

# Pregnancy and Motherhood During Surgical Training

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**IMPORTANCE** Although family priorities influence specialty selection and resident attrition, few studies describe resident perspectives on pregnancy during surgical training.

**OBJECTIVE** To directly assess the resident experience of childbearing during training.

**DESIGN, SETTING, AND PARTICIPANTS** A self-administered 74-question survey was electronically distributed in January 2017 to members of the Association of Women Surgeons, to members of the Association of Program Directors in Surgery listserv, and through targeted social media platforms. Surgeons who had 1 or more pregnancies during an Accreditation Council for Graduate Medical Education-accredited US general surgery residency program and completed training in 2007 or later were included. Important themes were identified using focus groups of surgeons who had undergone pregnancy during training in the past 7 years. Additional topics were identified through MEDLINE searches performed from January 2000 to July 2016 combining the keywords *pregnancy*, *resident*, *attrition*, and *parenting* in any specialty.

**MAIN OUTCOMES AND MEASURES** Descriptive data on perceptions of work schedule during pregnancy, maternity leave policies, lactation and childcare support, and career satisfaction after childbirth.

**RESULTS** This study included 347 female surgeons (mean [SD] age, 30.5 [2.7] years) with 452 pregnancies. A total of 297 women (85.6%) worked an unmodified schedule until birth, and 220 (63.6%) were concerned that their work schedule adversely affected their health or the health of their unborn child. Residency program maternity leave policies were reported by 121 participants (34.9%). A total of 251 women (78.4%) received maternity leave of 6 weeks or less, and 250 (72.0%) perceived the duration of leave to be inadequate. The American Board of Surgery leave policy was cited as a major barrier to the desired length of leave by 268 of 326 respondents (82.2%). Breastfeeding was important to 329 (95.6%), but 200 (58.1%) stopped earlier than they wished because of poor access to lactation facilities and challenges leaving the operating room to express milk. Sixty-four women (18.4%) had institutional support for childcare, and 231 (66.8%) reported a desire for greater mentorship on integrating a surgical career with motherhood and pregnancy. A total of 135 (39.0%) strongly considered leaving surgical residency, and 102 (29.5%) would discourage female medical students from a surgical career, specifically because of the difficulties of balancing pregnancy and motherhood with training.

**CONCLUSIONS AND RELEVANCE** The challenges of having children during surgical residency may have significant workforce implications. A deeper understanding is critical to prevent attrition and to continue recruiting talented students. This survey characterizes these issues to help design interventions to support childbearing residents.

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Although more than half of medical students are female, women remain underrepresented in general surgery, constituting 38% of residents<sup>1</sup> and 18% of faculty members<sup>2</sup> in the United States. Several factors that deter women from a surgical career have been suggested, including the perception that the field is not compatible with their desire to have a family.<sup>3</sup> In the past, women were more likely to delay parenthood until after completion of surgical residency,<sup>4</sup> but more are choosing to have children during residency.<sup>5,6</sup> With increasing numbers of women becoming pregnant during training and attrition of female residents estimated to be 25%,<sup>7</sup> the influence of childbearing on the surgical workforce must be better understood.

Support of pregnant surgical residents by training programs across the country is variable, with approximately half of US program directors reporting dedicated lactation facilities in their institutions and fewer providing on-site childcare.<sup>8</sup> Stigma associated with pregnancy during residency is still prevalent, with 2 of every 3 women surveyed in the American College of Surgeons reporting negative attitudes from peers and faculty that influenced their childbearing decisions.<sup>6</sup> Social pressure to avoid pregnancy during residency may arise from faculty or colleagues. A recent survey of US surgical program directors found that more than 60% believe that motherhood adversely affects a trainee's work, and nearly half suggested that the best time for a woman to have a child is during research years.<sup>8</sup>

Although single-institution experiences have been described,<sup>9-11</sup> leave duration, call responsibilities, attitudes of coworkers and faculty, and the presence of postpartum support are mixed, reflecting the diversity in policies, culture, and resources available to childbearing women in surgical training programs. The most contemporary national study of pregnancy during training took place nearly a decade ago and described a higher rate of childbirth in recent graduation cohorts, but challenges beyond negative stigmatization were not examined.<sup>6</sup> The goal of this study was to characterize the experience and perception of women surgeons who have been pregnant during residency. We present the findings of a national survey to describe the challenges and potential influence on training and to identify areas with the greatest potential for improvement.

