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Expert consensus for primary management of reproductive health: a Delphi study

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Abstract

Background The main barrier for an appropriate primary management of the reproductive health was lack of knowledge about the risk factors and prevention measures for infertility and the main recommendations was to involve primary care physicians in reproductive health.

Aims To reach a consensus around barriers and enablers for appropriate primary management of the reproductive health.

Methods An observational study was performed using the modified Delphi technique, from October 2017 to April 2018 in private and public assisted reproduction clinics in Spain. A questionnaire consisted of 58 items, divided into four blocks to explore consensus among a group of experts by synthesizing opinions.

Results In the first Delphi round, the response rate was 50% and panelists reached a 72.4% of consensus. In second round, the response rate was 55% and panelists reached a 25% of consensus. To minimize limitations related to the use of a structured questionnaire, a space for free text responses was provided. The following items yielded unanimous agreement: “It is necessary to promote reproductive planning—not just contraception—from secondary school,” “The media should not trivialize pregnancies in women aged over 50,” “Postponing family formation is the main cause of the increase in assisted reproduction treatments in Spain,” and “Postponing motherhood implies an inherently decreased probability of having children.”

Conclusions These recommendations could set the basis for a public health action plan for primary management of reproductive health. The findings may be applicable to any country whose health services system provides primary healthcare.

Keywords Consensus · Delphi technique · Infertility

Introduction

According to the last update of the World Health Organization (WHO) [1], an estimated 48.5 million couples worldwide were infertile in 2010. Human fertility problems may have a number of causes, including gynecological or andrological conditions as well as age, genetic abnormalities, infectious or environmental agents, and certain behaviors [2]. Several

of the most influential factors are modifiable, and there is conclusive evidence that some of them have a negative effect on assisted reproductive technology procedures [3–5].

Modern societal advances and women’s increased participation in the workforce have contributed to couples’ postponing family formation. Many people are unaware of the limits of their fertility; the symptoms and preventable causes of fertility problems [6]; and especially the variations that may exist from person to person, that is, one woman may be functionally infertile at age 37 while another will be so only at age 44 [2]. Although this major public health problem has accelerated the development and use of assisted reproductive technology (ART), data from the Human Fertilization and Embryology Authority (HFEA) indicate that the live birth rate from in vitro fertilization (IVF) is 29% for women aged under 35 years, compared with only 9% at age 40 to 42 [7]. Additionally, ART contributes to increasing healthcare costs and risks of multiple pregnancies [8].

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Gynecologists currently provide reproductive healthcare management services, which include identifying and managing risk factors for infertility. In addition, the primary healthcare team also provides family planning services to help couples avoid or space the pregnancies and address infertility issues [9]. Other specialists involved in reproductive health include oncologists, who inform cancer patients about fertility risks associated with their treatment and available options to address them [8], and geneticists, who counsel patients on hereditary conditions. While sexual and reproductive health education for young people is a key strategy for promoting safe sexual behavior, it generally focuses only on contraception.

For many causes of infertility, primary prevention is feasible. Thus, appropriately managing reproductive health from the very beginning might reduce the prevalence of infertility and improve health and quality of life. In order to develop a strategic plan for preventing infertility, it is necessary to first understand the current gaps and opportunities. To the best of our knowledge, due to the general lack of health services research on primary prevention and management of infertility, there is little solid evidence on the best interventions in this setting. The Delphi method elicits knowledge from subject experts, providing the means to reach a consensus opinion on a specific issue where evidence is uncertain or absent altogether. In addition, this method can be conducted online, which avoids the potential problems of face-to-face groups. The present Delphi study aimed to reach a consensus around barriers and enablers for appropriate primary management of the reproductive health.

Materials and methods

From October 2017 to April 2018, this observational study was performed using the modified Delphi technique following recommendations by the RAND (Research AND Development) Corporation [10]. The modified Delphi technique involves two rounds of questions and is used to explore consensus among a group of experts by synthesizing opinions [11]. Approval from the institutional ethics review board was not required because patient data were not used.

A scientific committee, composed of one primary healthcare physician and four gynecologists who were experts in assisted reproduction, was responsible for coordinating the project, defining the items of the questionnaire, and selecting the expert panel. Forty gynecologists from private and public assisted reproduction clinics and from different Spanish regions were invited to participate as panel members. Candidates had to have more than 5 years of experience as gynecologists and be working in the field of assisted reproduction. Convenience sampling was used to select participants' from the research team's professional network, and each candidate received an invitation letter describing the

study and requesting their approval and signature. Withdrawal from the study was possible any time.

