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## Comments

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ARTICLE

# Initiating patient discussions about oocyte cryopreservation: Attitudes of obstetrics and gynaecology resident physicians

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Dr. Brennan Peterson is a professor at Crean College of Health and Behavioral Sciences, Chapman University, Orange, California, USA. He studies how couples cope with infertility, and examines fertility awareness and attitudes towards oocyte cryopreservation among university students and physicians.

**Abstract** This study examined the attitudes of obstetrics and gynaecology (OB/GYN) resident physicians to initiating patient discussions regarding medical and elective oocyte cryopreservation (OC). The study used a cross-sectional online survey of OB/GYN medical residents in the USA, sampled from residency programmes approved by the American Council for Graduate Medical Education. In total, 208 medical residents, distributed evenly between postgraduate years 1–4, participated in the study. Residents' fertility knowledge and attitudes to initiating discussions about OC were gathered. Forty percent ( $n = 83$ ) believed that OB/GYN residents should initiate discussions about OC with patients (initiators), while 60% ( $n = 125$ ) did not (non-initiators). Initiators were less likely to overestimate the age at which a woman's fertility begins to decline, and were more likely to believe that discussions about OC and age-related fertility decline should take place during a well-woman annual examination. Initiators and non-initiators did not differ in their attitudes towards discussing OC with patients undergoing cancer treatments; however, initiators were significantly more likely to discuss elective OC with patients who were currently unpartnered or who wished to delay childbearing to pursue a career. Given the increasing age of childbearing among women, and the fact that women prefer to receive reproductive information from their healthcare providers, it is critical that such topics are discussed in consultations to assist patients in making more informed reproductive decisions. Further research is needed to assess the existing barriers to these discussions from both physician and patient perspectives.

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**KEYWORDS:** oocyte cryopreservation, preconception counselling, fertility preservation, obstetrics, gynaecology, medical education

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## Introduction

Throughout the world, the age at which women become first-time mothers has increased over the past several decades (Baird et al., 2005; Mills et al., 2011; Schmidt et al., 2012). In the USA, for example, the percentage of first births to women in their 30s and 40s has increased, while the percentage of first births to women in their teens and 20s has decreased (Martin et al., 2017). The reasons for delayed childbearing are complex, and represent global demographic and cultural shifts. Examples of such changes include an increased emphasis on gender equality, increased opportunities for women in education and the labour force, and comparatively lower rates of education for men in many countries, leading to a lack of educated partners (Birger, 2015). In addition, committed couples are choosing to marry at later ages, and are prioritizing financial stability prior to conception in order to support and provide for a child's basic needs (Daniluk and Koert, 2017; Mills et al., 2011).

While delayed childbearing provides women with greater flexibility and increased choice regarding education and career opportunities, there are also potential risks such as decreased fertility, increased rates of miscarriage and chromosomal abnormality, and the possibility of not achieving one's desired family size (Schmidt et al., 2012). Although women are commonly aware of the increased risk for miscarriage and genetic abnormalities at later ages, they tend to be less informed about the risks for age-related fertility decline (Lundsberg et al., 2014). Studies from around the world have consistently found that women in the general population, as well as those likely to delay childbearing, underestimate the impact of age on fertility as a potential risk factor for involuntary childlessness (Birch Petersen et al., 2015; Bunting et al., 2013; Chan et al., 2015; Hashiloni-Dolev et al., 2011). Additionally, women and men overestimate the success rate of treating infertility through assisted reproductive technology (ART) treatments, such as in-vitro fertilization (IVF) (Peterson et al., 2012; Wyndham et al., 2012).

