SPECIAL CONTRIBUTION

International Federation of Fertility Societies Surveillance 2010: preface

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Surveillance is a triennial worldwide compendium of national rules and regulations for assisted reproductive technology. It was last published in 2007. (Fertil Steril® 2010;■:■. ©2010 by American Society for Reproductive Medicine.)

Key Words: Surveillance, assisted reproductive technology, ART, countries, national, rules, regulations

For this edition of Surveillance we are without the spirited discussion and thoughtful contributions of Jean Cohen, a cofounder of Surveillance, who died in August 2007, soon after the 2007 version was presented in Durban, South Africa. Jean had initiated the move to electronic communication, which has been a crucial part of the data gathering for the present volume.

We are indebted to Keith Gordon, Ph.D., Medical Director, Schering Corporation, Schering-Plough and Santosh T. Varghese, M.D., Vice President, Primary Care and Cardiovascular, Global Medical Affairs, Schering-Plough Corporation of Kenilworth, New Jersey for their support that led to the development of the software for data collection and its initial presentation by Chris Graham, M.Comp., Managing Director of oc Products, LTD, Sheffield, United Kingdom. With the mechanism secured, we made e-mail contact with 340 addresses. From these, 195 addressees responded, and 175 responses were usable from 105 countries. Most countries had two respondents, but 41 countries had only a single return. In some cases there were conflicting answers, although it was often possible to determine the correct one by other comments made. If errors are found, please make contact with the International Federation of Fertility Societies (IFFS) Secretariat (IFFSSECRETARIAT@talley.com). If you would like to be a future correspondent or your country's data are not recorded, do make contact, because we would like to have another data collection round in 2012.

The striking change in this edition is the huge increase in the data garnered from many more countries than the 59 gathered in 2007. This shows how assisted reproductive technology (ART) has spread to distant parts. There has also been a substantial increase in the numbers of clinics in many parts of the world, mostly in those that were early in the field. More sophisticated techniques are offered, and there has been a corresponding increase in regulatory activity. It is likely that those countries entering more recently will in turn require regulatory supervision as their societies insist on oversight. The ethical discussions are influenced by cultural perspectives, which seem to dictate the various ART methods made available.

An increasing problem will be the cost of procedures. As ART spreads to parts of the world with fewer resources, there will be greater urgency to seek less-costly processes. The economic aspects remain a problem because few countries offer insurance or state support. This in turn influences the number of embryos transferred and the persistently high multiple pregnancy rates in most countries.

The authors of the first Surveillance wished to determine whether there was international consensus in areas of reproductive technology, although they began to realize, as time progressed, that this was unlikely. Surveillance 2010 shows this heterogeneity in all aspects of ART. In some ways this is to be celebrated, but all can learn from the best.

The authors are grateful for continuing interest in this compendium, which is to be presented at the IFFS Munich meeting. The material will be available on the IFFS Web site (http://www.iffs-reproduction.org).

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International Federation of Fertility Societies

Fèdération internationale des sociétés de fertilité
Federación internacional de las sociedades de fertilidad

IFFS Surveillance 2010

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Statement of general purpose[1]

[1]As presented in 2007

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Internationally, there is a wide divergence in views on the methods and the content of surveillance of assisted reproductive technologies (ART). This was clearly brought out by ‘‘IFFS [International Federation of Fertility Societies] Surveillance 98,’’ published in Fertility and Sterility 1999;71(Suppl 2) and ‘‘IFFS Surveillance 01,’’ published in Fertility and Sterility 2001;76 (Suppl 2), as well as by ‘‘IFFS Surveillance 04,’’ published in Fertility and Sterility 2004;81(Suppl 4). The 1998 data were presented to the national delegates who had participated in the 1998 survey at the IFFS meeting in San Francisco, California, in October 1998 in the hope that at least some of the discrepancies brought out by the survey could be resolved. This effort had limited success, because the delegates were concerned that they were not empowered to authorize a deviation from the situation as revealed by the survey. Thus, consensus on the various issues remains elusive. Because of the experience in trying to get consensus for the 1998 survey, this effort was not repeated with the data collected and published in ‘‘IFFS Surveillance 01’’ and in ‘‘IFFS Surveillance 04.’’ An effort was made simply to record the situation as it existed. Indeed, that will probably be the fate of ‘‘IFFS Surveillance 07,’’ which will be presented to the delegates at the IFFS meeting in 2007. The divergence of views on various issues makes it appear likely that the exact purpose of surveillance is elusive. Historically, surveillance was initiated in response to public concern about a new technology that dealt with the mysterious origins of the human being. Thus, the details may be unimportant as long as the public believes that some type of surveillance is in place. However, one hopes that the scientific community would strive for a higher goal. Indeed, the current discussions about multiple pregnancies and the number to transfer are evidence of this scientific aspiration.

In the final analysis, the purpose of this survey, ‘‘IFFS Surveillance 07’’, is to document the current status of the various issues in hopes of further steps along the road to a scientifically based consensus.

