

Pregnancy among residents enrolled in general surgery (PREGS): a survey of residents in a single Canadian training program

Shaila Merchant, MD, MSc,
MHS

Morad Hameed MD, MPH
Adrienne Melck, MD, MPH

From the Division of General Surgery,
Department of Surgery, University of
British Columbia, Vancouver, BC

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Correspondence to:
Dr. S. Merchant
910 West 10th Ave., Room 3100
Vancouver BC V5Z 4E3
shailam@interchange.ubc.ca

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Background: Interest in general surgery has declined, and lack of adequate accommodation for pregnancy and parenting may be a deterrent. We explored resident experiences with these issues within a single general surgery program.

Methods: We surveyed residents enrolled in the University of British Columbia general surgery program from 1997 to 2009 using a Web-based survey tool. Information regarding demographics, pregnancy, postpartum issues and issues pertaining to maternity/parenting policies was obtained. We used the Student *t* test, Z test and Fisher exact test for statistical comparisons.

Results: Of the 81 residents surveyed, 53 responded (65% response rate). There were fewer pregnancies during residency among female residents than among partners of male residents (PMRs; 9 pregnancies for 6 of 25 residents v. 23 pregnancies for 15 of 28 PMRs, $p = 0.002$). One of 9 pregnancies among female residents and 5 of 23 among PMRs ended in miscarriage ($p > 0.99$). Female residents and PMRs reported pregnancy-related complications with equal frequency. All female residents breastfed for at least 6 months; however, 67% (4 of 6) felt their resident role prevented them from breastfeeding as long as they would have liked. Most (5 of 6, 83%) pursued a graduate degree or research during their “maternity leave.” More than 50% of residents reported that their own workload increased because of a colleague’s pregnancy. Many (36 of 53, 68%) were unaware of the existence of any maternity/parenting policy, and most were in favour of instituting such a policy.

Conclusion: Resident mothers do not breastfeed for the desired duration, and precluding factors must be explored. Contingency plans are needed so colleagues are not overburdened when pregnant residents cannot perform clinical duties. General surgery programs must have a formal policy addressing these issues.

Contexte : L’intérêt suscité par la chirurgie générale a diminué et le manque d’aménagements adéquats pendant une grossesse et pour les obligations de soin des enfants peut constituer un élément de dissuasion. Nous avons exploré les expériences des médecins résidents face à ces questions dans le contexte d’un seul programme de chirurgie générale.

Méthodes : Au moyen d’un outil de sondage web, nous avons sondé les médecins résidents inscrits au programme de chirurgie générale de l’Université de la Colombie-Britannique de 1997 à 2009. Nous avons obtenu de l’information sur les caractéristiques démographiques, la grossesse, les problèmes postnataux et des questions reliées aux politiques sur la maternité et les obligations de soin des enfants. Nous avons utilisé le test *t* de Student, le test Z et la méthode exacte de Fisher pour établir des comparaisons statistiques.

Résultats : Sur les 81 médecins résidents sondés, 53 ont répondu (taux de réponse de 65 %). Il y avait moins de grossesses au cours de la résidence chez les femmes médecins résidentes que chez les partenaires des médecins résidents (PMR; 9 grossesses pour 6 médecins résidents sur 25 c. 23 grossesses pour 15 PMR sur 28, $p = 0,002$). Une des 9 grossesses chez les femmes médecins résidentes et 5 grossesses sur 23 chez les PMR se sont terminées par une fausse couche ($p > 0,99$). Les femmes médecins résidentes et les PMR ont déclaré des complications liées à la grossesse à la même fréquence. Toutes les femmes médecins résidentes ont allaité pendant au moins 6 mois, mais 67 % (4 sur 6) étaient d’avis que leur rôle de médecin résident les avait empêchées d’allaiter aussi longtemps qu’elles l’auraient souhaité. La plupart

(5 sur 6, soit 83 %) ont obtenu un grade supérieur ou effectué de la recherche durant leur « congé de maternité ». Plus de 50 % des médecins résidents ont déclaré que leur propre charge de travail avait augmenté à cause de la grossesse d'une collègue. Beaucoup (36 sur 53, soit 68 %) ne connaissaient pas l'existence d'une politique sur la maternité ou les obligations de soin des enfants et la plupart favorisaient l'établissement d'une telle politique.