Oocyte cryopreservation (OC), or egg freezing, has emerged in recent years as a technology which can help women balance the competing interests of education, career, partner selection and the desire to have children at a later age (Baldwin et al., 2015; Hammarberg et al., 2017; Hodes-Wertz et al., 2013; Stoop et al., 2015). The first pregnancy conceived from OC was in 1986 (Chen, 1986), and while OC quickly gained acceptance for use in patients diagnosed with cancer (Noyes et al., 2011), it has only recently begun to be more widely available for patients seeking elective fertility preservation (Mertes and Pennings, 2011; Stoop et al., 2014). In 2012, the European Society for Human Reproduction and Embryology (ESHRE) and the American Society for Reproductive Medicine (ASRM) removed the 'experimental' label from OC, primarily because improvements in rapid freezing (vitrification) led to improved success rates similar to those achieved with fresh oocytes, with no increased risk of birth defects or aneuploidy compared with embryo freezing (ASRM Practice Committee, 2013; ESHRE, 2012). However, both groups stopped short of recommending OC for elective purposes, acknowledging that more data are needed on the ethical implications, safety, efficacy, cost-effectiveness and emotional risks of the procedure.

Studies have found that a woman's healthcare provider is her preferred source of information about reproductive

health (Hodes-Wertz et al., 2013; Lundsberg et al., 2014). However, engagement in reproductive conversations is severely limited, as most patients only visit their provider once a year and rarely talk about fertility issues. One study reported that <25% of women surveyed had discussed reproduction with their provider, and that many women typically wait to seek information on fertility and conception until they are older, commonly at an age where their reproductive potential is reduced (Lundsberg et al., 2014). In a study of women who used OC as a means to preserve their fertility, 79% wished that they had done so at an earlier age, but stated that they did not because they were unaware of the technology (Hodes-Wertz et al., 2013).

Obstetricians and gynaecologists (OB/GYN) are considered the primary providers of comprehensive reproductive health education throughout the world, and serve as their patients' best source of information about new technologies, such as OC. With an increase in procreative delay, alongside women's overall lack of knowledge concerning age-related fertility decline, it is important that physicians discuss the full range of reproductive options with their patients to promote informed reproductive decision-making. Without such discussions, patients may not be fully aware of the impact of age on fertility, as well as fertility preservation options such as OC. As such, it is important to assess physicians' attitudes towards OC, and to understand their willingness to initiate conversations about OC with their patients.

A previous study by the authors' group examined the attitudes, knowledge and intentions of a group of OB/GYN residents in the USA to discussing age-related fertility decline and OC (Yu et al., 2016). In that study, most OB/GYN residents agreed that discussing age-related fertility decline was important, but their opinions differed regarding initiating patient conversations about OC. The present study examined differences between OB/GYN resident physicians who would initiate patient discussions about OC (initiators) and those who would not (non-initiators). In addition, physicians' likelihood of discussing OC with patients of varying ages with a cancer diagnosis compared with patients using elective OC, based on their initiator status, was assessed.

## Materials and methods

In September 2014, an online link to the survey was sent to the 232 residency programme directors listed on the website of the American Congress of Obstetricians and Gynecologists (ACOG). The programme directors were asked to forward this link to their residents. Resident participants had an opportunity to enter a raffle for one of six \$50 incentives at the completion of the survey. Programme directors were also asked to forward two follow-up reminders to residents over the following 4 weeks.

## Instrument design

The survey instrument was created using a combination of existing measures of fertility awareness (Lampic et al., 2006), as well as the clinical experiences of the study authors in the fields of OB/GYN, reproductive endocrinology, psychology and anthropology. Details of the instrument construction, including pilot testing and specific content,

have been reported previously (Yu et al., 2016). The current study examined participants' familiarity with OC and whether it was offered at their training institution. Participants were also asked whether they would initiate discussions about OC with their patients, at what patient age they would initiate such discussions, and whether such discussions should be part of a well-woman annual examination. Finally, residents were asked how likely they would be to discuss OC and support insurance coverage for the technology in different clinical situations (e.g. a 25-year-old with cancer) or for non-medical reasons (e.g. a 25-year-old who wants to pursue a career first).

### Sample characteristics

In total, 239 residents participated in the online survey, approaching 5% of all OB/GYN residents in the USA (based on 5021 total OB/GYN residents reported by the Accreditation Council for Graduate Medical Education) (ACGME, 2014). Of these, 208 residents indicated whether or not an OB/GYN should initiate discussions about OC with patients. These respondents formed the analytic sample and shared similar sociodemographic characteristics with other OB/GYN residents in the USA (e.g. 75% were aged 26–30 years). Residents were distributed evenly between postgraduate years 1 (PGY1) to PGY4. However, compared with all OB/GYN residents in the USA, the sample contained a higher proportion of women (90.9% versus 81%, respectively) and Caucasian (71.6% versus 54%, respectively) respondents (ACGME, 2014).

