

Birth Trends and Pregnancy Complications among Women Urologists

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- BACKGROUND:** As the number of women entering urology grows, so should discussions and awareness about pregnancy. To understand if urology training and practice potentially put women and their pregnancies at risk, we set out to assess the childbearing differences between the average American woman and the female urologist.
- STUDY DESIGN:** A 114-item anonymous survey was sent to all 365 American board certified female urologists in 2007. Data concerning birth trends, pregnancy, assisted reproduction, and complications were analyzed. Findings were compared with 2004 CDC data.
- RESULTS:** Two mailings yielded a 69% (n = 243) response rate; average age was 43 years; 67.4% had biologic children (average 2.0 children). Women urologists were older by 7 to 8 years for all births. An assisted reproduction technology birth was nearly 10 times more likely. Pregnancy complications were high, with a prevalence greater than that in the lowest income brackets in the United States. The induction rate was above average; the rate of cesarean deliveries was similar, with only 21 elective procedures performed. Ninety-two percent of women urologists would choose to have the same number of children: 66% at the same point in their career; 16%, earlier; 4%, later; 15%, uncertain.
- CONCLUSIONS:** Women urologists have children later in life, a smaller number, a higher induction rate, and a higher incidence of pregnancy complications. These are likely related to the older age at pregnancy, which certainly contributes to the higher number conceived by assisted reproduction technology. Cesarean delivery rates, which were expected to be higher, were similar. To avoid complications, childbearing should not be delayed, and residency programs and practice groups will need to develop programs that support the growing number of women urologists. (*J Am Coll Surg* 2009;208:293–297. © 2009 by the American College of Surgeons)
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Despite the fact that women currently make up 49.1% of medical student graduates, the percentage entering surgical subspecialties remains low. In 1996, 6.7% of female residents were in a surgical field. Ten years later, in 2006, it was not much higher, at 8%. The number of male residents in surgical fields has not changed (19.7% in 1996 and 19.3% in 2006), despite the lower percentage of male students in medical school. In urology, however, there has been an increase in the number of women entering the field over the years. In 1996, 0.3% of all female residents were in urology; in 2006, this

increased to 0.5%. The percentage of female urology residents in 1996 was 9.4%, increasing to 21.3% in 2006.¹

Many women defer pregnancy during medical school and residency training. This often places them at advanced maternal age during their pregnancies or attempted pregnancies. Risks associated with advanced maternal age are well known, including higher rates of birth defects and associated complications with pregnancy.^{2–6} The use of assisted reproductive technologies (ARTs) also increases with advanced maternal age. For women who do become pregnant during residency, there are issues related to workload, radiation exposure, patient logs, and long hours, leading to physical and emotional stressors that could increase risks associated with pregnancy.^{7,8}

Whether or not the trend of women entering urology will continue to increase is unknown. What is clear is that with more women in the field of urology, pregnancy issues are likely to have a greater impact on urology residency programs, surgical practices, and the women themselves. Given this, we set out to determine the pregnancy characteristics and patterns of female urologists in an effort to

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understand if work factors, advanced maternal age, or both adversely affect these women.

METHODS

We obtained the Career and Lifestyle survey created by Mizgala and colleagues⁹ and subsequently used and published by Capek and associates¹⁰ and Grandis and coworkers¹¹ (plastic surgery and otolaryngology, respectively). The questions were modified to reflect the field of urology and to direct the broader focus of the initial survey into our more narrowed interest. In addition, we created a 25-item supplemental pregnancy questionnaire to investigate pregnancy issues and complications. We then obtained a list of all American board-certified female urologists from the American Board of Urology and the Society of Women in Urology. This identified 365 women.

The 114-item survey, with the supplemental pregnancy section, was mailed to all women in July 2007. Given the personal nature of many of the questions, and to protect the privacy of the participants, a deidentified survey was used. The survey was anonymous, with no respondent identifier or tracking mechanism present on the survey itself. A self-addressed stamped return envelope was included, as was a preaddressed response postcard to be returned separately. The response postcard allowed us to identify nonrespondents and target them for the second mailing sent in August 2007. The postcard was not linked to the survey in any way.

Surveys were then entered into an online software program, Zoomerang, for further analysis. Data concerning age at delivery, birth trends, ART use, birth defects, and delivery complications were analyzed. The results were compared with 2004 data published by the CDC. We calculated the odds ratio (OR) for an ART birth among women urologists using the number of ART births identified by our survey respondents and the national ART birth rate from 2004. Corresponding 95% confidence intervals were also calculated for the odds ratio. Approval was obtained from the Institutional Review Board of the VA Boston Healthcare System.