Conclusion : Les femmes médecins résidentes qui sont mères n'allaitent pas aussi longtemps qu'elles le souhaiteraient et il y a lieu d'étudier les facteurs qui les empêchent de le faire. L'instauration de plans de relève s'impose aussi afin que les collègues ne soient pas surchargés lorsque des femmes médecins résidentes enceintes ne peuvent s'acquitter de leurs fonctions cliniques. Les programmes de chirurgie générale doivent avoir une politique officielle sur ces questions.

According to the Canadian Resident Matching Service, only about 8% of female applicants have selected and been matched to surgical specialties since 2002; this percentage increased marginally in 2010.¹ "Modern" medical students are giving a greater priority to raising a family during residency² and, as such, program directors are increasingly facing issues surrounding maternity and parenting. In addition, overall interest in general surgery among medical students has declined recently in both Canada³ and the United States,⁴ and general surgery training programs must strive to address issues that may potentially act as deterrents, including lack of adequate policies and accommodations for pregnancy and parenting during training. Lack of maternity policies in surgical programs has been shown to deter female medical students from applying to general surgery.⁵

The literature exploring these issues to date, particularly within a general surgery cohort, has been sparse. A recent literature review of 27 studies evaluating pregnancy in residency demonstrated an increased risk of adverse events, stress related to lack of support from fellow trainees and departments, resentment toward pregnant residents because of increased workload, and inconsistent policies regarding maternity and parenting;⁶ however, only 2 of 27 studies examined a purely surgical cohort. It is unknown how many general surgery programs currently have an explicit maternity/parenting policy; in a nationwide survey of practising female surgeons in Canada, almost two-thirds reported the lack of such a policy during residency or practice.⁷ Even when maternity policies exist, they are often unclear, confusing, poorly defined and variable among programs, even within the same hospital.⁸

In Canada, professional residents' associations establish an agreement on behalf of all residents specifying their rights in various matters, including parental leave; however, the uniqueness of a surgical residency demands unique maternity/parenting policies. Given the overall decline in the number of applicants to general surgery and the small proportion of female applicants to surgical specialties in recent years, it is timely to evaluate the modern attitudes and experiences of general surgery residents in a single Canadian training program that currently does not have a formal policy in place. We hypothesized that general

surgery residents were dissatisfied with the current situation, and in particular, with the lack of a formal policy on maternity/parenting.

METHODS

Study approval was obtained from the University of British Columbia Behavioural Research Ethics Board. We used the online tool SurveyMonkey to construct and distribute the survey, which was completed anonymously. The survey questions were designed to obtain information pertaining to demographics, experiences during pregnancy, adverse events, postpartum issues and issues pertaining to maternity/parenting policies. We constructed the questions so that respondents could select 1 specific answer unless more than 1 response was requested. There were also some open-ended questions that required the writing of text. We distributed the survey to all residents enrolled in the University of British Columbia (UBC) general surgery residency program over a 12-year period (1997–2009). An invitation to participate in the study was emailed to the potential participants, followed by up to 3 reminders as needed. No incentives to participate were used.

Table 1. Comparison between respondents and nonrespondents to a survey about pregnancy during a general surgery residency

| Characteristic | No. potential participants, n = 81 | Group; no. (%) | | p value |
|----------------|------------------------------------|---------------------|------------------------|---------|
| | | Respondents, n = 53 | Nonrespondents, n = 28 | |
| Sex | | | | 0.36 |
| Male | 46 | 28 (60.9) | 18 (39.1) | |
| Female | 35 | 25 (71.4) | 10 (28.6) | |
| PGY level | | | | |
| PGY1 | 9 | 4 (44.4) | 5 (55.6) | 0.26 |
| PGY2 | 9 | 7 (77.8) | 2 (22.2) | 0.49 |
| PGY3 | 8 | 8 (100) | 0 (0) | 0.05 |
| PGY4 | 8 | 8 (100) | 0 (0) | 0.05 |
| PGY5 | 6 | 5 (83.3) | 1 (16.7) | 0.66 |
| PGY6 | 8 | 0 (0) | 8 (100) | < 0.001 |
| Fellow | 7 | 7 (100) | 0 (0) | 0.09 |
| Attending | 26 | 14 (53.8) | 12 (46.2) | 0.14 |