The scientific committee developed and approved the questionnaire over the course of several face-to-face meetings. The final questionnaire consisted of 58 items, divided into four blocks (Appendix Table 3) and designed with Google Forms. The first block (20 items) focused on recommendations and process for oocyte vitrification; the second (9 items), on the current situation of primary management of reproductive health by healthcare professionals; the third (13 items), on risk factors for poor ovarian reserve; and the fourth (16 items), on issues related to information and communication in general society. Each item was an assertion (positive or negative) that showed a professional criterion regarding the barriers and enablers to appropriate primary management of reproductive health. Panelists were asked to rate each item individually and anonymously using a 9-point ordinal Likert-type scale (1–3: disagree; 4–6: neither agree nor disagree, and 7–9: agree). In addition, the questionnaire included an open comment section for additional observations.

The first round started on 10 November 2017. Expert participants received a link to the online form by email and a request to complete it within 5 weeks. One person collected all data to maintain confidentiality. After the first round, the research team analyzed the quantitative and qualitative (free text) data. The second round started on 5 February 2018, with experts who had participated in the first round receiving the round 2 questionnaire with the items that had not garnered consensus. We considered there to be consensus when 70% of responses were categorized as either “agree” or “disagree.” The research team assessed the results of both rounds and submitted their analysis to the scientific committee, who drew up the final report.

Statistical analysis

There is a lack of agreement around the ideal expert sample size in Delphi studies, and a convenience sample was chosen according to experts' availability [12]. Level of agreement was assessed through frequency tables. All scores were listed in a database created with SPSS version 22.0.

Results

In the first Delphi round, 20 experts (50% of those invited) from Spain completed the online questionnaire. Non-responders were sent a reminder 1 week before the end of the round. None of the experts needed additional information. Table 1 shows the analysis of the first round. Panelists reached a consensus on 42 (72.4%) of the 58 statements.

Table 1 Results of first round of Delphi process

ITEM	Disagree		Neither agree nor disagree		Agree	
	n	%	n	n%	%n	n%
1	18	90.0%	1	5.0%	1	5.0%
2*	9	45.0%	4	20.0%	7	35.0%
3	1	5.0%	5	25.0%	14	70.0%
4	16	80.0%	2	10.0%	2	10.0%
5	1	5.0%	4	20.0%	15	75.0%
6*	6	30.0%	5	25.0%	9	45.0%
7*	7	35.0%	4	20.0%	9	45.0%
8*	0	0.0%	7	35.0%	13	65.0%
9	0	0.0%	1	5.0%	19	95.0%
10	0	0.0%	0	0.0%	20	100.0%
11	0	0.0%	2	10.0%	18	90.0%
12	2	10.0%	3	15.0%	15	75.0%
13	0	0.0%	1	5.0%	19	95.0%
14*	6	30.0%	7	35.0%	7	35.0%
15*	5	25.0%	6	30.0%	9	45.0%
16*	10	50.0%	5	25.0%	5	25.0%
17*	3	15.0%	4	20.0%	13	65.0%
18	14	73.7%	3	15.8%	2	10.5%
19	1	5.0%	0	0.0%	19	95.0%
20	18	90.0%	2	10.0%	0	0.0%
21	0	0.0%	2	10.0%	18	90.0%
22	0	0.0%	0	0.0%	20	100.0%
23	0	0.0%	3	15.0%	17	85.0%
24	0	0.0%	3	15.0%	17	85.0%
25	0	0.0%	0	0.0%	20	100.0%
26*	2	10.0%	6	30.0%	12	60.0%
27	0	0.0%	1	5.0%	19	95.0%
28	0	0.0%	1	5.0%	19	95.0%
29	1	5.0%	3	15.0%	16	80.0%
30	0	0.0%	5	25.0%	15	75.0%
31	0	0.0%	6	30.0%	14	70.0%
32*	2	10.0%	7	35.0%	11	55.0%
33	15	75.0%	2	10.0%	3	15.0%
34	15	75.0%	0	0.0%	5	25.0%
35	3	15.0%	3	15.0%	14	70.0%
36*	3	15.0%	7	35.0%	10	50.0%
37	0	0.0%	6	30.0%	14	70.0%
38	3	15.0%	3	15.0%	14	70.0%
39	0	0.0%	2	10.0%	18	90.0%
40*	12	60.0%	6	30.0%	2	10.0%
41*	4	20.0%	10	50.0%	6	30.0%
42	14	70.0%	3	15.0%	3	15.0%
43	0	0.0%	1	5.0%	19	95.0%
44	0	0.0%	0	0.0%	20	100.0%
45	1	5.0%	0	0.0%	19	95.0%
46*	1	5.0%	7	35.0%	12	60.0%
47	0	0.0%	1	5.0%	19	95.0%

