



Article

Preimplantation genetic screening: results of a worldwide web-based survey

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KEY MESSAGE

Results of a web-based survey on practices of, and opinions on, preimplantation genetic screening (PGS) are presented. The results clearly emphasize increased utilization and interest in PGS; however, users and non-users of the technique express a need for more robust and evidence-based data on different aspects of PGS.

ABSTRACT

Our objective was to evaluate and characterize the extent and patterns of worldwide usage of preimplantation genetic screening (PGS) among the assisted reproductive technique community. A prospective, web-based questionnaire with questions relating to practices of, and views on, PGS was directed to users and non-users of PGS. A total of 386 IVF units from 70 countries conducting 342,600 IVF cycles annually responded to the survey. A total of 77% of respondents routinely carry out PGS in their clinics for a variety of indications: advanced maternal age (27%), recurrent implantation failure (32%) and recurrent pregnancy loss (31%). Few (6%) offer PGS to all their patients. In most cycles (72%), trophoctoderm biopsy is carried out and either array-comparative genomic hybridization (59%) or next-generation sequencing (16%) are used for genetic analysis. Only 30% of respondents regard PGS as clearly evidenced-based, and most (84%) believe that more randomized controlled trials are needed to support the use of PGS. Despite ongoing debate and lack of robust evidence, most respondents support the use of PGS, and believe that it may aid in transferring only euploid embryos, thereby reducing miscarriage rates and multiple pregnancies, increasing live birth rates and reducing the risk of aneuploid pregnancies and births.

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Introduction

Aneuploidy is widely recognized as a leading embryonic cause for both implantation failure and pregnancy loss in natural and assisted conceptions. The intention of preimplantation genetic screening (PGS) is to prevent aneuploid embryo transfers in infertile patients undergoing IVF. By identifying euploid embryos for transfer, PGS is expected to increase implantation and live birth rates and reduce miscarriage rates per transfer cycle. In the early days of PGS (PGS 1.0), cleavage-stage embryo biopsy using fluorescence in-situ hybridization (FISH) was used for assessing aneuploidy. After initial enthusiasm and widespread use, several randomized controlled trials (Mastenbroek et al., 2007; Staessen et al., 2004) and subsequent meta-analysis (Mastenbroek et al., 2011) failed to show a beneficial effect of PGS on the live birth rate after IVF. The use of PGS 1.0 has declined as it was also discouraged by professional societies (ACOG, 2009; Harper et al., 2010; Practice Committee of Society for Assisted Reproductive Technology, Practice Committee of American Society for Reproductive Medicine, 2008).

Advances in assisted reproduction and molecular genetic techniques have recently allowed the reintroduction of a new form of PGS (PGS 2.0). These improvements consist of the ability to perform comprehensive chromosome screening (CCS) of all 24 chromosomes; the ability to culture embryos to the blastocyst stage and carry out trophectoderm biopsy of several cells; and efficient techniques for embryo vitrification and warming. We are now witnessing a dramatic increase of the use of PGS 2.0 in many patient groups. Nonetheless, debate about the efficiency, pace and mode of introduction of PGS 2.0 into clinical practice is still ongoing (Gleicher et al., 2014; Mastenbroek and Repping, 2014; Sermon et al., 2016).

IVF-Worldwide.com is a comprehensive IVF-focused website linking specialists in IVF centres around the world, providing its members with the ability to communicate and discuss professional issues (www.IVF-Worldwide.com). IVF-Worldwide.com also contains educational materials, and conducts surveys on a variety of issues related to assisted reproduction techniques. The website is non-commercial and has an advisory board of key opinion leaders in the field who also construct and review the surveys posted on the website. The IVF-Worldwide.com platform allows access to a large number of IVF clinics worldwide, and is therefore an excellent tool to conduct large-scale surveys. Surveys are an interesting form of data collection, as they represent the 'wisdom of crowds', but they are only complementary to big data-collection platforms such as the European Society of Human Reproduction and Embryology PGD Consortium data-collection papers that allowed the field to understand trends on the use of genetic technologies in IVF (De Rycke et al., 2015).

The purpose of the present survey was to evaluate the extent and patterns of PGS usage worldwide, and to gain insights on the views and opinions of the assisted reproductive technique community on the use of PGS 2.0.

Materials and methods

Survey content

Through expert opinion and literature review, the authors developed a questionnaire that was directed to both current users and non-users of PGS. After general questioning on clinic characteristics and

demographics, PGS users received a 14-item questionnaire, whereas non-users received a five-item questionnaire. For each question, multiple choice answers were provided, from which a single answer could be chosen in nine questions, whereas in the remaining five questions, multiple answers were allowed.

The web-based questionnaire entitled 'Preimplantation genetic screening (PGS): what is my opinion?' was posted on the IVF-Worldwide.com website on September 20, 2015, and was open for data entry until November 17, 2015. The survey questions can be accessed at the following URL (IVF-Worldwide): <http://www.ivf-worldwide.com/survey/preimplantation-genetic-screening-pgs-what-is-my-opinion.html>. All registered members of IVF-Worldwide.com were invited by several email messages to participate. The survey contained a demographic section, with questions on the name of the IVF clinic, email address, country, and number of IVF cycles carried out in the most recent year. The medical section of the survey evaluated the practice patterns and opinions of respondents with a series of multiple choice questions.

Quality-assurance methods used

To minimize duplicate reports from a particular unit and possible false data, three parameters were compared with existing data of units registered on the IVF-Worldwide.com website. These parameters included the name of the unit, country, and email address. If all of these parameters from the survey matched the website archive data, this reporting site's data were included in the statistical analyses.

Statistical analysis

The analysis was based on the number of IVF cycles reported by the unit and not on the number of units in the study. Therefore, the relative proportion of answers reflects the total proportion of IVF cycles represented rather than the proportion of individual respondents to the survey questions. Results were calculated by using the following formulas as described in previously reported research from the IVF-Worldwide.com network (Vaisbuch et al., 2012):

Compliance with ethical requirements and conflict of interest statement

The survey does not involve human or animal research and hence a formal Institutional Review Body approval was not obtained. The Survey was available as an open-access questionnaire to the members of the IVF-Worldwide.com who voluntarily answered the study questions. Data collected for this research were anonymous. The authors declare that they have no conflict of interest.

Results

Completed survey forms were received from 386 IVF clinics, originating from 70 countries, from all five continents. These clinics carried out nearly 342,600 IVF cycles annually. The detailed response to all the questions can be accessed through IVF-Worldwide.com at <http://www.ivf-worldwide.com/survey/preimplantation-genetic-screening-pgs-what-is-my-opinion/results-preimplantation-genetic-screening-pgs-what-is-my-opinion.html>.

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