PGY = postgraduate year.

Data analysis

We used SPLUS software version 8.0 for Windows (Insightful Corp.) for descriptive statistical analysis. The Fisher exact test compared respondents with nonrespondents. Continuous variables were expressed as means and standard deviations (SD) and compared using the Student *t* test. We used a *Z* test for independent proportions to compare discrete variables. For all comparisons, we considered results to be significant at $p < 0.05$.

RESULTS

An invitation to participate in the study was sent to 81 potential participants, of whom 53 completed the survey, resulting in an overall response rate of 65%. Comparisons of the survey respondents and nonrespondents are summarized in Table 1. The characteristics of the survey respondents are summarized in Table 2.

The characteristics of female residents and the partners of male residents (PMRs) who became pregnant during residency are summarized in Table 3. The mean age at first pregnancy did not differ significantly between female and male residents. During residency, 6 of 25 (24%) female residents had 9 pregnancies compared with 15 of 28 (53.6%) PMRs who had 23 pregnancies ($p = 0.002$). Whereas 1 of

9 (11%) pregnancies reported by female residents and 5 of 23 (22%) pregnancies reported by PMRs ended in miscarriage, the difference was not significant. Both female residents and PMRs experienced pregnancy-related complications, such as hypertension, pre-eclampsia, preterm labour and low birthweight for gestational age; however, there was no significant difference in the rates of these complications between the 2 groups. Most residents notified their program director of the pregnancy between 12 and 20 weeks' gestation. Most female residents worked late into their pregnancy (≥ 36 wk), continuing both daytime clinical duties (4 of 6) and overnight call duties (3 of 6).

Three of the women primarily directed their own decision to cut back and/or stop clinical duties, though their doctors and spouses also played important roles in making this decision. All of the residents reported working as hard during pregnancy as they did when they were not pregnant. All 6 reported taking/planning to take 2–6 months

Table 2. Characteristics of all respondents to a survey about pregnancy during a general surgery residency

| Characteristic | No. (%) [*] |
|--------------------|----------------------|
| Age, mean (SD) yr | 32.7 (4.8) |
| Sex | |
| Male | 28 (52.8) |
| Female | 25 (47.2) |
| PGY level | |
| PGY1 | 4 (7.5) |
| PGY2 | 7 (13.2) |
| PGY3 | 8 (15.1) |
| PGY4 | 8 (15.1) |
| PGY5 | 5 (9.4) |
| PGY6 | 0 (0) |
| Fellow | 7 (13.2) |
| Attending | 14 (26.4) |
| Marital status | |
| Single | 12 (22.6) |
| Married | 31 (58.5) |
| Common law | 9 (17.0) |
| Divorced/separated | 1 (1.9) |
| No. children | |
| 0 | 30 (56.6) |
| 1 | 12 (22.6) |
| 2 | 6 (11.3) |
| 3 | 4 (7.5) |
| ≥ 4 | 1 (1.9) |

^{*}Unless otherwise indicated.
PGY = postgraduate year; SD = standard deviation.