Table 1 (continued)

ITEM	Disagree		Neither agree nor disagree		Agree	
	n	%	n	n%	%n	n%
48	0	0.0%	1	5.0%	19	95.0%
49	2	10.0%	2	10.0%	16	80.0%
50	1	5.0%	5	25.0%	14	70.0%
51	0	0.0%	5	25.0%	15	75.0%
52	0	0.0%	0	0.0%	20	100.0%
53	4	20.0%	2	10.0%	14	70.0%
54	0	0.0%	0	0.0%	20	100.0%
55	0	0.0%	0	0.0%	20	100.0%
56*	6	30.0%	3	15.0%	11	55.0%
57	1	5.0%	1	5.0%	18	90.0%
58*	10	50.0%	10	50.0%	0	0.0%

*Advances to second round (consensus < 70%)

According to the results of first round and panelists' comments, some items were reformulated for round 2. Eleven (55%) of the 20 experts who participated in the first round replied to the second online questionnaire. Non-responders were sent a reminder after 3 weeks. Table 2 shows the analysis of the second round. The expert panel reached a consensus on 4 (25%) of the 16 remaining "no consensus" statements.

In total, after second round, the first block of questions yielded 10 consensus items in agreement and 4 in

Table 2 Results of second round of Delphi process

ITEM	Disagree		Neither agree nor disagree		Agree	
	n	%	n	n%	%n	n%
2*	4	36.4%	3	27.3%	4	36.4%
6*	3	27.3%	3	27.3%	5	45.5%
7	1	9.1%	2	18.2%	8	72.7%
8*	1	9.1%	4	36.4%	6	54.5%
14*	6	54.5%	2	18.2%	3	27.3%
15*	3	27.3%	1	9.1%	7	63.6%
16*	4	36.4%	4	36.4%	3	27.3%
17	2	18.2%	1	9.1%	8	72.7%
26*	0	0.0%	4	36.4%	7	63.6%
32	1	9.1%	1	9.1%	9	81.8%
36*	2	18.2%	5	45.5%	4	36.4%
40*	5	45.5%	4	36.4%	2	18.2%
41	0	0.0%	3	27.3%	8	72.7%
46*	1	9.1%	3	27.3%	7	63.6%
56*	7	63.6%	1	9.1%	3	27.3%
58*	7	63.6%	3	27.3%	1	9.1%

*Questions not generating consensus (< 70%)

