtained from human resources, followed by questions pertaining to

their fertility history. Participants were only instructed to complete the survey if they had ever attempted to get pregnant. Each participant received a reminder email up to four times during the data collection period to encourage participation.

Through an extensive epoch-based questionnaire, the survey included all self-reported attempts to conceive beginning from medical school to present date and assessed fertility experiences and pregnancy outcomes. The survey utilized branch logic so when participants responded to certain questions, further descriptive questions were asked. A copy of the survey is available upon request. Additional data included the location of their work, department, job title, age, ethnicity, and years in profession. The primary outcomes included success at getting pregnant (yes or no, months it took to get pregnant) and outcome of the pregnancy (e.g., successful birth, miscarriage). All analyses were conducted using IBM SPSS Version 24. Chi-square tests were conducted to compare the frequencies of fertility success and pregnancy outcomes between EPs and physicians from other specialties. Analysis of variance (ANOVA) was used to test for differences in continuous outcomes as a function of physician specialty. General linear modeling was conducted to examine fertility success and pregnancy outcomes after controlling for physician age at pregnancy attempt and prior family history of fertility problems.

A total of 354 female physicians responded to the survey (42% response rate). Participants who reported that they had never tried to get pregnant in their career were excluded from the study analysis, resulting in 262 participants (74% of the initial response sample). In terms of demographics, 86% of participants were faculty physicians, 12% were residents and 1% were fellows. The mean (\pm SD) age of participants was 40 (\pm 8.64) years old and had worked at the hospital for a mean (\pm SD) of 6 (\pm 6.32) years. The majority of participants were White (83%) followed by Asian (5%), Black (4%), Hispanic (3%), and multiracial (2%). In terms of fertility history, 75% of the sample reported no history of infertility in their family. The 262 respondents reported 524 pregnancy attempts. Further analyses were conducted at the level of the pregnancy attempt.

Overall, physicians were successful in getting pregnant for 445 of all attempts (84%). EPs ($n = 34$) were less likely to get pregnant (73%) than physicians from other specialties (87%; $\chi^2 (1) = 9.99$, $p = 0.002$). EPs also took longer to get pregnant (mean \pm SD = 5.34 \pm

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5.51 months) than other physicians (mean \pm SD = 3.90 \pm 4.64 months; $F(1, 441) = 4.07, p < 0.05$). EPs also tried at an older age to get pregnant (mean \pm SD = 33.19 \pm 3.31 years) compared to other physicians (mean \pm SD = 31.68 \pm 3.45 years; $F(1, 521) = 11.62, p < 0.01$). However, age at the pregnancy attempt was not associated with likelihood of pregnancy success ($F(1, 521) = 0.60, p = 0.44$). Physicians were asked if they saw a doctor about their inability to get pregnant. The majority ($n = 42$ or 57%) indicated yes. The problems identified by the doctor and recommended outcomes are provided in Table 1. The most frequent reported problem was ovulatory dysfunction, followed by unexplainable cause and advanced maternal age. The most common outcome of the doctor assessment was hormone therapy, followed by intrauterine insemination. The sample size was too small to compare these assessment outcomes by physician specialty.

For the 445 successful pregnancy attempts, 92 (21%) experienced difficulties with their pregnancy. Among those 92 participants that experienced a difficulty with their pregnancy, 65 (71%) reported seeing a doctor about their pregnancy difficulty. The most common problems reported included ovulatory dysfunction ($n = 27$), advanced maternal age ($n = 20$), and problems with the partner ($n = 7$). EPs were not significantly more likely to indicate difficulties (29%) compared to physicians from other specialties (20%; $\chi^2(1) = 2.68, p = 0.102$). The variable of pregnancy outcome was coded as either a healthy birth or a miscarriage/premature birth. A healthy birth was reported in 79% of the pregnancies. Premature birth or miscarriage

was not more likely for EPs (21%) compared to physicians from other specialties (21%; $\chi^2(1) = 0.003, p = 0.953$). Generalized linear modeling revealed that after controlling for physician, history of infertility, and age of pregnancy attempt, being an EP was still a predictor of a reduced likelihood of a pregnancy attempt being successful (Wald $\chi^2(1) = 12.02, p = 0.001$). However, being an EP was no longer associated with how long it took to get pregnant (Wald $\chi^2(1) = 2.84, p = 0.09$).

The findings of this study must be interpreted with the following limitations. First, the study population only included physicians in one large health care system in South Carolina. Second, all measures of assessing infertility were self-reported. Third, the multiyear epoch design of this survey may be influenced by recall bias. Finally, infertility can be associated with feelings of anxiety and embarrassment; therefore, potential victims may have been hesitant to discuss their situations, even on an anonymous survey.⁷

To our knowledge, this is the first study to investigate if the prevalence of fertility problems is greater among EPs than physicians from other specialties. EPs are exposed to occupational risk factors include physical risks such as ionizing radiation, physiological stressors including shift work variability, and psychological demands including making frequent high-stakes decisions. These risk factors have been researched independently as factors contributing to fertility, but no study has examined how fertility impacts EPs when compared to other physician specialties.⁸ Research shows that a substantial percentage of female physicians would have attempted to conceive earlier (53.3%) or would have used cryopreservation to preserve fertility (16.7%) had they known infertility would be an issue.¹ Perhaps these data will encourage the EM community to begin increasing fertility education and awareness in medical school and throughout training. Further inquiry into the reasons for these findings and extension beyond a single health care system are needed to better understand the role of workplace stressors on female physician fertility. The novel approach of an epoch-based questionnaire focused on each pregnancy attempt shows promise to answer these important questions.

At this large academic health center, female EPs were significantly less likely to get pregnant than physicians from other specialties. As a specialty, further exploring EPs fertility issues and its link to burnout will be important to maintain a healthy and robust EP work force.

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TABLE 1 Distribution of self-reported causes of infertility and outcomes of doctor's assessment for participants who went to the doctor for infertility concerns

Causes of infertility	N
Ovulatory dysfunction	18
Unexplainable cause	11
Advanced maternal Age	8
Other	8
Problem with my partner	6
"I do not know"	5
Endometriosis	3
Tubal factor/disease	1
Anatomical disorder	1
Total	61
Outcomes of doctors assessment	
Hormone therapy	18
Intrauterine insemination (IUI)	14
In-vitro fertilization (IVF)	14
Other	5
No further intervention	5
Egg/sperm donor	2
Total	58

Note: Multiple causes and outcomes may be selected for each assessment.

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