### Statistical analysis

Data from the online survey were analysed using SPSS Version 21 (IBM Corp., Armonk, NY, USA). Descriptive statistics first analysed the characteristics of study participants. Next, chi-squared analyses examined initiator status based on participants' characteristics, preconception planning and OC. Independent samples *t*-tests and chi-squared analyses also examined respondents' awareness of fertility issues based on initiator status. Gender differences were not examined due to the small sample size of male residents.

The study was reviewed and approved by the Yale University Human Investigation Committee (HIC#1409014546).

### Results

Of the 208 OB/GYN residents, 83 (39.9%) were willing to initiate patient discussions about OC, while 125 (60.1%) were not. Initiators and non-initiators did not differ in age, gender, race/ethnicity, relationship status, religious affiliation, postgraduate year or geographic location (all *P*-values >0.20). However, initiators were more likely to have children themselves (20.7%) than non-initiators (9.6%) [ $\chi^2(1) = 5.09$ , *P* = 0.02]. In addition, respondents with professional plans to pursue general practice were less likely to be initiators (39.8%) than those with other professional plans (e.g. fellowships in reproductive endocrinology) (60.2%) [ $\chi^2(1) = 6.35$ , *P* = 0.01]. As reported previously, residents who would initiate

discussions about OC would do so at a mean patient age of 31.1 years (Yu et al., 2016).

### OB/GYN residents' attitudes to discussing preconception planning and fertility, based on initiator status

Table 1 presents residents' attitudes to discussing preconception planning and fertility with patients. Consistent with their inclination to discuss OC with patients, initiators were also more likely to begin discussions regarding patients' childbearing intentions [ $\chi^2(1) = 9.79$ , *P* = 0.002] and age-related fertility decline [ $\chi^2(1) = 18.97$ , *P* < 0.0001]. Although initiators and non-initiators did not differ significantly in the mean age at which they would initiate discussions about age-related fertility decline {initiators: 31.79 [standard deviation (SD) 3.48] years; non-initiators: 31.97 (SD 3.53) years; *P* = 0.74}, initiators were more likely to report that discussions about age-related fertility decline should be part of a well-woman annual examination [ $\chi^2(1) = 15.52$ , *P* < 0.0001]. The most common reason why OB/GYN residents would discuss age-related fertility decline with their patients was to educate and inform women. The most common reasons why OB/GYN residents would not discuss age-related fertility decline were because they thought that annual discussion of such topics was too frequent, because they did not want to be perceived as pushing childbearing on their patients, and because they wanted to fully respect patient choices.

### OB/GYN residents' awareness of fertility issues based on initiator status

Both initiators and non-initiators reported mean ages of fertility decline consistent with previous studies: slight decrease between 24 and 34 years of age [initiators: 31.29 (SD 3.09) years; non-initiators: 31.95 (SD 3.16) years] and marked decrease between 35 and 39 years of age [initiators 37.39 (SD 2.54) years; non-initiators: 37.71 (SD 2.54) years] (ACOG, 2014; Yu et al., 2016). However, 37% of all participants overestimated the age ( $\geq 35$  years) at which a slight decrease in a woman's ability to get pregnant occurred, and 48% overestimated the age ( $\geq 40$  years) at which a marked decrease in a woman's ability to get pregnant occurred. Non-initiators were significantly more likely than initiators to overestimate the age at which fertility begins to decline [68.8% non-initiators versus 31.2% initiators;  $\chi^2(1) = 4.25$ , *P* = 0.039, phi = 0.14]. A similar pattern was evident for overestimates of the age at which fertility decreased markedly (63.6% were non-initiators and 36.4% were initiators), but the association was not statistically significant [ $\chi^2(1) = 0.99$ , *P* = 0.32, phi = 0.069]. Correct knowledge of IVF success rates was not associated with initiator status [ $\chi^2(1) = 2.28$ , *P* = 0.13, phi = 0.11]. Approximately the same proportion of initiators (51.5%) and non-initiators (57.7%) overestimated the success rate of IVF. Overall, <18% of all respondents accurately estimated the percentage chance that a woman undergoing one treatment of IVF would deliver a live birth (20–29%) (Centers for Disease Control and Prevention (CDC) et al., 2014).