## Methods

A 74-question survey was electronically distributed in January 2017 to active members of the Association of Women Surgeons, to members of the Association of Program Directors in Surgery listserv, and through targeted social media platforms on Facebook and Twitter. Program directors from 255 Accreditation Council for Graduate Medical Education-accredited US general surgery residency programs were asked to forward the survey to current and former female trainees. A link to the survey was posted with permission within 2 Facebook groups of physician and surgeon mothers. The Physician Moms Group is one of the largest social media platforms for physicians of all specialties, with 67 156 members at the time of survey dis-

## Key Points

**Question** What is the perception and experience of pregnant general surgery residents?

**Findings** This national survey of 347 general surgeons who have had 1 or more pregnancies during residency revealed concerns about unmitigated work schedules during pregnancy, negative stigma associated with pregnancy during training, dissatisfaction with maternity leave options, inadequate lactation and childcare support, and desire for greater mentorship on work-life integration. These challenges were associated with 39% of participants seriously considering leaving residency and 30% reporting they would advise a female medical student against pursuing a career in surgery.

**Meaning** Multiple challenges facing pregnant surgical residents may negatively influence career satisfaction and must be addressed to attract and retain the most talented workforce.

tribution. The Surgeon Moms Group is composed of surgeons of all specialties, with a membership of 960 women at the time of survey distribution. A link to the survey was also disseminated on Twitter. Weekly reminders were posted on social media sites until the number of responses exceeded the calculated sample size. The survey was available online for 4 weeks. Participation was voluntary, and no compensation was provided. Completion of the survey inferred consent. The survey was approved by the Association of Program Directors in Surgery Committee on Research and given exemption by the Partners Human Research Committee Institutional Review Board. All data were deidentified.

## Survey Development

The survey was developed using a cognitive testing approach. Focus groups were held at training programs at Stanford University Medical Center and Brigham and Women's Hospital. Ten surgeons who became mothers during residency within the past 7 years underwent interviews to identify important themes. Additional topics were identified through MEDLINE searches performed from January 2000 to July 2016 combining the keywords *pregnancy*, *resident*, *attrition*, and *parenting* in any specialty. Questions were developed to address each topic and validated by collaborators with expertise in qualitative and survey research. The survey was piloted within a small group of female surgeons at the Association of Women Surgeons and at 3 training programs, with several rounds of cognitive feedback used to develop the final instrument.

The survey collected demographic information, including age and level of training during pregnancy, current role (resident, fellow, or practicing surgeon), current or intended surgical specialty, past or anticipated graduation date, number of pregnancies during residency, and duration of maternity leave. Residency program information included type of program (academic or independent), program size, location, and presence of the following: formal maternity leave policy, lactation facilities, and childcare support. A 4-point Likert scale format was used to assess perceptions on the following topics: working while pregnant, maternity leave policies, breastfeeding and

Table 1. Participant Characteristics

Characteristic	No. (%) of Surgeons (N = 347 <sup>a</sup> )
Current role	
Practicing surgeon	159 (45.8)
Fellow	53 (15.3)
Resident	135 (38.9)
Current or anticipated surgical specialty (n = 293)	
General	55 (18.8)
Trauma and acute care surgery	51 (17.4)
Breast	35 (11.9)
Pediatrics	28 (9.6)
Plastics	26 (8.9)
Colorectal	23 (7.8)
Vascular	21 (7.2)
Bariatric and minimally invasive	17 (5.8)
Cardiothoracic	12 (4.1)
Surgical oncology	11 (3.8)
Endocrine	8 (2.7)
Transplant	6 (2.0)
Past or anticipated year of residency completion	
2007-2009	24 (6.9)
2010-2012	53 (15.3)
2013-2015	79 (22.8)
2016-2018	136 (39.2)
2019-2022	55 (15.9)
No. of pregnancies during residency (n = 346)	
1	246 (71.1)
2	94 (27.2)
3	6 (1.7)
Level of training during pregnancy <sup>b</sup> (n = 327)	
PGY 1	16 (4.9)
PGY 2	41 (12.5)
PGY 3	72 (22.0)
PGY 4	55 (16.8)
PGY 5	89 (27.2)
Research years <sup>c</sup>	54 (16.5)
Length of maternity leave duration, wk (n = 320)	
1-6	251 (78.4)
≥7	69 (21.6)
Survey access (n = 346)	
Physician Moms Group	56 (16.2)
Surgeon Moms Group	96 (27.7)
Link emailed from program director	79 (22.8)
Link emailed from other	99 (28.6)
Twitter	16 (4.6)

Abbreviation: PGY, postgraduate year.

<sup>a</sup> Each question was answered by more than 90% of participants except where otherwise noted.

<sup>b</sup> Women who had more than 1 child and delivered at least 1 child during clinical residency were listed under the earliest postgraduate year that they were pregnant.