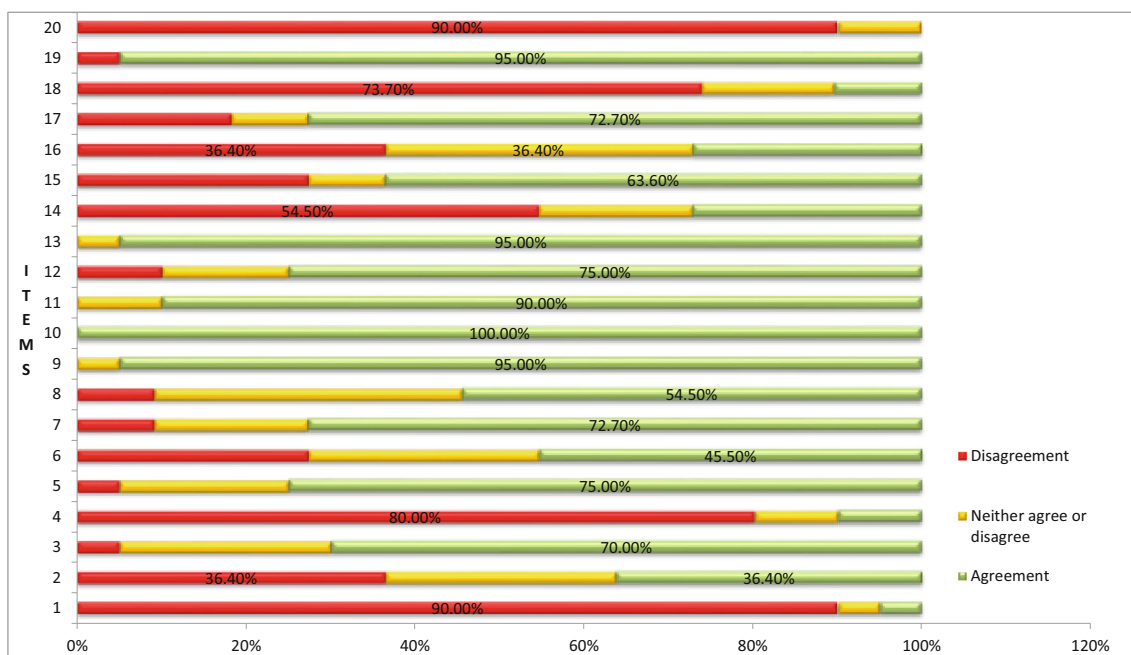


Fig. 1 Results of the first block of questions at the end of study

disagreement (Fig. 1), leaving 6 where fewer than 70% of participants had the same response. With regard to recommendations and process for oocyte vitrification, all the respondents (100%) agreed that “the general population does not have enough information about the process of oocyte vitrification.” For the second block of questions, at least 70% of respondents agreed with 8/9 items addressing the current situation of healthcare professionals’ primary management of reproductive health (Fig. 2). Participants unanimously agreed on two statements: “Family doctors should be involved in reproductive health” and “Other specialties should be involved in promoting fertility preservation programs for oncological patients.” Regarding the third block of the questionnaire about risk factors for poor ovarian reserve, after second round there were 8 affirmative and 3 negative consensus items (Fig. 3), while respondents were in agreement with 13/16 items included in the fourth block of the questionnaire (Fig. 4). The following items yielded

unanimous agreement: “It is necessary to promote reproductive planning—not just contraception—from secondary school,” “The media should not trivialize pregnancies in women aged over 50,” “Postponing family formation is the main cause of the increase in assisted reproduction treatments in Spain,” and “Postponing motherhood implies an inherently decreased probability of having children.”

Discussion

This consensus study reflects the views of assisted reproduction specialists and identifies barriers and recommendations for improving primary management of the reproductive health. The main barrier identified was lack of knowledge about the risk factors and prevention measures for infertility. The recommendations generating the most