Preface (2004)

Howard W. Jones, Jr., M.D.[1] and Jean Cohen, M.D.[2]
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The development of in vitro fertilization (IVF) and its subsequent variations and extensions, all now included under the umbrella of ART, appears to have generated more interest and concern among religious leaders, bioethicists, and the general public than any other medical procedure. Not only the ethicists and moral theologians but also consumer advocate groups have expressed dissatisfaction with one or more aspects of their treatment or lack of access thereto. This widespread interest and concern has attracted the attention of, or was called to the attention of, the political process. As a result of these events, many committees and commissions, some governmental, some not, have examined the ethical, legal, religious, medical, and public policy aspects of ART, resulting in the establishment of unofficial guidelines and/or government regulations in many sovereign states wherein ART is practiced. For the purpose of this discussion, the word guideline is used to designate sets of rules to be followed voluntarily, generally proposed by unofficial organizations such as an infertility society or a society of obstetrics and gynecology. The word regulation is used to designate sets of rules adopted by legislative action, with assigned penalties for violations.
It is to be noted that there are several political entities—Canada, for example—wherein there are neither regulations nor guidelines. It is of interest that the practice of ART in these entities without either guidelines or regulations conform in general to the practices in those entities where guidelines or regulations are in force.

Such guidelines or regulations have taken various forms. They often not only express a particular medical perspective but sometimes reflect the social and religious mores of the particular sovereign state. Some of the guidelines or regulations have been formulated to accommodate special-interest groups. Furthermore, surveillance of compliance with guidelines or regulations ranges from none at all to the issuance of a license by a governing body after designated requirements are fulfilled, often including periodic follow-up inspections.

The specific purposes of this project are as follows:
-tabulating the practices of sovereign nations or political subdivisions thereof with respect to the adoption of guidelines or regulations;
-tabulating the methods of surveillance, if any, of such guidelines or regulations;
-tabulating the similarities and differences of the guidelines or regulations themselves concerning the various procedures under the umbrella of ART, especially in view of identifying within the guidelines or regulations any that may be medically naı¨ve, contradictory, or not supportive of the best interests of the patients, their families, and society in general; and
-highlighting the changes between this survey, ‘‘Surveillance 04,’’ and the previous two surveillances sponsored by IFFS.

Preface (2007)

Howard W. Jones, Jr., M.D., and Jean Cohen, M.D.

An e-mail survey was developed and one or more individuals from the principal sovereign nations were invited to respond. Answers were obtained from 57 countries, but not all questions were answered in all responses. This explains why in some of the tables that follow some information is not given. The number of centers is an estimate and should not be taken as fact. The coordinators (Natalia van Houten and Keith Gordon) prepared the tables under the various subheadings matched to the questionnaire. The analysis of the survey was prepared by the editors Jean Cohen, M.D., Howard Jones, Jr., M.D., Ian Cooke, M.D., and Roger Kempers, M.D.
This report, ‘‘IFFS Surveillance 07,’’ summarizes the various laws, regulations, and/or guidelines established by 57 nations to regulate and oversee the medical practice of ART.
The most striking finding is the great diversity in these laws and guidelines.
The following two questions immediately arise:
1. Why does society wish to oversee ART as opposed to other specific medical procedures?
2. What exactly does society wish to oversee?
An answer to both questions may arise principally from a single source. Historically, there was great objection to the work of the pioneers in IVF. This protest was from a variety of organizations, all under the umbrella of the religious right. Although objections took various forms, the essence of the complaints was that IVF resulted in the destruction of some fertilized eggs, which were considered by the objectors to have the moral status of a human already in being, in other words, of a human being.
It must also be said and emphasized that many religious organizations of various persuasions, as well as a large segment of the population, take the position that the developing human conceptus does not deserve protection by society during early development, which is the situation in the clinical application of IVF.
The divergent views concerning the moral status of the developing embryo are likely the chief cause of the divergent rules and guidelines, because pressure is exerted by adversary groups and individuals on those responsible for enacting such laws or guidelines.

The very fact that it has been necessary to adopt laws or guidelines probably is itself an expression of the tension arising from the various points of view about moral status.
If this analysis is correct, it appears that a consensus on the necessity for and the method of surveillance of ART is unlikely in the foreseeable future. Even physicians and scientists can reflect the societal influences and thought that surround them.

Meanwhile, one hopes that ‘‘IFFS Surveillance 07’’ will prove to be a source of information about these matters and will stimulate more discussion of why and what society is trying to achieve by its monitoring of ART.

Preface (2010)

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Chapter 1: Number of centres

Since IFFS Surveillance 2007, the number of countries responding has grown from 57 to 162 (Table 1.1). This includes 54 countries with multiple responses. Of these 54, 20 gave the same number and 34 gave different numbers of centres. These responses did not seem to be related to the size of the country (either in area or population) or any perceived government control. Table1.1 lists the countries followed by the lowest number and the highest number quoted. Japan remains the country with the largest number of centres with a range of 606 - 618. Using these data, the total number of clinics ranges from 4077-4456.

In the December 30, 2009 Newsletter from IVF-Worldwide, the number of Clinics registered on their website was 3055, so these figures seem to be consistent.

In Surveillance 2007, the numbers of Clinics were discussed to try and determine the extent of ART treatment in different countries. Because of this variation, the countries have been listed in Table 1.1 without detailed comment.