<sup>c</sup> Women were listed under research years only if they were pregnant with all their children during nonclinical time.

lactation, childcare and motherhood, job satisfaction, perceptions of stigma, attitudes of colleagues, and satisfaction with training program support. For this study, the response *agreed* represents the sum of agreed and strongly agreed, and *disagreed* represents the sum of disagreed and strongly disagreed. The survey is available online (eFigure in the Supplement).

### Study Participants

Women who had 1 or more pregnancies during an Accreditation Council for Graduate Medical Education-accredited US general surgery training program and who completed (or were anticipated to complete) residency in 2007 or later were included. Those who had a pregnancy during surgical residency but did not complete surgical training were included if their year of graduation was expected to be 2007 or later.

### Sample Size Calculation and Statistical Analysis

To calculate sample size, recent US surgical workforce data from the American College of Surgeons Health Policy Research Institute<sup>12</sup> were used to estimate the number of surgeons of childbearing age eligible for this study. Of the approximately 28 000 surgeons in general surgery and general surgery subspecialties, 15% are women. If half were of childbearing age and could possibly become pregnant during the period studied, the maximum potential sample would be 2100 women. A sample of at least 327 women was calculated to detect a difference of 5% in responses to survey questions with 80% power and  $\alpha = .05$ .

We performed  $\chi^2$  analysis for categorical variables.  $P \leq .05$  was accepted to indicate statistical significance. Data were analyzed using Stata, version 14.0 (StataCorp).

## Results

### Demographics and Program and Hospital Characteristics

A total of 347 women (mean [SD] age, 30.5 [2.7] years) met the inclusion criteria and reported 452 pregnancies. The response rate could not be calculated because the number of surgeons who were pregnant during residency was unknown and the methods of distribution precluded calculation of the respondent denominator. More than one-quarter of respondents had more than 1 pregnancy during residency, with most pregnancies taking place during or after postgraduate year 3. Although 101 of the 452 pregnancies (22.3%) occurred during nonclinical (research) years, 288 respondents (83.0%) had at least 1 pregnancy during clinical training (Table 1). Most respondents were residents of an academic training program; 298 (85.9%) of their programs had 4 or more chief residents per class (Table 2).

### Residents' Perception of Workplace Culture, Pregnancy Experience, and Postpartum Support

The answers to the Likert scale format questions are summarized in Figure 1 and Figure 2 and discussed by the following themes.

### Working While Pregnant

A total of 253 respondents (72.9%) had witnessed faculty members or other residents making negative comments about pregnant trainees or childbearing during training. Of these, 185 (73.1%) were concerned they were perceived poorly during their own pregnancies. A total of 208 participants (59.9%) reported there was a negative stigma associated with being pregnant as a surgical resident, and 108 (55.1%) perceived pressure to plan pregnancies during nonclinical time.

A total of 297 women (85.6%) worked an unmodified schedule until delivery, with 289 (83.5%) and 300 (87.0%) reporting that requesting accommodations for less demanding rotations during pregnancy would have been perceived negatively by their peers and supervising faculty, respectively. A total of 220 (63.6%) were concerned that their work schedule or duties adversely influenced their health or the health of their unborn child.

### Maternity Leave

Formal surgical program maternity leave policies were reported by 121 participants (34.9%). The American Board of Surgery (ABS) leave policy was cited as a major barrier to obtaining the desired length of leave by 268 (82.2%). A total of 251 respondents (78.4%) reported receiving 6 weeks or less of maternity leave. A greater proportion of these residents perceived their maternity leave was of insufficient duration compared with those who received more than 6 weeks of leave (200 [79.7%] vs 32 [46.4%],  $P < .001$ ). Those who delivered during clinical years were more likely to have fewer than 6 weeks off compared with women who delivered during nonclinical years (210 of 273 [76.9%] vs 29 of 54 [53.7%],  $P = .001$ ).

### Childcare and Motherhood

Childcare support was offered through the residency program or hospital for 64 respondents (18.4%). Most often, this was in the form of preferential daycare enrollment, discounted daycare, or access to backup childcare services, but 55 women (85.9%) reported that these options did not offer hours that accommodated a surgical resident's schedule. Three residents (0.86%) were offered a monetary stipend to assist with childcare expenses. A total of 260 residents (75.4%) reported that additional childcare support would have helped them focus on their surgical training.