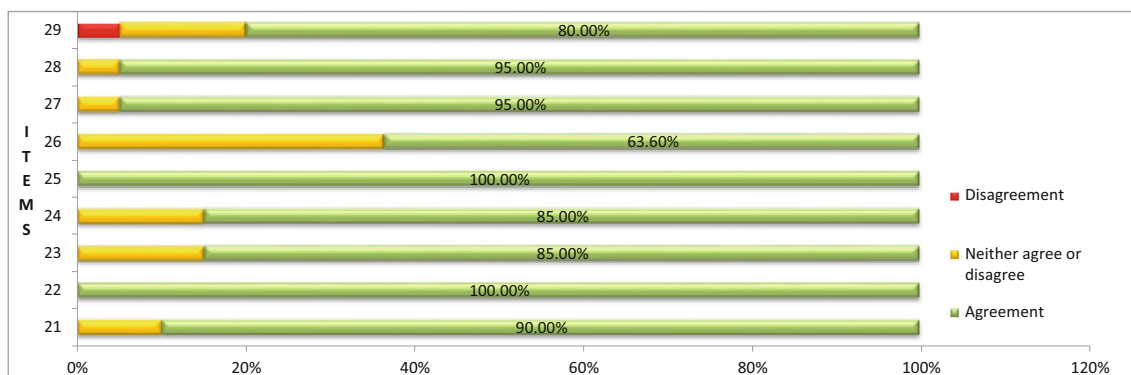


Fig. 2 Results of the second block of questions at the end of study

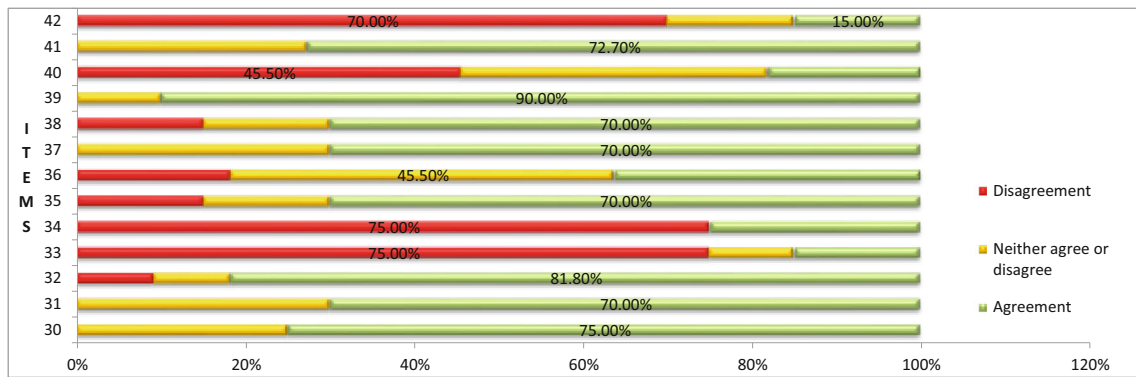


Fig. 3 Results of the third block of questions at the end of study

consensus were about involving primary care physicians in reproductive health and promoting reproductive planning in high school and the media.

Nowadays, oocyte cryopreservation is recommended to women who require gonadotoxic chemotherapy or are at high risk of premature ovarian failure. Although Gunnala and Schattman [13] stated that cryopreservation should be considered from age 34 to 37 to increase success rates and cost-effectiveness, elective egg freezing remains controversial. The results of the present study showed that 90% of experts considered that social egg freezing is ethical, but most respondents thought that there was an upper age limit tied to this process. They would discourage women of advanced ages from undergoing oocyte preservation because the number and biological competence of the eggs is low. Moreover, respondents agreed that there are an optimal number of oocytes to vitrify for social reasons; social vitrification should not be financed by the public healthcare system; and that today, only a small percentage of women who vitrify oocytes will be able to use them in the future. Furthermore, most panelists agreed

that oocyte vitrification should be recommended to women with endometriosis, and more conservative surgeries for ovarian endometriosis should be implemented. In addition, the expert panel agreed that there is a lack of information about the oocyte vitrification process among both the general population and primary care providers.

Our experts agreed that it is necessary to involve both gynecologists and primary care physicians in reproductive health, and guidelines for primary care physicians are needed to manage women at risk of low ovarian reserve. The National Public Health Action Plan for the Detection, Prevention, and Management of Infertility in the USA [14] has called for a greater integration of infertility services into the primary healthcare setting to help access screening, testing, and counseling. Additionally, respondents agreed that healthcare providers should be informed on the usefulness of oocyte vitrification and the need to assess ovarian reserve through tailored information campaigns. With regard to the process itself, there was consensus around assessing ovarian reserve by counting antral follicles in all routine gynecological visits,