REFERENCES

IVF-Worldwide <www.ivf-worldwide.com>

Table 1.1
Number of centres

Country	n
Abu Dhabi	10
Albania	3
Algeria	7
Argentina	23 to 25
Armenia	1
Australia	63
Austria	25
Bangladesh	10
Belarus	4
Belgium	16 to 30
Bosnia	3
Brazil	150
Bulgaria	16
Bukina Faso	1
Cameroon	2
Canada	26 to 27
Chile	8 to 9
China	102 to 300
Colombia	19 to 21
Congo	0
Croatia	7 to 11
Cuba	1
Cyprus	10
Czech Republic	30
Dem. Rep.Congo	1
Denmark	18 to 22
Dominican Rep	4
Ecuador	6 to 8
Egypt	52 to 55
El Salvador	1 to 4
Estonia	4
Ethiopia	1
Finland	19 to 20
France	90 to 106
Germany	120 to 121
Ghana	7
Greece	50 to 60
Hong Kong	7
Hungary	12
Iceland	1
India	500

Table 1.1
Continued

Country	n
Indonesia	12
Iran	40
Ireland	7
Israel	24 to 30
Italy	360
Ivory Coast	3
Jamaica	1
Japan	606 to 618
Jordan	19
Kenya	4
Korea	142
Kosovo	3
Kuwait	12
Latvia	4 to 5
Lebanon	20
Libya	9 to 10
Lithuania	4
Malaysia	26
Mali	1
Mexico	Uncertain
Montenegro	3
Morocco	18
Namibia	0
Nepal	3
Netherlands	13
New Zealand	7
Nigeria	16 to 20
Norway	11
Pakistan	10
Panama	7
Paraguay	1 to 3
Peru	5 to 7
Philippines	4
Poland	50
Portugal	24
Romania	11
Russia	80
Saudi Arabia	24 to 40
Senegal	2
Serbia	14
Singapore	9

Table 1.1
Number of centres

Country	n
Slovakia	8
Slovenia	3
South Africa	12 to 15
Spain	177 to 203
Sri Lanka	5
Sudan	4
Swaziland	0
Sweden	15 to 16
Switzerland	26
Taiwan	72 to 78
Thailand	35
Togo	1

Table 1.1
Continued

Country	n
Trinidad & Tobago	1 to 2
Tunisia	8
Turkey	112 to 116
Uganda	1
United Kingdom	66
Ukraine	19
Uruguay	4
USA	450 to 480
Venezuela	17 to 18
Vietnam	11 to 12
Zimbabwe	1

CHAPTER 2: Legislation and guidelines

When IVF became a clinical reality in the early 1980s, it operated as any other clinical specialty, i.e., without specific laws or guidelines, except those applying to any other aspect of clinical medicine. However, the concept of IVF seemed, to a portion of the general public, as "going too far." In the United Kingdom, Australia, especially in the state of Victoria, and in the United States, among the early countries to apply IVF, public protests, picket lines, letters to the editor, and editorials stimulated public concern. Finally, the Roman Catholic Church in 1987 issued a document, "Donum vitae" which stated that IVF was illicit and not to be used by the faithful. Indeed, this remains the official position of the Roman Church into the 21st century. In many nations, governments reacted to the public concern by enacting laws or guidelines which made IVF a special situation in that it had to operate under special laws or guidelines in contrast to every other specialty in medicine. The purpose of this chapter is to document the international situation with regard to legislation, guidelines or the lack thereof.

There are no sophisticated data which will allow the comparison of end results in countries operating under these various legislative situations; indeed it might be extremely difficult ever to get information of this kind. Generally speaking, countries that have long been the users of IVF do have some sort of legislative regulation or guidelines with certain quasi-official regulation concerning parts of the operation. It will, therefore, probably never be possible to determine the effect of regulations or guidelines, or lack thereof, on the clinical outcome of IVF programmes.

ANALYSIS OF THE SURVEY

Among the 103 nations with reliable information on this point, 42 operated with legislative oversight, 26 with voluntary guidelines, and 35 operated with neither (Table 2.1). In some instances, this subdivision is somewhat arbitrary. For instance, the United States can clearly be labeled as a guideline country and yet if a program were to use donor eggs, donor sperm, or donor embryos, it would fall under regulations promulgated by the Federal Drug Administration. In Australia, the situation is somewhat ambiguous. All clinics are required by law to be accredited. The penalty for operating a non-accredited clinic is up to 10 years in jail. However, there are no specific penalties for breaching the Australian Code of Practice other than withdrawal of accreditation if compliance actions are not satisfactorily attended to.

In the entities where clinical ART functions under legislation, the legislation usually includes regulation governing the operation of the embryological laboratory. However, there are some exceptions, for instance, Armenia, Brazil, Iceland, Indonesia, Kosovo, Russia, Singapore, Spain, Sweden, and Vietnam (Table 2.1). In guideline countries, the guidelines usually include guidelines for embryological laboratories but there are exceptions. For instance, Argentina, Belarus, Iceland, Ivory Coast, Poland, and Ukraine have no embryological laboratory guidelines (Table 2.1). Curiously enough, it seems that the countries that do not have embryological laboratory guidelines do not have separate laws governing the operation of the embryological laboratory. However, among countries that operate without legislation and without guidelines, there are some countries which have laws governing embryological practice. Such is the case with Bosnia, Colombia, the Democratic Republic of the Congo, the Dominican Republic, Nigeria, Romania, Slovenia, and Sudan (Table 2.1).

About two-thirds of the countries operating under legislation have licensing bodies. The United Kingdom is a prototype for that arrangement. The Human Fertilisation and Embryological Authority (HFEA) requires that all programs before the issue of a licence demonstrate that they can comply with a Code of Practice which is constantly updated by HFEA and which covers all details of the clinical and embryological practice associated with assisted reproductive technology.

Furthermore, if research is to be conducted by a particular programme, a special licence is also required from the HFEA. HFEA issues an annual report of end results without identification of individual clinics. Some programmes of IVF may have a quasi-licensing aspect. For example, in the United States the Society for Assisted Reproductive Technology (SART), a subsidiary of the American Society for Reproductive Medicine (ASRM), issues a certificate to programs which adhere to the most recently published ASRM minimal standards for IVF and ART, maintain a high level of ethical and moral standards and submit annual data to the SART registry as mandated by the Fertility Clinic Success Rate and Certification Act (Widen legislation). It is possible however for programmes to operate without being certified by SART and approximately 10% of clinics in the United States so operate. If one is a member in good standing of SART and there is some violation of the above mentioned regulations, SART does have the opportunity to withdraw its certification. However, this really has little impact.