### Breastfeeding and Lactation Support

A total of 329 of 344 respondents (95.6%) reported breastfeeding was important to them, but 200 (58.1%) stopped earlier than they would have preferred because of the challenges of balancing work duties with time to express milk. Designated lactation facilities were present for 220 respondents (63.4%), although 96 (43.6%) of these residents reported access was limited by the location and number of facilities. A total of 270 respondents (85.2%) reported they were uncomfortable asking attending surgeons for permission to step away from an operation to express milk, and 267 (78.8%) perceived faculty would not have been supportive if asked. The establishment of case-coverage policies by

**Table 2. Training Programs, Hospital Characteristics, and Support Policies**

Characteristic	No. (%) of Women
Type of program (n = 342)	
Academic	297 (86.8)
Independent	45 (13.2)
Program size (No. of chief residents)	
1-3	48 (13.8)
4-6	173 (49.9)
≥7	126 (36.3)
Geographic location <sup>a</sup> (n = 346)	
Northeast	104 (30.1)
Midwest	82 (23.7)
West	75 (21.7)
South	85 (24.6)
Program offered reduced work schedule during pregnancy	
Yes	50 (14.4)
No	297 (85.6)
Program had formal maternity leave policy	
Yes	121 (34.9)
No	168 (48.4)
I don't know	58 (16.7)
Type of support or policy	
Hospital had lactation facility (other than bathroom)	
Yes	220 (63.4)
No	96 (27.7)
I don't know	31 (8.9)
Hospital or program offered childcare support <sup>b</sup>	
Yes	64 (18.4)
No	262 (75.5)
I don't know	21 (6.1)

<sup>a</sup> Northeast included Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New York, and Pennsylvania. Midwest included Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. West included Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Hawaii, Oregon, and Washington. South included Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, Washington, DC, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, and Texas.

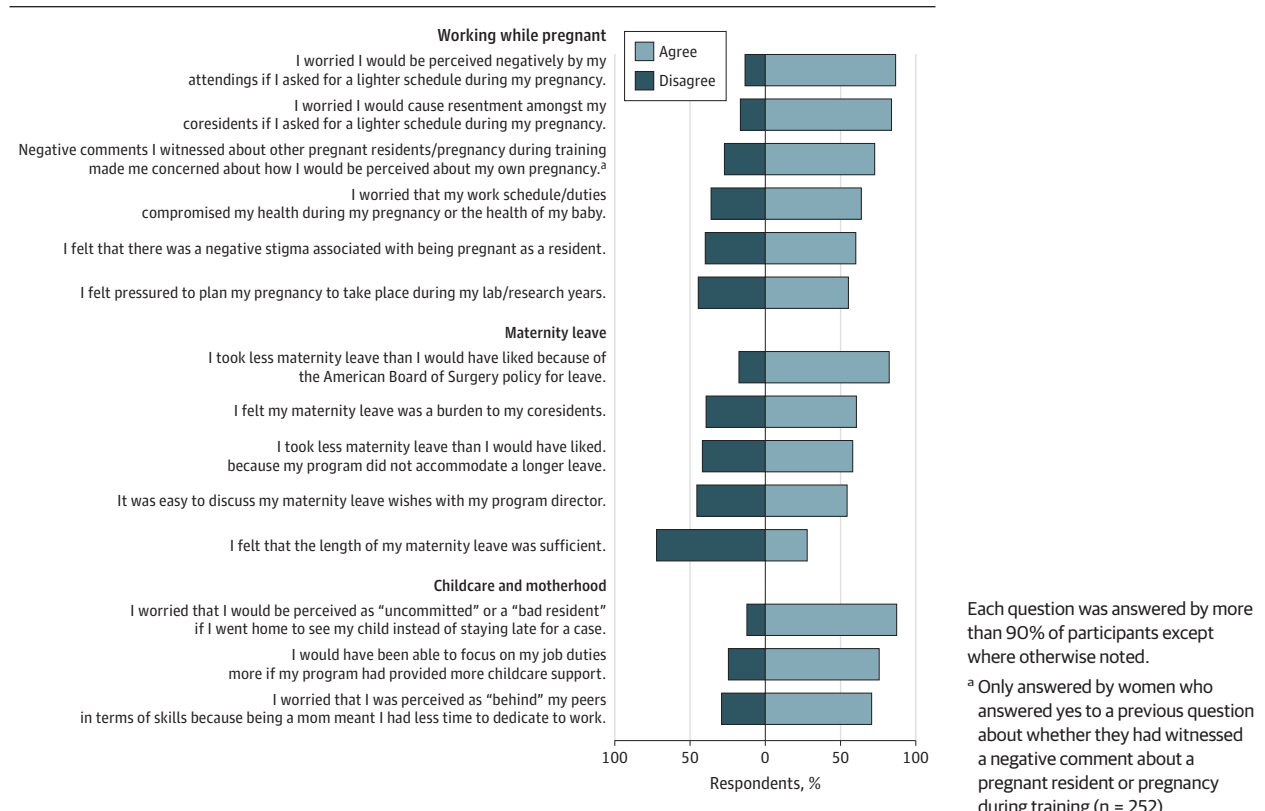
<sup>b</sup> Childcare support included any of the following: monetary support, backup childcare, and preferential childcare enrollment.

fellow residents to allow time to express milk without compromising patient care was favored by 203 respondents (64.9%).