Table 3. Characteristics of female residents and male residents whose partners became pregnant during residency

| Characteristic | Female residents, <i>n</i> = 6 | Male residents, <i>n</i> = 15 | <i>p</i> value |
|---|--------------------------------|-------------------------------|----------------|
| Age at first pregnancy, mean (SD) yr | 30.2 (1.9) | 31.7 (2.6) | > 0.99 |
| No. pregnancies | | | 0.002 |
| 1 | 4 | 8 | |
| 2 | 1 | 6 | |
| 3 | 1 | 1 | |
| Total | 9 | 23 | |
| Miscarriages, no. (%) | 1 (11) | 5 (22) | 0.85 |
| Complications, no. (%) | | | 0.91 |
| Hypertension | 1 | 0 | |
| Pre-eclampsia | 1 | 0 | |
| Pre-term labour | 0 | 1 | |
| Low birthweight for gestational age | 0 | 2 | |
| Total | 2 (22) | 3 (13) | |
| Time when program director informed, wk | | | N/A |
| < 12 | 1 | 0 | |
| 12–20 | 5 | 11 | |
| > 20 | 0 | 2 | |
| Unknown | 0 | 2 | |
| Stopping overnight call duties, wk | | N/A | N/A |
| < 20 | 1 | | |
| 20–30 | 0 | | |
| 31–35 | 2 | | |
| 36–40 | 3 | | |
| Initiation of labour | 0 | | |
| Stopping daytime clinical duties | | N/A | N/A |
| < 20 | 1 | | |
| 20–30 | 1 | | |
| 31–35 | 0 | | |
| 36–40 | 3 | | |
| Initiation of labour | 1 | | |

N/A = not applicable.

off from clinical duties after the delivery; however, most (5 of 6) were either doing full-time research or a graduate degree or both during the postpartum period. In comparison, most (10 of 15) male residents took 2–4 weeks off from clinical duties, whereas 1 resident took 1–2 months and another resident took 2–6 months off. Three male residents took less than 1 week and 2 were off clinical duties but were working on a graduate degree.

With respect to attitudes of others toward the pregnancy, most female (5 of 6) and male residents (13 of 15) felt well or somewhat supported by attending surgeons; only the minority of female (1 of 6) and male (2 of 15) residents felt somewhat not supported or experienced feelings of neutrality. With respect to support from resident colleagues, most female (4 of 6) and male (11 of 15) residents felt well or somewhat supported, whereas a minority of female (2 of 6) and male (4 of 15) residents reported either neutrality or feeling somewhat not supported. Two of 6 female residents felt guilt regarding their colleagues' increased workloads as a result of the pregnancy, and 2 also thought they would obtain less operating experience as a result of the pregnancy. More than half of the residents (23 of 45) who responded to the relevant question felt that working with a pregnant colleague increased their own workload.

With respect to breastfeeding, 5 of 6 residents breastfed for 6–12 months, and 1 resident breastfed for more than 12 months; however, 4 residents felt their role as a surgical resident prevented them from breastfeeding for as long as they would have liked. All 6 used a breast pump at work; 4 felt they were given enough privacy to do this, but 3 reported not having enough time to pump. Only 2 were aware of a special area in the hospital where they could pump and store their milk.

The minority of respondents (5 of 53) erroneously believed that the residency program had a maternity/parenting policy in place, whereas most (36 of 53) did not know. Eleven were sure no such policy existed. Interestingly, 2 of 6 pregnant female residents and 11 of 15 male residents with pregnant partners were not sure if a policy existed. Most respondents felt that a policy would be important and that it should address the following issues: overnight call duties, clinical expectations during the third trimester, months of maternity leave allowed without affecting length of training, breastfeeding at work, issues pertaining to residents with pregnant partners and flexibility of rotation schedules.

When given the opportunity to express additional comments, several common themes emerged. One theme was that many residents used vacation time to care for their newborns because of the desire to finish the program "on time" and because they felt that taking additional time off would be frowned upon. This added to stress levels as most were unclear as to how much time could be taken away from training without it affecting the duration of training. Many residents commented on the benefits of flexible rota-

tion schedules so that lighter rotations could be done in the third trimester. Many felt that a contingency plan, such as paid clinical associates, should be in place in case of illness or unexpected pregnancy complications.