RESULTS

Of the initial 365 women on our mailing list, accurate mailing addresses were available for 354. The initial mailing yielded a 60% response rate. The second mailing was sent to all women for whom we did not have a response postcard, culminating in a 69% total response rate ($n = 243$). The average respondent age was 43 years, with a range of 33 to 66 years. The survey identified 163 women (67.4%) who delivered a total of 331 biologic children. The average age at the time of delivery for each child is

Table 1. Results

Variable	Women urologists	CDC national norms
Children per mother, average	2.0*	2.7
Maternal age, y, average		
First child	32.6 (n = 153)	24.6
Second child	35.1 (n = 119)	27.9
Third child	36.5 (n = 33)	29.2
Fourth child	37.4 (n = 74)	30.5
Conceived via assisted reproductive technology	10.63% (17/160)	1%
Pregnancy complications	25.3% (76/300)	4.9–19%
Bed rest during pregnancy	21.2% (32/151)	No comparison identified
Early delivery induction	31.8% (50/157)	21.75%
Cesarean sections	24.35% (73/300)	22.9%

*n = 163 mothers, n = 331 babies.

listed in Table 1. The average age of first pregnancy increased with time. In 1995 and 1996, the average maternal ages when the first child was born were 29.8 years and 30.6 years, respectively. In 2005 and 2006, the averages were 33 years and 36.3 years, respectively.

Overall findings are listed in Table 1. ART births among women urologists were nearly 10-fold higher (OR 9.77; 95% CI 5.91 to 16.16) compared with the national CDC data from 2004.¹² Women who attempted ART and were unsuccessful were not assessed. Pregnancy complications were high, and in fact, in age matched comparisons, women urologists had a higher prevalence of pregnancy complications than in the lowest income brackets in the United States.¹² Only complications that were from delivery and did not involve a complicated pregnancy were eliminated. Reported complications are listed in Table 2. Further investigation identified 32 of 151 women who stated they were placed on bed rest for at least one of their pregnancies, with many women adding comments that they were on bed rest for more than one pregnancy. The induction rate was higher than average, at 35.2%. Many women reported induction for more than one pregnancy. But our comparison was with CDC data for a single year and to avoid a falsely elevated induction rate, multiple pregnancy inductions in the same mother were counted only once. The cesarean birth rate was lower, with only 21 elective operations performed secondary to residency or job demands or to decrease the risk of incontinence (Table 3). The remaining 52 women had cesarean deliveries for medical reasons, including those who did not wish to have

Table 2. Reported Complications of Pregnancy

Complication	n
Chorioamnitis	1
Gestational diabetes	6
HELLP	1
Hemorrhage	1
Hyperemesis	8
Hypertension	5
Incompetent cervix	6
Intrauterine growth retardation	5
Oligohydramnios	7
Placenta previa	2
Placental abruption	5
Placental failure	2
Polyhydramnios	1
Preeclampsia	6
Premature rupture of membranes	3
Preterm labor/premature delivery	19
Puerperal uterine inversion	2
Thrombotic thrombocytopenia purpura	1

HELLP, hemolytic anemia, elevated liver enzymes and low platelet count.

a vaginal birth after cesarean. In regard to satisfaction, 92% of women urologists would choose to have the same number of children, 66% would have children at the same point in their career; 16% would have them earlier, 4%, later, and 15% were uncertain. A number of women entered comments that they would have liked more children, but this question was not directly asked, so a true incidence could not be determined.

DISCUSSION

This study identified many interesting findings, including a lower number of total children, a high use of ARTs, a high rate of pregnancy complications, a high rate of delivery inductions, and a similar rate of cesarean births. We acknowledge that there are significant limitations with a study such as this that spans 40 years and relies on historical memory. In addition, the CDC data are from a single year, making direct comparisons impossible. Confounding issues were reduced as much as possible (ie, only one pregnancy per mother was counted when doing comparisons with a single CDC year), but we recognize that the CDC numbers are best used as reference information only, and are meant to help put the results into context. In addition, not every respondent answered every question. All statistics were calculated based on the most accurate number available for each individual question and took into consideration only the actual respondent rate per question.

First, female urologists have fewer children than the national norm. They also tend to have their children 7 to 8

Table 3. Reasons for Elective Cesarean Delivery

Reason	n
Timing	6
Incontinence risk	3
Both	9
Controlled situation	3

years later than national averages, which likely is a strong factor leading to their decreased number of total children. In other surveys of female physicians, it has been observed that women are less likely to marry and have children than are their male counterparts.⁸⁻¹¹ Although our study did not address the issues of delayed childbearing in that we did not ask women why they had their children at the times that they did, it can be surmised that the prolonged education and training required of the medical profession was a strong influence. This could certainly explain, at least in part, why male physicians have more children, particularly if their wives are not in the medical, or specifically, surgical professions.