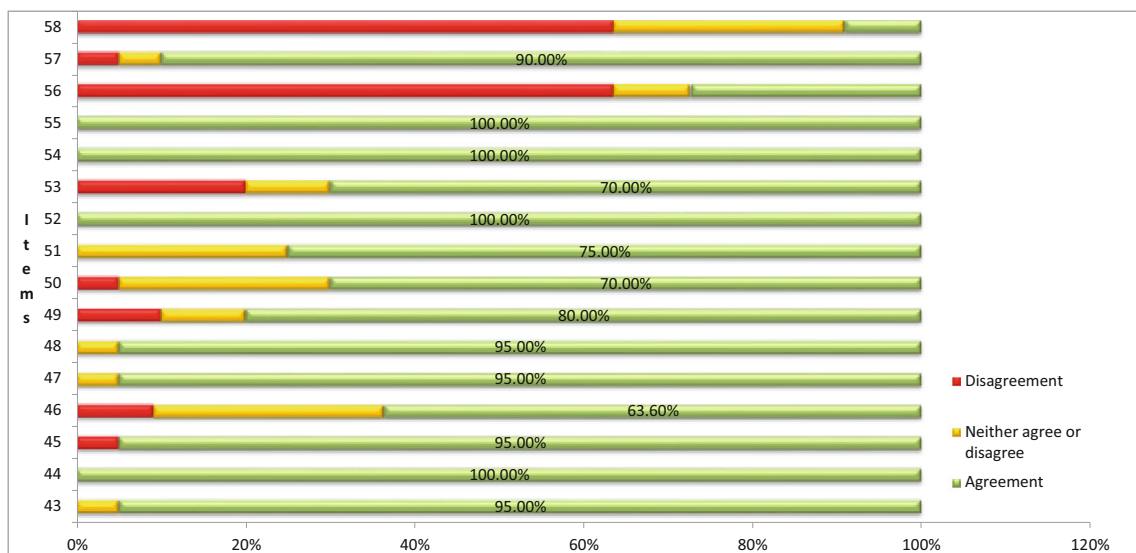


Fig. 4 Results of the fourth block of questions at the end of study

but there was no consensus about testing anti-Müllerian hormone (AMH) levels, suggesting that the utility of the AMH as a marker of ovarian reserve remains controversial.

Although tobacco and obesity have previously been associated with infertility [15–17], experts believe that weight control and smoking are not taken into sufficient account in considerations on ovarian reserve. Respondents believed that healthy behaviors help women maintain their fertility to more advanced ages; however, there was no consensus around the statement that toxic habits are currently the leading cause of the increase in fertility treatments in Spain.

All the experts supported the promotion of reproductive planning in young people from secondary schools, and most thought that family planning centers focus on contraception but neglect counseling on reproductive health. Understanding the reproductive cycle is necessary for making decisions about fertility control [2]; however, the experts consulted perceived a lack of knowledge around the reproductive lifespan and the risks of delaying childbearing among general consumers. These perceptions help explain their agreement about the need for social education through the media: the media should objectively inform the public on what the ovarian reserve is and risk factors related to its depletion, especially age, making efforts to not trivialize pregnancies at advanced maternal age. In fact, the expert panel agreed that an age limit for allowing fertility treatments would be appropriate. On the question of legalizing surrogacy in Spain, as it is in the USA or Portugal, panelists did not reach a consensus.

This study has the inherent limitations specific to this design. In order to minimize limitations related to the use of a structured questionnaire, a space for free text responses was provided, and comments were incorporated into the round 2 questionnaire. Although Delphi studies are influenced by researchers, the questionnaires were anonymously completed, thereby minimizing the potential for influence and/or bias.

The Delphi method was applied to achieve an agreement on barriers and enablers for improving reproductive health, and the findings may be applicable to any country whose health services system provides primary healthcare. The results generated several recommendations, which could set the basis for developing a public health action plan for primary management of reproductive health. Further research to better understand the primary care physicians and patients' opinions might be needed. In addition, the costs over the benefit of the measures to be adopted should be assessed.

In conclusion, specialists in assisted reproduction commonly agree on the most important issues related to reproductive health, and this consensus could constitute a solid starting point for interventions aiming to improve primary management of reproductive health.

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Availability of data and material Data are available upon request.

Code availability Not applicable.

Authors' contributions We thank all expert panel members for their efforts.

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Compliance with ethical standards

Conflicts of interest The authors declare that they have no conflicts of interest.

Ethical approval Approval from the institutional ethics review board was not required because patient data were not used.

Consent to participate Consent to participate was not required because patient data were not used.

Consent for publication All authors declared their agreement to publish this study.