### Career Satisfaction

A total of 135 respondents (39.0%) reported that their experience of pregnancy during residency made them strongly reconsider whether they wanted to continue their surgical training. A total of 102 respondents (29.5%) would caution a female medical student against a career in surgery because of the difficulty of balancing the profession with motherhood, and 231 (66.8%) reported that additional mentorship on balancing career with pregnancy and motherhood would have been helpful.

Figure 1. Responses to Likert Survey Questions for Working While Pregnant, Maternity Leave, and Childcare and Motherhood



## Discussion

This national survey of 347 surgeons who were pregnant during residency demonstrated concerns over unmitigated work duties late in pregnancy, perceptions of negative stigma related to childbearing, dissatisfaction with maternity leave policies, inadequate lactation and childcare support, and desire for stronger mentorship in work-life integration. These challenges negatively influenced career satisfaction for many respondents, with 39% seriously considering leaving residency and 30% reporting they would advise a female medical student against pursuing a surgical career. As more women enter surgical residency,<sup>13</sup> the logistics of training and retaining the best candidates must consider the needs of childbearing residents.

Despite more than a decade of work-hour reform, general surgery attrition remains 20% or more.<sup>14,15</sup> Studies<sup>7,15</sup> report that lifestyle concerns and female gender are associated with the desire to leave the field. The current study found that women having children during residency may be at particularly high risk. Differences in priorities between men and women may account for greater risk of attrition in new mothers, with female surgeons investing nearly twice as many hours and missing more work activities because of parenting obligations compared with their male counterparts.<sup>16</sup>

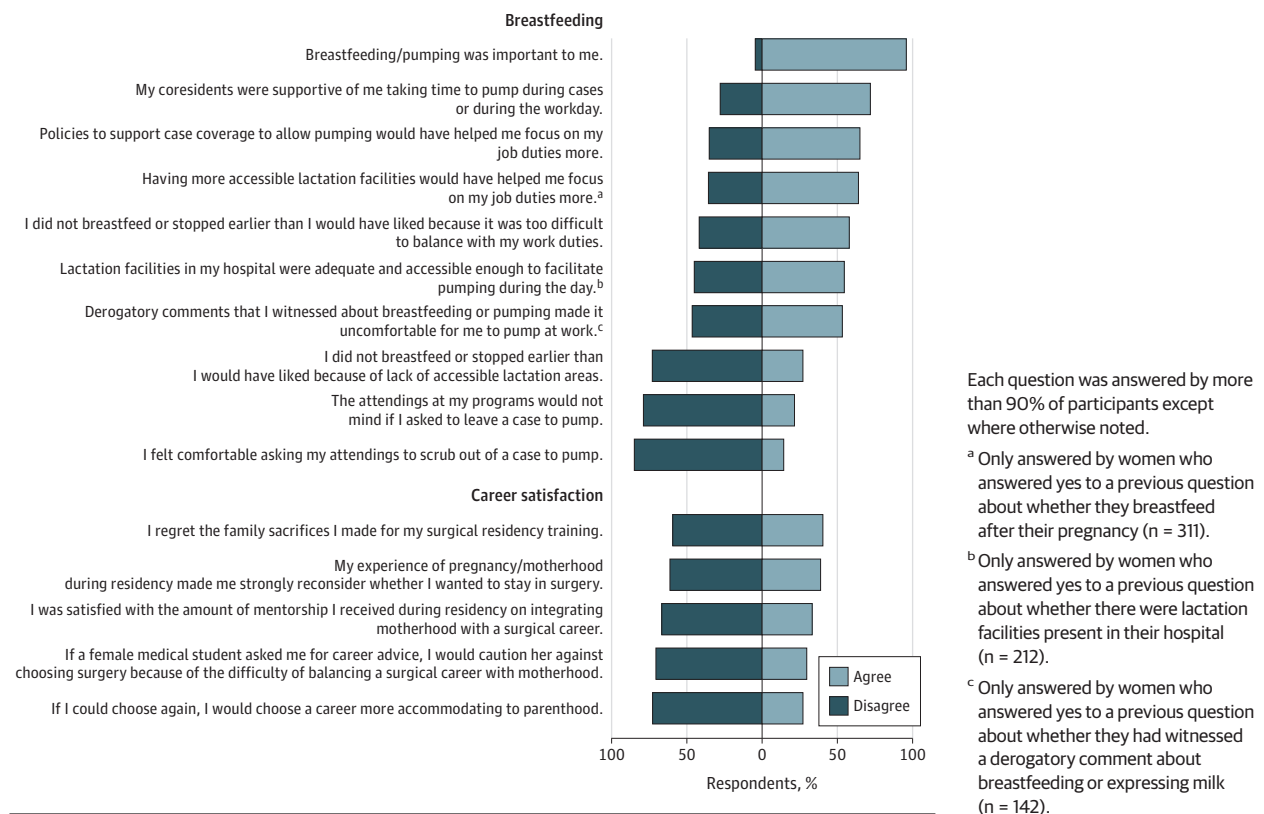
A second issue that influences the surgical workforce is the challenge of recruiting the most talented students in an era in