**Table 1** Obstetrics and gynaecology (OB/GYN) residents' attitudes towards discussing preconception planning and fertility based on initiator status.

Item	Initiator n = 83	Non-initiator n = 125	P-value
Should an OB/GYN initiate discussions with patients about their potential childbearing intentions?			0.002
Yes	82 (98.8%)	107 (86.3%)	
No	1 (1.2%)	17 (13.7%)	
Should an OB/GYN initiate discussions about age-related fertility decline with patients?			<0.001
Yes	80 (96.4%)	91 (72.8%)	
No	3 (3.6%)	34 (27.2%)	
Should discussing the natural decline in fertility with age be part of a well-woman annual examination?			<0.001
Yes	72 (86.7%)	77 (61.6%)	
No	11 (13.3%)	48 (38.4%)	
Reasons for 'yes'			
Educating women about this helps women make informed reproductive decisions	66 (79.5%)	68 (54.4%)	
I want to provide comprehensive health education to my patients	55 (66.3%)	64 (51.2%)	
Women should be aware of the correct relationship between fertility and age	54 (65.1%)	51 (40.8%)	
I can help dispel many of the myths in society/media regarding fertility and age	36 (43.4%)	43 (34.4%)	
Bringing this issue up annually is too frequent, but I am not opposed to discussing this issue with patients every 3–4 years	5 (6.0%)	26 (20.8%)	
I do not want to be perceived as pushing childbearing on patients	5 (6.0%)	26 (20.8%)	
Reasons for 'no'			
Bringing up this issue annually may lead to emotional distress in my patients	5 (6.0%)	18 (14.4%)	
I want to be able to fully respect patient choices	4 (4.8%)	19 (15.2%)	
I do not have enough time	1 (1.2%)	6 (4.8%)	
It is not my primary responsibility	0 (0%)	2 (1.6%)	

### OB/GYN residents' familiarity with and attitudes to OC, based on initiator status

Table 2 shows that initiators and non-initiators did not differ in their familiarity with OC [ $\chi^2(1) = 2.36, P = 0.12$ ], or whether or not their institution offered the procedure to patients [ $\chi^2(1) = 1.64, P = 0.20$ ]. However, compared with non-initiators, initiators were more likely to respond that OC should be part of an annual well-woman examination with a gynaecologist [ $\chi^2(1) = 73.59, P < 0.0001$ ]. The primary reason for this was educating women so that they understand the implications for their childbearing options. When asked why they would not discuss OC during an annual examination, both initiators and non-initiators indicated that raising the issue annually was too frequent, that they did not want to be perceived as pushing childbearing on patients, and that the discussions could lead to emotional distress in patients.

### OB/GYN residents' likelihood of discussing OC in different patient situations, based on initiator status

Table 3 compares the likelihood that initiators and non-initiators would discuss OC with patients of varying

ages and different life circumstances (e.g. receiving chemotherapy thought to impair future fertility, desiring to delay childbearing to pursue a career, not having a current partner but wanting children in the future). Initiators and non-initiators reported similar likelihood for discussing OC with patients receiving chemotherapy thought to impair future fertility. This was true regardless of whether the patient was 25 or 35 years old. However, when asked about discussing OC with patients who wanted to pursue a career first and have children later, or patients who were currently unpartnered but planned to have children in a few years, initiators were significantly more likely to discuss OC compared with non-initiators, regardless of the patient's age.

### Discussion

The aim of this study was to examine the attitudes and characteristics of OB/GYN residents who would initiate conversations about OC with their patients compared with those of residents who would not. Initiators were more likely to have correct knowledge regarding when a woman's

**Table 2** Obstetrics and gynaecology (OB/GYN) residents' familiarity with and attitudes towards oocyte cryopreservation based on initiator status.