Second, female urologists have an extremely high use of ART. In addition, this rate did not take into account women who used ART and were unsuccessful in becoming pregnant, so the number is likely to be even higher. Given that our pregnancy group spans 40 years and ART was not as prevalent in the past, our results likely underestimate the current use by female urologists. But this is not surprising for many reasons. As women age, the rate of spontaneous pregnancy decreases. In fact, as noted in the obstetrics literature, infertility rates increase after the age of 30 years. Compared with women ages 20 to 24, fertility is reduced by 6% in the next 5 years, by 14% between ages 30 and 34, by 31% between ages 35 and 39, and to a much greater extent after age 40.¹³ The advanced maternal age of our group is clearly a factor for the high use of ART. Also, women physicians may be more aware of options for pregnancy and more likely to have the resources and finances to seek care. Our group is educated, of a good socioeconomic class, and knowledgeable about medical options, which undoubtedly played a role. In fact, women physicians of more advanced maternal ages may be offered ART when the general older population may not, simply because of relationships with physicians they know and access to resources not always offered to the general older or more complicated population.

Third, our data revealed an increased risk of complications with pregnancy. Female surgeons have physically demanding jobs and are typically of higher socioeconomic class. But they also tend to be of more advanced maternal age, which is a known risk factor for pregnancy complications.²⁻⁶ In 2004, the highest rate of complications occurred in rural Alabama to a group of African-American

women in the lowest income brackets.¹² Our complication rate places female urologists at a level higher than this group, which is in stark contrast to our population.

Various studies of female physician groups from 1987 to 2003 revealed conflicting results. Two studies identified increased incidence of low birth weight infants born to obstetrics residents, and increased pregnancy complication rates among pediatric and plastic surgery residents, at 36% and 57%, respectively.¹⁴⁻¹⁷ But a 1990 study published in the *New England Journal of Medicine* found that although female physicians tended to report a higher incidence of preterm labor and preeclampsia, they did not have a higher rate of preterm delivery or delivery of a small-for-gestational-age child, except in residents working more than 100 hours per week.¹⁸ Several large metaanalyses with thousands of women (not only physicians) were conducted. These evaluated the incidence of low birth weight, preterm delivery, and preeclampsia in women with prolonged working hours, shift work, lifting, standing, and heavy physical workload. Results confirm that these women carry higher risks for complications, so recommendations to restrict these activities later in pregnancy were made.^{19,20} For surgeons, limitation of their normal nonpregnancy work duties is difficult, which includes all of the factors listed. If work hours are a significant factor leading to complications, then institution of the 80-hour work week should improve results for women urology residents. But work hour restrictions will not affect women who have children once they are beyond residency and in practice, which was more than half of our population. So these studies suggest that at the very least, urologists in practice should be cognizant to restrict their hours and have open conversations with their partners early during their pregnancies to help avoid miscommunication and differing expectations later in pregnancy.

Fourth, our patients had a similar cesarean delivery rate as compared with the general population. This was surprising because we had suspected that there might be a higher rate among female urologists, who are aware of the risks of incontinence from labor and vaginal deliveries, and the fact that a large number of our respondents actually treat this disorder in their patients. But the rate may, once again, be attributable to the longer time span of our survey. It is well known that cesarean birth rates have increased over the years. So our respondents who had their children many years ago would have been less likely to be offered a cesarean section, and this may be lending itself to an artificially lower number. That being said, it is encouraging to know that the urologists' deliveries appear to be similar to those of the average mother.

As stated earlier, a significant limitation to this study is that childbirth spanned 40 years, which contributes to the difficulty of making true comparisons with any group. But

although we cannot determine how far attitudes have shifted, one can only guess that pregnancy during residency 40 years ago was not as well supported as it is today. In fact, a 1983 survey from the Medical College of Ohio showed that one-third of the surveyed faculty and residents believed that women of childbearing age were a hiring risk.²¹ Presumably, this led to fewer women being hired or selected. It is unlikely that this belief is as commonly held today. But that being said, it is clear that if women wish to reduce their risk for complications and avoid ART, they need to have children at younger ages. In the medical community, we need to support women in this endeavor and create training programs and licensing boards that do not penalize women for their timing of childbirth, but work with them to fulfill their training requirements. A pregnant resident or partner should not be a source of stress, anxiety, and discontent, but rather, should cause the program or practice to be creative for the few months that the issue is at hand. Although residency programs have begun to address these issues with implementation of formal maternity leave policies, these are generally only of 6 weeks duration. The conflict with this is that women who wish to have as much time as possible with their newborn will not want to sacrifice any of their leave before birth and may put themselves at higher risk unless they are formally restricted by their obstetrician. We believe that postbirth maternity leave should be a separate leave allocation than the disability that may be required of a pregnant woman.