DISCUSSION

The present study characterizes the experience of general surgery residents in a single Canadian postgraduate program pertaining to pregnancy and postpartum issues. As more students enter residency during child-bearing years and more women enter surgical specialties, it is inevitable that program directors will increasingly be faced with issues pertaining to pregnancy and parenting, and having a policy specific to surgical residency may help to alleviate confusion and allay problems.

We hypothesized that general surgery residents were dissatisfied with the lack of program-specific maternity/parenting policies; our data indirectly support our hypothesis and highlight the need for changes at the residency program level. Whereas a general policy exists for all residents in the province of British Columbia,⁹ surgical residency is unique in that it can be more physically demanding, require longer hours and may not have the same flexibility in scheduling that other residency programs may have. A maternity/parenting policy for surgical residents must account for these unique concerns and should address the following issues, which were deemed to be important by the residents we surveyed: clinical expectations in the third trimester, including on-call duties; flexible rotation scheduling; the use of vacation time for maternity/parenting and the amount of time that can be taken without affecting length of training. Carty and colleagues¹⁰ surveyed residents in a single general surgery training institution in the United States where a maternity policy had been formed immediately after the first resident pregnancy. In that report, all resident mothers felt they had been treated very fairly, and colleagues of these residents felt that the pregnancies did not negatively affect their own workloads. Cole and colleagues¹¹ also reported the creation of a policy in an otolaryngology residency program that incorporated flexible research blocks into the curriculum; this allowed a unique program of study to be designed for each resident while still maintaining the required number of days and months for clinical and research training. These reports suggest that when clear policies and contingency plans are in place, pregnant residents are more satisfied, program requirements are still fulfilled, and resident colleagues are not overburdened should unexpected illness or complications occur. The establishment of a definitive policy may be even more important in Canada as there are currently no residency work hour restrictions similar to those in the United States, and residents may need such policies to protect their health as well as the health of their babies.

Although our cohort of female respondents reporting

pregnancy during residency was relatively small (6 of 25), it represents 24% of female respondents; furthermore, it is likely that our sampling method was unable to capture all episodes of childbirth during residency. Whereas it is difficult to draw major conclusions from these small numbers, a few important points can be highlighted. The number of pregnancies during residency was significantly less among female residents than among PMRs ($p = 0.002$), a finding also reported by others.¹² This could be a result of the difficulty female surgical residents experience trying to balance the demands of work responsibilities with those of raising a family.^{8,13} There were a significant number of adverse events experienced by female residents, including hypertension (17%), pre-eclampsia (17%) and miscarriage (11%). It has been well documented in the literature that female residents have increased rates of complications during pregnancy compared with the general population and PMRs. In a survey of 1200 female physicians, Phelan¹⁴ found that the rate of pregnancy-induced hypertension was greater among physicians than in the general population, and Grunebaum and colleagues¹⁵ reported a 7.5-fold increase in intrauterine growth restriction during residency compared with pre- and postresidency pregnancies. Studies have shown that the rate of pre-eclampsia in the general population is about 5%;¹⁶ our cohort of female residents reported much higher rates of pre-eclampsia and pregnancy-induced hypertension. Similarly, in a comparison of female residents and PMRs, Klebanoff and colleagues¹⁷ found a higher rate of pre-eclampsia and premature labour among female residents.

An interesting finding in our study was that most female residents were pursuing graduate studies and/or research after the birth of their children in comparison with a minority of male residents. This may reflect that these highly motivated women feel compelled to advance their careers despite not being on clinical duty, possibly owing in part to being worried about losing training time or feeling guilty about taking time off. Whereas the present survey did not specifically explore the motivations behind this behaviour, we hope to address this in greater detail in a future nationwide study. A policy precisely outlining the amount of time available for maternity leave without adding to the overall duration of training may alleviate residents' drive to work in the postpartum period when they are adjusting to parenthood. Studies have shown that the amount of time taken by female and male residents after the birth of their children is variable, ranging from 0 to 52 weeks;^{8,12,13,18} however, many women report that they would take more time after the birth if they had the choice,⁸ and women with 9 or more weeks' maternity leave were more likely to report satisfaction with their postpartum experiences, such as breastfeeding.¹⁹ In our study most of the female surgical residents were able to breastfeed for at least 6 months; however, 4 of 6 reported that their role as a surgery resident prevented them from breastfeeding as long as they

had wanted. Such findings have been reported among other practising female surgeons¹⁹ and family practice residents.⁸ This is a difficult issue to address as the time demands of surgical residency are obvious and may preclude women from having the time to pump their milk while at work. A practical solution may be to have a designated area in the hospital close to the operating rooms where mothers can have some privacy to pump and store their milk in between cases.