Item	Initiator n = 83	Non-initiator n = 125	P-value
How familiar are you with the concept of oocyte cryopreservation as a technique for fertility preservation?			0.12
Familiar or very familiar	25 (30.9%)	26 (21.3%)	
Less familiar	56 (69.1%)	96 (78.7%)	
Is oocyte cryopreservation offered to patients at your training institution?			0.20
Yes	55 (67.9%)	72 (59.0%)	
No	26 (32.1%)	50 (41.0%)	
Should discussing oocyte cryopreservation be part of a well-woman annual examination?			<0.001
Yes	41 (50.0%)	1 (0.8%)	
No	41 (50.0%)	123 (99.2%)	
Reasons for 'yes'	Educating women about this issue helps women make more informed reproductive decisions	33 (39.8%)	0 (0%)
	Understanding the implications of oocyte cryopreservation increases women's childbearing choices	30 (36.1%)	1 (0.8%)
	I want to provide comprehensive health education to all my patients	27 (32.5%)	1 (0.8%)
	Other	1 (1.2%)	0 (0%)
	Bringing this issue up annually is too frequent, but I am not opposed to discussing this issue with patients every 3–4 years	29 (34.9%)	50 (40.0%)
Reasons for 'no'	I do not want to be perceived as pushing childbearing on patients	12 (14.5%)	37 (29.6%)
	Other	8 (9.6%)	37 (29.6%)
	Bringing up this issue annually may lead to emotional distress in my patients	13 (15.7%)	31 (24.8%)
	I want to be able to fully respect patient choices	10 (12.0%)	30 (24.0%)
	It is not my primary responsibility	2 (2.4%)	26 (20.8%)
I do not have enough time	7 (8.4%)	18 (14.4%)	

Depending on missing data, total *n* for the analyses presented in this table ranged from 203 to 208.

fertility begins to decline, were more likely to believe that residents should initiate discussions about age-related fertility decline, and were more likely to believe that discussions about OC and age-related fertility decline should take place during a well-woman annual examination. Furthermore, initiators also had significantly more favourable attitudes towards discussing OC with patients who were electing to delay childbearing to pursue a career, or were currently unpartnered but planned to have children in the future.

Initiators and non-initiators differed in two key demographic variables. As a group, initiators were more likely to have their own children, and were less likely to be going into general OB/GYN practice. It is possible that initiators and non-initiators hold different attitudes and world views regarding fertility and patient care due to their childbearing status and choice of future specialty. Ironically, residents going into general practice are those who most need to initiate patient discussions about fertility preservation, yet these residents are the least likely to do so. Given the fact that 60% of residents in the current study reported that they

would not initiate discussions about OC, it is possible that OB/GYN resident physicians view this procedure outside the scope of general reproductive healthcare practice. However, recent studies have found that women want their healthcare provider to be their primary source of information about reproductive health (Lundsberg et al., 2014), and that the majority of women want their physician to provide counselling about possible pregnancy complications related to advanced maternal age (Sheinis et al., 2018). Understanding the mechanisms that can narrow the gap between patients' preferences and providers' views may be an important area of future study.

Initiators and non-initiators also differed on other key attitudes related to patient care. For example, nearly all residents who would initiate discussions about OC would also initiate discussions about age-related fertility decline (96%), while only 73% of non-initiators would do so. Furthermore, 87% of initiators believed that discussions about age-related fertility decline should be part of a well-woman annual examination, compared with only 61% of non-initiators. A

**Table 3** Likelihood of discussing oocyte cryopreservation in different patient situations based on initiator status ( $n = 208$ ).