which lifestyle preferences significantly influence specialty selection.<sup>17</sup> Although nearly half of medical school graduates are female,<sup>18</sup> women are less likely to pursue a career in general surgery.<sup>19,20</sup> Causes of this gender discrepancy include the lack of female role models, gender discrimination, and pregnancy and child care concerns.<sup>3,21-23</sup> By combating stereotype, female residents have an even greater influence than female faculty members on recruitment of medical students to the surgical profession.<sup>20</sup> The current study suggests that this mentor model is jeopardized by the difficulties faced by pregnant residents, with nearly one-third of respondents reporting they would advise female students not to pursue the specialty as a result of their own experience. Addressing the challenges associated with pregnancy during training empowers female residents to serve as compelling role models for the attainment of surgical training and family.

Literature on teaching programs reports formal maternity leave policies in 90% of pediatric and 80% of obstetrics and gynecology residencies even a decade ago.<sup>24,25</sup> Obstetrics and gynecology residencies demand long hours and have smaller program sizes, similar to general surgery, but provide a mean of 8.7 weeks off from training for maternity leave.<sup>25</sup> On the basis of this survey, general surgery programs trail these metrics. The ABS sets limitations on time away from training to ensure adequate education of qualified surgeons, but several options are outlined by their leave policy.<sup>26</sup> To complete training in 5 years, residents are permitted 12 weeks away during the first 3 years of training and 8 weeks away during the



Figure 2. Responses to Likert Survey Questions for Breastfeeding and Career Satisfaction



last 2 years, with an additional 2 weeks during each period to accommodate medical conditions, including pregnancy. Residents may also complete clinical training during a 6-year period, although implementation of this track may be limited by concerns over the financial burden of extended training and reluctance to significantly lengthen residency.<sup>27,28</sup> These 2 options may be considered to be insufficient by pregnant residents, with too little time away provided for those who wish to finish in 5 years and too much time away in the 6-year track. In October 2017, the ABS reformatted their published policies to clarify flexible-training tracks, including extension of the chief year by the length of leave taken. The challenges for residents of such off-cycle training depend on the duration of extension and trainees' postgraduation plans, with minimal influence on those completing residencies by July 31 but delays past August 1 influencing the ability to begin fellowship on time.<sup>29</sup> Program-level barriers to implementation of flexible-training tracks must be further studied. Although the ABS sets limitations on time away like many other specialty boards (eTables 1 and 2 in the Supplement) and allows early eligibility for board certification,<sup>30</sup> most women completing this survey perceived the ABS policies to be an obstacle to obtaining adequate duration of leave. This response may reflect a need for better understanding of all leave possibilities (Table 3).

Most women in this survey reported an unmodified schedule until birth despite concerns about fetal and maternal health. Most respondents reported concern that requesting adjustments to their schedules would trigger negative perceptions

from faculty and coresidents. Studies<sup>31,32</sup> suggest that pregnancy complications, such as preeclampsia and preterm labor, occur with higher frequency among residents who work long hours compared with matched controls. Preferential scheduling of less challenging rotations during the third trimester, as recommended by Association of Women Surgeons guidelines for maternity leave in residents,<sup>33</sup> may reduce health risks, minimize coverage gaps if the resident is unable to work close to term, and avoid engendering resentment among peers who are asked to cover duties unexpectedly. Residents who require additional accommodations because of medical limitations during pregnancy may need to lengthen the duration of their training to ensure the quality of their education.

Challenges in balancing work duties with time to express milk caused more than half of respondents to stop breastfeeding earlier than they wished. The inability to meet personal breastfeeding goals is a source of frustration<sup>34,35</sup> and adds to misgivings about the ability to balance parenthood with career.<sup>36</sup> Practical solutions that minimize disruption to patient care and education include cross-coverage systems that allow another resident to briefly relieve a nursing resident during long cases<sup>36</sup> and designation of facilities with dedicated equipment for expressing and storing milk<sup>37</sup> near the operating room.