Individuals in programmes which are in violation of the standards promulgated from time to time by ASRM, either by the Ethics Committee or the Practice Committee, can be expelled from ASRM. Indeed, that was the situation with the doctor who was responsible for the octuplets in California in 2009. Patients would need to be aware of these actions for there to be any effect. It is also worth mentioning that a considerable body of civil law has arisen in spite of legislation and rules and regulations. The United States might be again cited as an example. Since IVF has been widely practised clinically, there have been tried in the civil and appellate courts well over 1,000 cases involving various aspects of the practice of assisted reproductive technology. These include such things as the custody of a frozen embryo in divorce cases, the parental claims by surrogates, the question of whether IVF is covered in insurance contracts, and in addition, of course, liability claims when some error has been made, as for example, the loss of embryos or the transfer of non-parental embryos.

DISCUSSION

The great variations in the details of what can and cannot be done under legislation and guidelines from country to country suggest that influences are at work other than the goal of good medical practice. Italy can be used as an example. Italian law limits insemination to no more than three oocytes and requires that all fertilized oocytes be transferred. This is not good 21st century medicine and reflects the cultural bias of the national legislative body. The penalties for violation are severe. These regulations have led to a certain amount of fertility tourism by patients from Italy and indeed from other countries, where there is restrictive legislation, to another to search for a location that permits procedures that cannot be performed in the home country.

It is to be noted that in legislative countries in which severe penalties are imposed for violation of the code, all penalties are applied to the practitioners and to the clinic and there appears to be no country with legislation which is directed toward the patient for being involved in a procedure that is in violation of the legislation. It is difficult to document to what degree legislation and guidelines are followed in detail. There is abundant evidence however to suggest that violations of some aspects may be widespread. The United States can again be used as an example where the incidence of multiple pregnancies cannot be accounted for except by violation of the guidelines as to the number to be transferred as reported in the annual SART report.

Not covered by the survey, but of interest, is the fact that there is at least one country, namely Costa Rica, in which IVF is prohibited. This is the result of an action by the constitutional court of that country in which it is stated that personhood begins with fertilization and it has therefore been interpreted to indicate that since there may be some destruction of early embryos which are involved in IVF, IVF is not practised at all in that nation.

SUMMARY

In the 2007 IFFS Surveillance, 58 countries were surveyed. In the current 2010 Surveillance, 107 countries have been surveyed. This great increase in the number of countries surveyed has resulted in a substantial shift in the percentage of countries covered by legislation as opposed to guidelines or neither one. In the 2007 Surveillance, some 50% of countries were covered by legislation, whereas in the 2010 Surveillance, this had dropped to 42%. On the other hand, in 2007 only 19% of the countries had neither legislation nor guidelines, but that figure is now 35% in the 2010 report. These changes are probably not as significant as they seem because many of the recently added countries are from the developing world where there has been insufficient time for guidelines or legislation to be adopted. One can speculate that in further reports the number of legislative countries or guideline countries will increase at the expense of the countries operating with neither.

There is some evidence that in legislation in some countries, the legislation has been more influenced by the social background of the legislative body of the country than by the goal of good medical practice. These are exceptional countries and Italy is the prime example. On the other hand, in most countries where there is legislation, there can be little doubt that the guiding principle has been an effort to practise good medicine. Legislation, which is regarded as restrictive by the patient population, has led to a certain amount of reproductive tourism to overcome the restrictive aspects of the legislation. It needs to be mentioned that in one country, Costa Rica, ART cannot be practised because of the ruling of the constitutional court. This country has not been included in any of the analysed material.

Table 2.1

Regulation of ART

Country	Statutes	Guidelines	None	Licensing body	Statutes incl. embryo lab practice	Guidelines incl. embryo lab practice	Neither incl. embryo lab practice
Abu Dhabi	+	-	–	+	+		
Albania	+	–	–	+	–		
Algeria	+	–	–	–	+		
Argentina	-	–	+			–	
Armenia	+	–	–	+	–		
Australia	-	+	–	+		+	
Austria	+	–	–	+	+		–
Bangladesh	-	–	+				
Belarus	-	+	–			–	
Belgium	+	–	–	+	+		
Bosnia	-	–	+				+
Brazil	+	–	–	+	–		
Bulgaria	+	–	–		+		
Burkina Faso	-	–	+				
Cameroon	-	+	–			+	
Canada	+	–	–	+	+		
Chile	-	+	–			+	
China	-	+	–			+	
Colombia	-	–	+	–			+
Congo	-	–	+				–
Croatia	+	–	–	+	+		
Cuba	-	+	–			+	
Cyprus	–	+	–			+	
Czech Rep	+	–	–	+	+		
Dem Rep Congo	–	–	+				+
Denmark	+	–	–	+	+		
Dominican Rep	–	–	+				+
Ecuador	–	–	+				
Egypt	–	+	–			+	
El Salvador	–	–	+				–
Estonia	+	–	–	+	+		–
Ethiopia	–	–	+				
Finland	+	–	–	+	+		
France	+	–	–	+	+		