One final point highlighted by our study is that of increased workload for colleagues of pregnant residents. Unfortunately, residency scheduling does not take into account the possibility of pregnancy, let alone unforeseen complications associated with pregnancy. As there is no formal mechanism that deals with these occurrences, they are experienced as disruptions that create considerable stress on an already high-pressure system. Certainly, residents who are pregnant hold some responsibility to inform those making the schedule to prevent last-minute scheduling changes. Our study shows that more than 50% of residents felt that having a pregnant colleague increased their own workloads. This has been previously reported in the literature,^{6,8,13} and opinions regarding the increased workload of fellow residents are varied. For example, whereas Sayres and colleagues¹³ found that more than 40% of pregnant residents felt hostility from their fellow colleagues, Carty and colleagues¹⁰ reported that residents perceived no negative impact on their own workloads during a colleague's pregnancy. It is imperative that contingency plans be present in advance so that they can be put into place quickly if needed. For example, allowing more flexible scheduling of rotations may enable pregnant residents to have lighter rotations toward the end of their pregnancies. Instead of having other residents cover the call for pregnant residents, a hired paid associate could provide necessary coverage.

Limitations

Our study has several limitations. First, our comparison of responders and nonresponders revealed significant differences. All of the third- and fourth-year residents participated in the survey, reflecting the fact that in our program these residents tend to pursue research or a graduate degree and may have more time to complete surveys. Furthermore, most of the resident pregnancies occurred during these years, suggesting that residents who were pregnant were more likely to participate in the survey, leading to a form of selection bias. None of the sixth-year residents participated in the survey, possibly reflecting a busier clinical schedule and studying for upcoming exams. Whereas our 65% response rate was suboptimal, it is consistent with the lower response rates observed in Internet-based surveys. This has been postulated to be owing in large part to lack of face-to-face contact with an interviewer and the

impersonal nature of Internet surveys.²⁰ Furthermore, the response rate may reflect the sensitivity of the respondent as well as the generally busy schedules of residents, fellows and attending surgeons. Incentives to increase our response rate could be considered in future studies. Whereas Internet-based surveys are a relatively easy way to collect data, it is important to consider that they depend on the ability of the respondents to understand the questions without help. It is therefore critical that questions are simple and direct, but the possibility for misinterpretation certainly exists. This could be addressed in future studies by personally interviewing a cohort of residents to gain more in-depth information regarding issues of particular interest. An Internet-based survey is also limited to those who can access the Internet and who have email addresses, possibly excluding those who have no access to computers. Owing to the characteristics of our population, however, lack of access to computers is very unlikely. Finally, the retrospective nature of our study allows for potential recall bias as we were surveying individuals who were in the program as far back as 12 years ago.

CONCLUSION

Our survey of general surgery residents in a single Canadian training program has highlighted several important issues pertaining to pregnancy during residency, particularly regarding the importance of having a maternity/parenting policy in place. By anticipating that pregnancies will occur and pre-emptively having policies and contingency plans in place, much confusion and resentment may be avoided, leading to greater satisfaction among pregnant residents, their colleagues and the program itself. Furthermore, more medical students may be inclined to choose general surgery as a career if appropriate accommodations are made for pregnancy and parenting.

Competing interests: None declared.

Contributors: All authors designed the study, analyzed the data, reviewed the article and approved its publication. Drs. Merchant and Hameed acquired the data. Drs. Merchant and Melck wrote the article.

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