Childcare was identified as a significant challenge that distracted from education and training. An American College of Surgeons survey reported that 90% of partnered female surgeons have working counterparts and 50% are in dual-

Table 3. Maternity Leave Options

Maternity Leave Duration	Options for Leave	Details	Requires ABS Approval	Requires ACGME/RRC Approval
<b>PGYs 1-5</b>				
≤6 wk	4 wk of leave from 1 y of training plus up to 2 wk of medical leave	Allows preservation of leave time in subsequent years	No	No
7-10 wk	Up to 8 wk of leave may be used from PGYs 1-3 or PGYs 4-5 plus 2 wk of medical leave	Requires use of leave time accrued during 2 y, leaving fewer (or no) weeks for vacation during the year the leave was borrowed from	No	No
	4 wk of leave from 1 y of training plus 2 wk of medical leave plus program director requests ABS approval for additional 1-4 wk of leave	Avoids using borrowed leave time from subsequent training years; additional weeks of leave requested from ABS must be made up at end of residency; allows completion of residency before August 1, avoiding affecting fellowship; if case and training requirements met, the QE may be taken after completion of PGY 4; the QE may also be taken same year of graduation if training completed by August 31, with results and CE site selection held until program director attests to completion of ABS requirements	Yes <sup>a</sup>	Yes <sup>b</sup>
11 wk to 12 mo	4 wk of leave from 1 y of training plus 2 wk of medical leave plus program director requests ABS approval for additional leave	Allows resident to preserve leave time for use during other training years; additional leave must be made up at end of residency; for those planning a fellowship beginning August 1, the start date will be affected; if case and training requirements met, the QE may be taken after completion of PGY 4; the QE may also be taken same year of graduation if training completed by August 31, with results and CE site selection held until program director attests to completion of ABS requirements	Yes <sup>a</sup>	Yes <sup>b</sup>
12 mo	Up to 12 mo of leave may be taken; leave may be taken in one block or divided	48 wk of full-time training is required to complete each postgraduate year; no block of training may be shorter than 4 wk	Yes <sup>a</sup>	Yes <sup>b</sup>
<b>PGYs 1-3 only<sup>c</sup></b>				
11-14 wk	Up to 12 wk of leave may be used from PGYs 1-3 plus 2 wk of medical leave	Requires use of leave time accrued during first 3 y, leaving fewer (or no) vacation during the years the leave was borrowed from	No	No

Abbreviations: ABS, American Board of Surgery; ACGME/RRC, Accreditation Council for Graduate Medical Education/Residency Review Committee; CE, certifying examination; PGY, postgraduate year; QE, qualifying examination.

<sup>a</sup> Program director must request permission from ABS on official letterhead by mail or fax with complete schedule of resident's training with calendar dates including all leave time.

<sup>b</sup> Changes in resident complement require the program director to request permission from ACGME/RRC to temporarily carry an extra resident. Details available at: [https://www.acgme.org/Portals/0/PFAssets/ProgramResources/440\\_resComp.pdf](https://www.acgme.org/Portals/0/PFAssets/ProgramResources/440_resComp.pdf).

<sup>c</sup> Maximum leave time without additional ABS approval during PGYs 4 and 5 is 8 weeks (2 additional weeks for medical leave may also be taken).

physician relationships,<sup>38</sup> making childcare particularly stressful. A study<sup>39</sup> from Stanford University School of Medicine found that female faculty members prioritized a flexible work environment with access to nearby childcare as the most important need to improve career success. On-site daycare, sick childcare centers, and subsidy programs to support childcare costs have been implemented cost-effectively for many businesses,<sup>40</sup> hospital systems,<sup>41</sup> and residency programs.<sup>42</sup> These provide examples of successful childcare programs that promote employee wellness and retention.

Surgical leaders have long emphasized the importance of mentorship as a critical retention tool for women.<sup>43,44</sup> A large cross-sectional study<sup>45</sup> of surgical residents reported that informal socialization with faculty significantly increases their approachability when trainees face difficulties and is strongly associated with residency satisfaction. Women were less likely to form these relationships and were identified as a particularly vulnerable group for attrition. Two-thirds of participants in the current survey expressed a desire for greater mentorship on integrating work with family. Formal programs that pair residents with mentors of shared gender and experience

may foster a sense of inclusion in the surgical community and provide nonthreatening opportunities to seek support and experience-based advice on balancing career goals with pregnancy and childcare.<sup>45</sup>

### Limitations

This study is limited by its method of distribution, which precluded calculation of a response rate. It is unknown how many women viewed the link to the survey or how many program directors forwarded the study to trainees and graduates. However, because the number of women who have been pregnant during training is not known, an a priori decision was made to use a multimodal approach to reach as many female surgeons as possible. Despite this, the study cohort demonstrates balanced geographic distribution and wide variation in program size. As with all studies that use self-reported data, there may be response bias. The use of physician mothers' groups within Facebook may have also introduced selection bias because opinions may not be representative of all US surgical resident mothers. Lastly, causal inferences cannot be made from the data because of the cross-sectional design.