Table 2.1
Continued

Germany	+	–	–	+	+			
Ghana	–	+	–			+		
Greece	+	–	–	+	+			
Hong Kong	+	–	–	+	+			
Hungary	+	–	–	+	+			
Iceland	+	–	–	–	–			
India	–	+	–			+		
Indonesia	+	–	–	+	–			
Iran	+	–	–	+	+			
Ireland	–	+	–			–		
Israel	+	–	–	+	+			
Italy	+	–	–	+	+			
Ivory Coast	–	+	–			–		
Jamaica	–	–	+					–
Japan	–	+	–			+		
Jordan	–	–	+					–
Korea	+	–	–	+	+			
Kosovo	+	–	–	+	–			
Kuwait	–	+	–			+		
Latvia	–	–	+					–
Lebanon	–	–	–					–
Libya	–	+	–	+		+		
Lithuania	–	–	+					–
Malaysia	–	–	+					–
Mali	–	–	+					
Mexico	–	+	–			+		
Montenegro	+	–	–	+	+			
Morocco	–	–	+					–
Namibia	–	–	+					–
Nepal	–	–	+					–
Netherlands	+	–	–	+	+			
New Zealand	+	–	–	+	+			
Nigeria	–	–	+					+
norway	+	–	–	+	+			
Pakistan	–	–	+					–
Panama	–	–	+					–
Paraguay	–	–	+					–
Peru	–	–	+					–
Philippines	–	+	–			+		
Poland	–	+	–			–		
Portugal	+	–	–	+	+			
Romania	–	–	+					+

Table 2.1

Continued

Russia	+	–	–	+	+			
Saudi Arabia	–	+	–			+		
Senegal	–	–	+					–
Serbia	–	+	–			+		
Singapore	+	–	–	+	+			
Slovakia	+	–	–		–			
Slovenia	–	–	+					+
South Africa	+	–	–		+			
Spain	+	–	–	+	+			
Sri Lanka	–	+	–			+		
Sudan	–	–	+					+
Swaziland	–	–	+					–
Sweden	+	–	–		–			
Switzerland	+	–	–	+	+			
Taiwan	+	–	–	+	+	+		
Thailand	–	+	–					
Togo	–	–	+					–
Trinidad/Tobago	–	–	+					–
Tunisia	+	–	–	+	+			
Turkey	+	–	–	+	+			
Uganda	–	–	+					–
UK	+	–	–	+	+			
Ukraine	–	+	–			–		
Uruguay	–	–	+					–
USA	–	+	–	–		+		
Venezuela	–	+	–			+		
Vietnam	+	–	–	+	–			
Zimbabwe	–	–	+					–

CHAPTER 3: Insurance coverage

In the early 1980s, as IVF became a clinical reality, it was hoped in the United States at least that the procedure would be covered by private health insurance which was the only type of health insurance available in the states. However, the United States private health insurance industry, except for special policies or by mandate, has excluded ART on the grounds, at first, that it was experimental and later, on the grounds that infertility was not a disease. Interestingly enough, the American Society for Reproductive Medicine (Fertil Steril, 2008, Vol. 90, Suppl. 3) defined infertility as a disease quoting the 31st edition of Dorland's Medical Dictionary (2007). However, it can be argued that infertility is a symptom of many diseases. In this connection, private health insurance will pay for some symptoms, e.g., the treating of headaches.

Integral to this discussion is the fact that when coverage for infertility is available by private health plans in the United States the claims for infertility amount to only about 1% of all claims processed by the company. In consequence, infertility does not represent a major item for the health industry and therefore it is difficult to get the attention of the industry to focus on what to them is a minor item.

ANALYSIS OF THE SURVEY

Only 50 countries supplied information concerning medical insurance for assisted reproductive technology. In general, the lack of response was confined to countries of the developing world or from nations greatly influenced by religious doctrine which is opposed to the use of assisted reproductive technology. Among countries which supply information about coverage, there is a wide range of entrance requirements. Furthermore, the benefits are quite varied. Some of them are quite adequate, for instance, Israel, France, and Belgium. Even in countries which have liberal benefits there is invariably a limit to these benefits. For example, in Israel the benefits cease after the couple has had two children.

Overall, 32 nations reported some form of insurance coverage. As mentioned, these countries are in the developed world, among nations which have had clinical IVF available for a considerable period of time. It is to be noted that in some countries reporting that there were no benefits, there are indeed partial benefits. For instance, in Algeria which reported no coverage, also reported that the drugs used for ART are reimbursed, but the techniques are not.

The variation in coverage where it exists is impressive. Thus, in Australia the Medicare system provides a set amount of reimbursement, in Austria two-thirds of the medical treatment is covered. In Belgium the couple is required to pay about 10% of the cost of the cycle. The Belgian coverage is unique in tying coverage with single embryo transfer in certain circumstances. In the Czech Republic several procedures are not covered, for instance, ICSI or cryopreservation. In Denmark the therapy is limited to three cycles, in France it is four cycles, in Hungary it is five cycles, in Israel the benefits cease after two children are born, in Korea it is three cycles but only partial coverage with preconditions as the couple must be married and under the age of 44. In Russia the National Health Plan pays for 5% of all the cycles in the country. Further variations are noted in the table.

DISCUSSION

There are a limited number of countries with insurance coverage for assisted reproductive technology. These are among the developed world with long experience of ART. Coverage available is always limited, although in many countries the limit is quite generous. It is extremely variable from quite adequate to quite partial. When health insurance coverage is complete, as for instance in a few special policies in the United States which includes ART, the claims for ART represent approximately 1% of all health insurance claims.