Appendix

Table 3 Delphi questionnaire

- | Oocyte vitrification |
|--|
| 1. It is unethical to freeze oocytes for social reasons, that is, when no pathology presents an imminent threat to a woman's fertility. |
| 2. With regard to oocyte vitrification, no distinction should be made between social and medical reasons. |
| 3. Professionals should recommend oocyte vitrification for young women with endometriosis. |
| 4. All women who are not trying to conceive should undergo oocyte vitrification before their 30th birthday, independently of their ovarian reserve status. |
| 5. There are an optimal number of oocytes that should be vitrified for social reasons. |
| 6. There is no consensus around the optimal age for considering social egg freezing. |
| 7. Oocyte vitrification is indicated in all young women with endometriosis. |
| 8. General gynecologists are not sufficiently knowledgeable about the process of oocyte vitrification. |
| 9. Primary healthcare physicians are not sufficiently knowledgeable about the process of oocyte vitrification. |
| 10. The general population does not have sufficient information about the process of oocyte vitrification. |
| 11. There is no consensus on the AMH values in patients that should trigger consideration of oocyte vitrification. |
| 12. Only a small proportion of women who freeze their eggs will use them in the future. |
| 13. More conservative surgical interventions should be implemented in women with ovarian endometriosis. |
| 14. Biomarkers of ovarian reserve can identify patients who should be advised to freeze their eggs. |
| 15. Women who have not fulfilled their desire to have a baby should periodically undergo testing to assess ovarian reserve by means of an antral follicle count. |
| 16. Women who have not fulfilled their desire to have a baby should periodically undergo AMH testing to assess ovarian reserve. |
| 17. Current access to oocyte vitrification is a source of social inequality. |

Table 3 (continued)

18. Oocyte vitrification in women without medical indication should be covered by the public healthcare system.
19. After a certain age, women should have their eggs frozen.
20. The risks associated with oocyte vitrification make the process unadvisable in most women.
- Primary management of the reproductive health
21. Family doctors should be involved in reproductive health.
22. General gynecologists should be involved in reproductive health.
23. There should be clinical practice guidelines on managing women at risk of low ovarian reserve available for primary healthcare physicians.
24. Clinical practice guidelines targeted to general gynecologists are not used for managing women at risk of low ovarian reserve.
25. Other specialties should be involved in promoting fertility preservation programs for oncological patients.
26. Doctors who attend oncological patients are usually unaware of the possibilities for preserving their fertility.
27. Family planning centers focus on contraception, not reproductive counseling.
28. There should be awareness campaigns for health professionals on the usefulness of egg freezing.
29. There should be awareness campaigns for health professionals on the need to assess ovarian reserve.
- Risk factors for poor ovarian reserve
30. Weight is not taken into sufficient account with respect to ovarian reserve.
31. Tobacco use is not taken into sufficient account with respect to ovarian reserve.
32. Patients with endometriosis do not know the impact this pathology has on ovarian reserve.
33. AMH testing should be systematically undertaken during routine gynecological visits.
34. AMH testing should be systematically undertaken in all women aged over 30.
35. Early AMH testing should be undertaken in women at risk for low ovarian reserve.
36. Healthy behaviors are not taken into sufficient account in investigations into couples' infertility.
37. Assessment of ovarian reserve by means of antral follicle count should be included in routine gynecological controls.
38. Endometriosis is underdiagnosed in routine gynecological exams.
39. The population does not recognize the true impact of obesity on fertility.
40. Toxic habits are currently the main reason for the increase in fertility treatments in Spain.
41. Healthy behaviors significantly prolong women's fertility to more advanced ages.
42. Effective treatments currently exist to maintain women's fertility at advanced ages.
- Information and communication
43. The media should disseminate information on the risks of delaying maternity.
44. It is necessary to promote reproductive planning—not just contraception—from secondary school.
45. The general population is unaware of the inherent risks of delaying maternity.
46. Uterine surrogacy should be legalized in Spain.
47. There is an absolute lack of knowledge among the population regarding the “shelf life” of the ovary.
48. The population does not know the harmful effects of unhealthy behaviors, like tobacco use, on the ovarian reserve.
49. The media should objectively inform the public on what the ovarian reserve is.
50. The media should inform the public about the possibilities of prolonging the reproductive lifespan through oocyte vitrification.

Table 3 (continued)

51. The media should report on the impact of behavioral risk factors (eating disorders, inappropriate use of contraceptives, sexually transmitted infections, and tobacco use) on the ovarian reserve.
52. The media should not trivialize pregnancies in women aged over 50.
53. An upper age limit should be legally established for access to fertility treatments.
54. Postponing family formation is the main cause of the increase in assisted reproduction treatments in Spain.
55. Postponing motherhood implies an inherently decreased probability of having children.
56. Assisted reproduction techniques allow couples who have postponed family formation the possibility of having their own child.
57. Patients with reproductive problems frequently complain about having had inadequate information for planning their reproductive life.
58. Men who postpone paternity until after age 40 should freeze sperm samples in order to maintain future fertility.

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