Patient situation	Initiator, $n = 83$ Mean (SD)	Non-initiator, $n = 125$ Mean (SD)	t	P-value
A 25-year-old Gravida 0 with a new diagnosis of cancer who will be receiving chemotherapy thought to impair her future fertility	4.72 (0.65)	4.65 (0.78)	0.73	0.47
A 35-year-old Gravida 0 with a new diagnosis of cancer who will be receiving chemotherapy thought to impair her future fertility	4.70 (0.62)	4.60 (0.74)	1.00	32
A 25-year-old Gravida 0 who wishes to pursue a career first and have children afterwards	2.70 (1.01)	2.14 (0.96)	4.05	<0.0001
A 35-year-old Gravida 0 who wishes to pursue a career first and have children afterwards	3.86 (0.96)	3.18 (1.12)	4.48	<0.0001
A 35-year-old Gravida 0 who is currently unpartnered but plans to have children in a few years	3.92 (0.98)	3.29 (1.06)	4.31	<0.0001
A 40-year-old Gravida 0 who is currently unpartnered but plans to have children in a few years	3.89 (1.27)	3.41 (1.31)	2.64	0.009

SD, standard deviation.

Mean responses were based on a five-point Likert scale ranging from 1 (very unlikely) to 5 (very likely).

resident's willingness to engage in preconception counselling that includes discussions about age-related fertility decline is a vital element of patient care, and empowers patients to make more informed reproductive choices at an age that maximizes their reproductive potential (Peterson, 2017; Wyndham et al., 2012).

Initiators and non-initiators differed in the accuracy of their knowledge related to age-related fertility decline. Initiators were less likely than non-initiators to overestimate when a woman's fertility begins to decline (31.2% versus 68.8%, respectively). It is interesting to note that the mean age at which initiators believed that there is a slight decline in a woman's fertility (31.3 years) corresponded with the mean age at which they would initiate discussions about OC (31.1 years). It is possible that having more accurate knowledge about when fertility begins to decline contributed to residents' attitudes to initiate discussions about OC. However, future studies are needed to clarify the relationship between fertility knowledge and initiating discussions about OC with patients.

When asked to estimate the livebirth rate following one IVF treatment, initiators and non-initiators did not differ significantly, and both groups vastly overestimated the overall probability of a live birth. While studies have found that patients in the general population falsely believe that IVF is more successful than it is (Wyndham et al., 2012), more recent studies have also found that practising gynaecologists and OB/GYN residents report similar misconceptions (Garcia et al., 2017; Revelli et al., 2016). The livebirth rate for women undergoing IVF varies considerably throughout the world, with rates at 20% in Latin America and Canada, 20–25% in Europe, and 27–29% in the USA (Centers for Disease Control and Prevention (CDC) et al., 2014; Kushnir et al., 2017). Furthermore, the rate of success varies depending on the age of women at the time of treatment, with a steep decline occurring after 40 years of age. In the USA, for example, women aged <35 years have the highest livebirth rate following ART (41.9%), with the livebirth rate for women aged 41–42 years reducing to just 10.8% (Centers for Disease Control and Prevention (CDC) et al., 2014). Given the substantial increase in the percentage of OB/GYN

patients aged  $\geq 40$  years seeking fertility treatment, having correct knowledge about these rates is undeniably important (Martin et al., 2017).

When evaluating the likelihood of discussing OC in different patient situations, initiators and non-initiators were equally likely to discuss OC with younger (aged 25 years) and older (aged 35 years) patients with a new cancer diagnosis, but initiators were significantly more likely to support discussions about elective OC with women delaying childbearing to pursue a career or who were currently unpartnered but planned to have children in the future. For over a decade, the American Society of Clinical Oncology has recommended that physicians should discuss fertility preservation options with oncology patients, and involve a reproductive specialist early in their care (Lee et al., 2006). As such, it is possible that most OB/GYN residents feel it is medically necessary to initiate these discussions. However, it is important that physicians discuss the full range of reproductive options available to all patients, including those women who elect fertility preservation for reasons other than a cancer diagnosis (e.g. lack of partner, seeking a higher level of education or pursuing a career). Studies have found that despite the fact that the experimental label has been removed from OC, patients who use the technology are doing so at an advanced age with diminished ovarian reserve; a decision which may limit their reproductive potential (Schon et al., 2017). In a study of 183 women who had undergone elective OC at a mean age of 38 years, >75% wished that they had frozen their eggs at an earlier age, but had not done so because they did not know about the procedure (Hodes-Wertz et al., 2013).