SUMMARY

There is no international consensus on health insurance coverage for ART. Only about 30 countries of all of those surveyed had some form of insurance coverage, which always had a limit. However, some countries, as for instance, Belgium, France and Israel offer very sophisticated coverage. Finally, it is to be noted in Belgium the coverage is tied to good clinical practice, i.e., the requirement that in initial transfers under some circumstances a single embryo transfer is required.

Table 3.1
Insurance coverage

Country	A national health plan	Private insurance	No coverage	Comment
Abu Dhabi	+	–	–	Only nationals of UAE are covered by national insurance, the rest of the population not
Albania	–	–	+	
Algeria	–	–	+	The drugs which are used for ART are reimburssed but the techniques are not
Armenia	–	–	+	
Australia	+			Under the Australian Medicare system, each patient receives a set amount of reimbursement towards the cost of an ART cycle
Austria	+	–	–	Two thirds of medication and treatment are covered by a social insurance fund
Belgium	+	–	–	Patient pays about 300-400 Euro per IVF or ICSI cycle whereas the actual cost is 4000-5000 Euro so 90% coverage
Brazil	–	–	+	
Bulgaria	+	–	–	
Canada	–	–	+	
China	–	–		
Colombia	–	–	+	
Croatia	+	–	–	
Czech Repub	+	–	–	National health reimbusements covers: 1) IUI (at the maximum seven times per year) 2)IVF is reimbursed in the basic scheme three times for woman life till the age of 39 years. It means-controlled ovarian hyperstimulation by the cheapest urinary gonadotrophins, oocyte retrieval, 48 to 72 hours embryo cultivation and fresh embryo transfer)- Other lab. procedures are always needed to be paid by patients (ICSI, assisted hatching, prolonged embryo cultivation, embryo cryopreservation, cryo embryo transfer,
Denmark	+	–	–	3 free IVF cycles and herafter private. The medication is reimbursed for all.
Estonia	+	–	–	100% for the treatment, 60% for the medication.

Table 3.1
Continued

Country	A national health plan	Private insurance	No coverage	Comment
Finland	+	–	–	Patients pay for the medication up to 660 EUR per year and about half of the other costs in the private sector. In government supported hospitals the other costs for the patients are 100-200 EUR.
France	+	–	–	Complete for work-up and for care. For IVF up to 4 attempts
Germany	+	+	–	50% of the costs of three cycles are covered
Greece	+	–	–	Complete coverage is forseen by the law, however this has not yet been
Hong Kong	+	–	–	There are criteria that patients have to fulfil before being recruited into the
Hungary	+	–	–	5 times IVF/ICSI fully covered. The drugs used for stimulation are differently reimbursed. GnRH analogues 0%, hMG/FSH/hCG 70%, progestagens 30-50%
Iceland	+	–	–	
Indonesia	–	–	+	
Iran	–	–	+	
Israel	+	–	–	Until the woman has two children
Italy	+	–	–	regulations
Korea	+	–	–	Partial coverage for three cycles. Only under preconditions: couple married, age 44 years old or younger, and family income less than 130% of urban average
Kosovo	–	–	+	
Kuwait	–	–	+	
Latvia	–	–	+	
Libya	–	–	+	
Montenegro	+	–	–	up to 2250 units for one cycle, and 2
Netherlands	+	–	–	mandatory private insurance or a

Table 3.1
Insurance coverage

Country	A national health plan	Private insurance	No coverage	Comment
Portugal	+	–	–	Medication and tests are only partially supported. The techniques are fully supported in public hospitals but are totally paid by couples in the private
Romania				Starting with 2010 there will be a national plan for ART coverage for approximately 250 couples up to 2000 euro, with some entry criteria.
Russia	+	–	–	complete reimbursment in a national health plan for 5% of all cycles in the country and partial or complete from local budgets.
Slovakia	+	–	–	
Slovenia	+			Six cycles until the age of 42 plus 4 cycles after a live birth
South Africa	–	–	+	ART is subsidised in one public/academic institution. Most private insurance does not pay for ART, a very few do,so very limited cover
Spain	+	–	–	Full coverage including medication but only for about 30% of the cycles performed, the rest are private
Sweden	+	–	–	Complete for public hospitals, partial at private clinics (reimbursement of drugs)
Switzerland	–	–	+	
Taiwan	–	–	+	
Tunisia	+	–	–	Medicine expenses are covered for patients having public care insurance.
Turkey	+	–	–	of drug fees, 50% of treatment fees.
UK	+	–	–	Excellence has defined the algorithms for

Table 3.1
Continued

Country	A national health plan	Private insurance	No coverage	Comment
USA	–	+	–	The coverage is very variable. About 14 states provide some type of coverage or mandate that coverage be offered to employers (but not necessarily provided to patients), with fewer than 5 providing extensive coverage, all having some limitations. Many patients have coverage for diagnostic tests but not for treatment, or have lifetime limits on infertility treatments. Some patients have very good coverage, e.g. up to 3 complete cycles, with private insurance. It is estimated that nationally approximatly 20% of all ART costs are covered by government mandate of private insurers and/or by private insurers.
Vietnam	–	–	+	The cost of ART treatment is high, with respect to average personal income.

Chapter 4: Marital status

Without a fixed definition of legal versus *de facto* marriage and same-sex relationships, accurate responses can be difficult. Table 4.1 only includes the 50 countries with clear answers. If a country had two different responses, then the answers were not included. The differences may reflect different regions of the country or different clinics.

Since Surveillance 2007, there has been liberalization in many countries involving ART and single women, so Table 4.1 only lists the countries in the different categories.