## Conclusions

Pregnancy and childcare support may have a significant influence on the decision to pursue or maintain a career in surgery. To attract and retain the most talented candidates, surgical programs must address the challenges facing new mothers in residency. Open discussion among surgical lead-

ers and educators must develop strategies for workforce shortages, improvements in the working environment, flexible leave policies, and preservation of the integrity of education for the pregnant resident and her colleagues. As the profession works to build the surgical workforce, the call to invigorate the field requires assessment and acknowledgment of the needs of an increasing population of women surgeons beginning families during training.

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**Author Contributions:** Dr Rangel had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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*Acquisition, analysis, or interpretation of data:* All authors.

*Drafting of the manuscript:* Rangel, Changala, Haider, Doherty.

*Critical revision of the manuscript for important intellectual content:* All authors.

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*Administrative, technical, or material support:* Rangel, Smink, Kwakye, Changala, Haider, Doherty.  
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## Invited Commentary

## Mountain Climbing, Motherhood, and Surgical Practice

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**Climbing one of the world's tallest peaks** is on the bucket lists of many people. But not every adventurer can, should, or even wants to do it. Mountain climbing requires considerable planning and support, practical considerations, and much time away from work—which means it also involves the availability of others to provide coverage. It also helps to have a great team. Once begun, some climbers are unable to summit. Each of these factors means that difficult decisions may be necessary to determine if the right time to climb exists, and when.<sup>1-3</sup>

The same concepts can be applied to the challenges of parenthood during surgery residency, particularly for pregnancy and early motherhood. Here the figurative summit is happy, healthy offspring. In this issue of *JAMA Surgery*, Rangel et al<sup>4</sup> raise the many pertinent concerns of female residents who choose to start or expand a family during training. As in climbing, factors such as health, drive, and an adequate support system are essential parts of the equation, and because the amount of time that can be missed during the formative clinical years is specified during residency training by the Accreditation Council for Graduate Medical Education, anticipatory planning is also important. For instance, medical leave at the end of pregnancy may be necessary to manage or avoid complications, which may even shorten maternity leave. In addition, although scheduling lighter rotations with shorter operative times can be advantageous, life itself leaves no guarantee of correct timing or best outcomes.

Child care arrangements are also pivotal. Although it certainly should be a professional standard in the United States, accessible on-site child care is not yet often provided. In fact, as of 2012, only 7% of companies nationwide provided this highly desirable option,<sup>5</sup> even though some employers have

shown improved employee recruitment and retention when in-house child care is available.<sup>6</sup> We agree with Rangel et al<sup>4</sup> that access to a lactation room is a perfectly reasonable and attainable accommodation in today's world. We also agree wholeheartedly that, when well thought-out, pregnancy during residency should not be met with negativity from peers and superiors; after all, adults of any sex do tend to form families.<sup>7</sup> However, as with some of the practical issues inherent to climbing, we do not think that the idea of regularly scrubbing out during operative cases to express breast milk is currently realistic in surgical training. Perhaps in a perfect future it will be.

Rangel et al<sup>4</sup> rightly acknowledge that their study is limited by an unknown survey response rate. The findings are further limited by possible bias from a high proportion of dissatisfied respondents, and by study design limitations, such as the exclusion of childbearing at times other than surgical training, miscarriage or adoption, variable time in training, the experience of male surgeons as parents, and the views of non-surgeon physicians as parents. Nevertheless, the survey results have important value, especially in calling for change. The current situation of women surgeons in the United States demands and requires change.

Good mentorship is priceless during medical training. The best advice we can give, as surgeon mothers of 8 children altogether, is to remember that pregnancy and early infancy are just the beginning of the long adventure of parenthood. There will be sick babies, unruly teens, unmissable teacher meetings, lost homework, championship games, and birthday parties after which everyone will come down with the flu.<sup>8</sup> As surgeons, we have a special bond with our patients, who expect that if they need us, we will be there. The same thing goes for our children. If the prospect of leaving a recital, fencing match, or tickle-fest to perform urgent surgery is enough to sway a



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