An annual well-woman's examination may be an occasion when such information could be discussed. However, when residents were asked if OC should be part of a well-woman's annual examination, 99% of non-initiators and 50% of initiators responded that it should not. Residents indicated that discussing the issue annually was too frequent, that they did not want to be perceived as pushing childbearing on patients, and that the discussions could lead to emotional distress in patients. Rather than recommend that all OB/GYN residents must engage in discussions about OC, it is important to



give validity to these concerns and conduct future studies examining the motivations behind these attitudes. For physicians, initiating OC discussions with patients is embedded in a complex system of care that includes administrative constraints, time limitations, and the need to address and treat the most pressing symptoms first. OC may be viewed by many as an elective procedure that falls outside the general scope of routine gynaecological care, and would only be discussed given unique patient circumstances. Physicians may also have other concerns related to OC given that more information is needed about long-term success rates, ethical implications, optimal timing for the procedure, and patient motivations for future use (Hammarberg et al., 2017; Harwood, 2015). Future studies that examine barriers to physician/patient discussion of OC are needed to understand the complexity of this issue more fully.

### Implications and conclusions

As far as is known, this is the first study to examine the attitudes of OB/GYN resident physicians to initiating discussions with patients about OC. Findings from this study could be used by OB/GYN residency programme directors to inform changes to the residency curriculum and to training opportunities related to OC. This could be done in three ways. First, residency training programmes could include familiarity with OC, as only 25% of residents indicated that they were familiar or very familiar with the procedure. While it is possible that reluctance to initiate discussions about OC comes from a lack of familiarity, initiators and non-initiators did not differ significantly on this variable. Regardless, the low percentage of residents who had familiarity with OC highlights a need for improved resident education in this area. Increasing exposure to reproductive endocrinology and infertility practices during training, or using case scenarios in resident education to simulate provider–patient interactions, could increase familiarity of OC in residents with little exposure to elective OC or oncofertility OC patients. Second, residency programmes could incorporate communication skills training to help residents initiate and lead patient discussions about OC and age-related fertility decline, thus strengthening the provider–patient relationship (Chakrabarti, 2014; Muessig et al., 2015). Finally, programmes could strengthen resident knowledge of fertility preservation, age-related fertility decline and ART success rates for patients at all ages, as even a brief 1-h educational information session on these topics has been shown to improve fertility knowledge and change fertility attitudes in resident participants (Will et al., 2017).

The findings from this study should be viewed in the context of the study's limitations. The authors relied on resident programme directors to forward the study to potential participants, so the exact number of residents who actually received a recruitment email is unknown. Thus, an exact response rate to the survey cannot be given, and non-response bias cannot be analysed. This study also has the limitations present in any self-report survey completed in an online, anonymous format, which can include self-selection bias. In addition, female residents (90%) were slightly over-represented in the study sample

compared with the proportion of female OB/GYN residents in the USA (80%) (AAMC, 2014; ACGME, 2014), as were Caucasian respondents (72% versus 54%; ACGME, 2014). Due to the small number of male respondents, analyses lacked sufficient power to explore gender differences between female and male initiators. Finally, while the study asked whether residents would be willing to initiate discussions about OC with patients, it did not determine whether physicians would be willing to initiate such discussions with patients of a spectrum of different ages and conditions. Future research that examines this issue more fully would be a valuable addition to this area of inquiry.

In summary, this study highlights the differences in attitudes to patient care in a sample of OB/GYN residents who would initiate patient discussions about OC compared with residents who would not. Initiators were more likely to have their own children, were less likely to be going into general OB/GYN practice, had more accurate knowledge of when a woman's fertility begins to decline, and were more likely to initiate patient discussions about age-related fertility decline during a well-woman's annual examination. As OC has the potential to alter how women make decisions about the timing of education, work, partnership and parenthood, and because patients look to OB/GYN healthcare providers as their primary source of information on reproductive issues, it is important that that physicians consider the implications of initiating patient discussions related to fertility preservation so that patients have access to the full range of reproductive options available. Having such information will enable patients to make the most informed reproductive decisions possible, which will ultimately maximize their reproductive potential based on the unique circumstances of their lives.

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