DISCUSSION

Similar comments can be made about the three aspects of governance, statutes, guidelines or none, where custom prevails. The major objection to service provision arises from the beliefs associated with Islam, which requires couples to be married and forbids the inclusion of single women. In countries with some form of government-funded support, restrictions were imposed on couples who had "social childlessness" who were not supported, and only couples with demonstrable infertility were supported. The difference between these groups in some cases was blurred. Some countries reported difficulties obtaining donor sperm.

SUMMARY

Table 4.1shows the countries and their differing approaches, but the picture seems less clear than it was three years ago.

Table 4.1
Couple requirements for ART

How ART is governed	Marriage not required	Marriage required	Singles accepted	Lesbians accepted
Covered by statutes	Armenia Australia Brazil Bulgaria Canada Estonia Finland Korea Kosovo Netherlands South Africa Spain UK USA	Abu Dhabi Albania Algeria China Hong Kong Indonesia Iran Kuwait Taiwan Turkey Vietnam	Belgium Bulgaria Canada Denmark Estonia Finland Greece Hungary Iceland Israel Montenegro Russia South Africa Spain UK USA Vietnam	Belgium Canada Denmark Estonia Finland Iceland South Africa Spain Sweden UK USA
Covered by guidelines	Australia Belarus Netherlands New Zealand Nigeria Poland South Africa Spain Thailand Ukraine USA Venezuela	Cyprus Egypt Hong Kong Iran Japan Kuwait Malaysia Morocco Pakistan Philippines Saudi Arabia Singapore Vietnam	Belarus Belgium Ghana India New Zealand Serbia South Africa Spain Ukraine USA Venezuela	Belgium India New Zealand South Africa Spain USA Venezuela
		Marriage/stable relationship		
None	Bosnia Burkina Faso Chile Congo Cuba Dem Rep Congo Dominican Rep Ecuador El Salvador Kenya Mexico Namibia Swaziland Uganda Uruguay Venezuela	Bosnia Burkina Faso Chile Congo Cuba Kenya Mexico Namibia Uganda Uruguay Venezuela	Dominican Rep Israel Jamaica Mexico Nigeria Uganda Uruguay	Israel Jamaica Mexico Trinidad/Tobago Uganda

Chapter 5: Number of embryos for transfer in ART

The number of embryos transferred at ART is the principal contributor to the multiple pregnancy rate. In the World Collaborative Report on Assisted Reproductive Technology, 2002, published in 2009, the overall twin rate was 25.7% and the triplet rate was 2.5% for over 600,000 cycles reported from 53 countries. However there was a 31.7% twin rate and a 3.7% triplet rate in North America and a 21.1% twin rate and a 0.8% triplet rate in Australia and New Zealand (1).

In January, 1998 the SART-ASRM (Society for Assisted Reproductive Technology-American Society for Reproductive Medicine) embryo transfer guidelines were published, these were modified in November, 1999 and again in September, 2004 to reduce the numbers recommended for transfer. The current recommendations are 1-2 embryos at <35 years, 2-3 at 35-37, 3-4 at 38-40 and 4-5 >40 with a smaller maximum number of embryos being transferred for patients with prior IVF success or for patients undergoing their first IVF cycle with good quality embryos and a sufficient quality and quantity for cryopreservation. A review of the SART database to try and assess the impact of those guidelines (2) recognised that routine transfer of multiple embryos occurred in the early years of ART practice. However ovarian stimulation, culture conditions and better embryo selection have since increased the implantation rate and resulted in an increased risk of multiple births. The adherence to the guidelines by clinics varies as does the patient selection. The need to cover costs by out of pocket expenses impacts on decisions about how many embryos to transfer. Education of patients and the community are important, although some patients prefer twins, in spite of full knowledge of the risks of multiple pregnancy. Methods that have been used to reduce the likelihood of multiple pregnancy have been single embryo transfer (SET) and increasing time in culture for the embryos to reach the blastocyst stage for transfer. Reviewing the data from 1996 to 2003, it was considered that the voluntary guidelines had had an effect, but embryo selection techniques needed to improve and socio-economic issues that pressurised patients and physicians to transfer more embryos needed to be addressed.

A later data set, the SART data for 2006, were reviewed (3) and 48% were multiple deliveries, compared with 51% for the 2003 data. Those who were at highest risk were those who underwent transfer using fresh embryos, either their own (31%) or donor eggs (39%). ART contributed 1% of all births in 2006, but accounted for 18% of multiple births. The point is made that *"to minimise the adverse maternal and child health effects associated with multiple pregnancies, ongoing efforts to limit the number of embryos transferred in each ART procedure should be continued and strengthened."*

In Canada, where all 25 clinics reported their data for 2006 per cycle started (4), one or two embryos were transferred in 67% of cycles and the multiple birth rate was 30.3% showing only a slight decrease over previous years. For a woman's own oocytes the live birth rate was 27.1% and the multiple birth rate was 30.3%. For donor oocytes the live birth rate was 33.6% and the multiple birth rate was 37.3%; for frozen-thawed embryos the live birth rate was 24.3% and the live birth rate was 22.5%.

Of course IVF is not the only contributor to multiple pregnancy. In the USA in 2003, ART and ovulation induction contributed 16 and 21% respectively to twin deliveries, 45 and 37% to triplets and 30 and 62% to quadruplets (2). More information has become available about multiple embryo transfer. In a study of pregnancies of ≥22 weeks' gestation, those pregnancies which had three fetal heart beats were followed (5). Those that resulted in a twin delivery had significantly increased risk for reduced birthweight and shorter gestations. The adjusted odds ratio for very low birthweight (<1500g), moderately low birthweight (1500-2499g) and low birthweight (<2500g) were 1.69, 1.38,

and 1.47 respectively, (all $p \leq 0.001$). These early fetal losses, found when three or more embryos were transferred, were associated with a substantial risk for adverse pregnancy outcome. The mechanisms are unclear, but fetal growth restriction has been strongly associated; there have been higher rates of abnormal umbilical cord insertion (marginal or velamentous).