As more women begin to enter the field of urology, issues of child bearing and pregnancy will have a greater impact on residency programs and practice dynamics. The 80-hour residency work week decreases the work load on all residents, including those who are pregnant, which may help decrease pregnancy complication rates. Duty hour restrictions may also allow more female residents to believe that they will be able to balance residency with starting a family. By not waiting until the end of a 5- to 6-year residency and having children at a younger age, women may have lower complication rates and less use of ART. These data should be used by women urologists, residency directors, and the urologic community at large to help increase awareness and lead to choices and policies that reduce risks, not increase them.

Author Contributions

Study conception and design: Lerner

Acquisition of data: Lerner, Gulla

Analysis and interpretation of data: Lerner, Stolzmann, Gulla

Drafting of manuscript: Lerner, Gulla, Stolzmann

Critical revision: Lerner

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Invited Commentary

Some Things Cannot Be Delegated

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The results of this study, which reports the responses of 243 of 365 American Board Certified female urologists reveal statistics that are not surprising to those of us who are women surgeons in our 50s. These women surgeons had fewer children at a later age, requiring assisted reproduction 10 times as often. Additionally, complications surrounding the pregnancy occurred more frequently, which accompanied the risk of older age. Having been a 40-year-old pregnant woman surgeon who had preeclampsia and postdelivery right heart failure with only one child, I can relate well to this article (was that why they asked me to write this editorial?).

When I was an intern in general surgery at the University of California Los Angeles, I rotated on urology in September 1980 with one of two other interns that year who was a woman – Debbie. The service had never had both interns be women, and there was quite a bit of noise, as you can imagine. How things have changed!

The solution seems simple; we must encourage women surgical residents to have children during residency if they desire. But to have children and work an 80-hour work week, they will need money, time, or family to help. Supportive partners can do this, but what if they are working 80-hour work week too, as 30% of spouses of women surgical residents do? We also need to be sure that we accommodate their needs during pregnancy and after delivery with a positive attitude. It is tough to build flexibility into any residency program, but we must find ways to do it.

Many women surgeons have difficulty finding the correct partner, and I have met many residents and young women faculty across the country who have chosen to have a child on their own or adopt. Our acceptance and support of this choice is essential as well. A family can be assembled in many ways. I have two fabulous stepsons that comprise my family, and my 13-year-old son, Taylor, is so much better off with Matt (age 29) and Paul (age 27) in his life. I

am a better surgeon and leader because of Taylor, Matt, and Paul as well. Partners helping to raise the children and support the female surgeon can be spouses or significant others of either gender and need to be welcomed into the department or practice groups. This makes a world of difference. My husband, Phil, is the glue that keeps our family together and I do not know what I would do without him.

An additional concern for department chairs is providing an avenue for young academic female faculty to maintain their academic productivity while they are having and raising young children. I have found that it is important to focus on one or two academic pursuits at a time. Additionally, it is critical to limit travel to important meetings and be sure schedules are organized. This is true for all young faculty—male and female—but there are data that show that women have less academic productivity once they start a family and men do not; some studies actually show men are even more productive during this time.

One of my strengths as a leader is the ability to delegate; raising children cannot be delegated to others. As parents,

we need to be there. My family will tell you that I am not there as much as other mothers are, but when I am, I am engaged and I keep up with what my family is doing and my schedule and the department. My son Taylor told his class last year on career day that he wanted to be an accountant like his dad, and when other boys said they wanted to be surgeons, he responded with, "but you don't live with one!" He believes I work too much, am gone a lot, but then says I am the best!

One last thought: I have been mistakenly asked by others if I am Taylor's grandmother! That is painful. And I do wish I could have had a second child, but had no biologic time, so we all need to stretch a bit to allow our women residents and faculty to have children earlier. The workplace environment changes will help both surgeons of both genders. We will then attract more women into surgery. This year at Johns Hopkins, our general surgery applicant pool was 50% women, up from 10% in 2002. This is the path we must take. We, as leaders, must take an active role—it cannot be delegated—trust me—I know—I am a mother!