There have been continuing calls for elective SET (6). A review of the annual reports from all IVF units in Sweden to the National Board of Health and Welfare from 1991-2004 showed that despite a successive reduction in the number of embryos transferred to SET, delivery rates were maintained at around 26%. During that time the multiple birth rate decreased dramatically from about 35% to around 5% (7). Although it is agreed that SET minimises twin pregnancies it has also been claimed that it results in lower live birth rates (8).

A population based study in Australia and New Zealand from 2002-6 (9) examined own gamete embryos used to deliver a "healthy baby", described as "a single baby born live at term, weighing ≥2500g surviving for at least 28 days post-birth and not having congenital anomalies". The numbers of transferred embryos were grouped as single embryo, double embryo and three of more embryos. The live delivery rate was significantly higher for transfer of fresh blastocysts (27.9%) than for blastocysts cultured from thawed cleavage embryos (22.0%), fresh cleavage embryos (21.7%), thawed blastocysts (16.3%) and thawed cleavage embryos (15.2%). Natural selection occurs during the additional two or three days in culture and there are fewer transfers of blastocysts than cleavage stage embryos. Nevertheless it was a reported that the proportion of blastocyst transfer has increased from 13.4% in 2003 to 30.6% in 2007 and SET from 32% to 64% in that time. It was suggested that an optimum practice model to maximise the birth of a healthy baby is the transfer of blastocysts and the freezing of cleavage embryos in fresh cycles and subsequent transfer of blastocysts cultured from these thawed cleavage embryos. Vitrification should also have an impact and data from this newer freezing technique is awaited. Where there are adequate numbers of good quality cleavage embryos, a proportion should be frozen at the cleavage stage and three or four cultured on to the blastocyst stage with a single blastocyst being transferred. This could be applied in younger patients in their first ART cycle, where the loss on the further culture is likely to be minimal.

ANALYSIS OF THE SURVEY

There were 20 countries that provided details of the limits that are prescribed by statute (Table 5.1). Sweden has been exemplary in voluntarily moving to predominantly SET and Belgium reinforces this by using it to influence reimbursement. Italy's law specifying that all the embryos produced after a maximum of 3 oocytes have been fertilised must be transferred, except when there are maternal risks, has been challenged successfully in the courts. For other countries there are different age related restrictions and the maximum number varies. There are no penalties for violations in some countries, but they are severe in Germany.

There are 23 countries that are subject to guidelines. Two countries have published theirs, the USA (10) and Canada (11). In both Australia and the UK clinics have been exhorted to introduce a strategy to minimise the multiple pregnancy rate.

Similarly, 11 countries indicated that there are neither statutes nor guidelines regulating their practice. However 36 countries responded and indicated that there was a maximum that was customarily transferred. This ranged from 2 countries, Namibia and Swaziland, which had a limit of 2, 14 had an upper limit of 3, 12 had one of 4, while 6 had an upper range of 5, Bosnia, Cameroon, Ethiopia, Libya and Nigeria. Kuwait had a limit of 6 and in Panama there was no limit.

SUMMARY

There seems to have been slow progress in reducing the number of embryos transferred at IVF. The numbers are high in those countries in which ART is less well developed, reflecting the earlier years of the now more experienced countries and perhaps a difference in embryological laboratory methodology. Competition between clinics and the drive for "success" are potent obstructions to change, but education of clinic staff and the public should be much better. State support needs to be markedly extended, although the socio-economic argument has to be better put. In more experienced environments recourse to blastocyst transfer should be encouraged and vitrification may allow a better outcome after transfer of fewer embryos.

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Table 5.1
How many embryos can be transferred?

How ART is governed	Country	Limits on number transferred	Penalty for violation
Covered by statute	Abu Dhabi	3 if <35y; 4 if >34y	Confinement ± fine
	Belgium	2 if <36y; 3 if <40y;40+y no limit	None as yet ?future
	Brazil	2 if <35y; 3 if 36+y, max. 4 regardless of age	None
	Bulgaria	Age and previous failures	Practice restriction 3-12 m
	China	2 if <35y; 3 for others	No
	Denmark	1 if <35yin first 1-2 cycles	Not known
	Estonia	Up to 3	Financial restriction
	Germany	2 if <38y; maximum 3	3 years jail
	Greece	3 up to 40y; >40y up to 4	Fine, licence lost for 6 m
	Hungary	2-3; above 40y,4	Loss of licence
	Iceland	1 if <35y; 1-2 if >35y if poor embryos	Loss of licence
	Israel	2 if <35y	No
	Kosovo	3 maximum	
	Latvia	3 maximum	None
	Slovenia	3 by law; 2 by practice, usually 1<36y	Fine
	Spain	3 maximum	Fine or clinic closure
	Sweden	1 is the norm; 2 maximum	Licence loss
	Switzerland	3 maximum	Fine or prison
	Taiwan	4 or less	Fine
	Turkey	Up to 3	Loss of licence
Covered by guidelines	Argentina	2 good quality ≥35y, more if poorer quality or older	
	Australia	Only state that steps should be taken to minimise multiple pregnancy	
	Austria	Age and number of failed previous cycles	
	Chile	2 if <40y; 3 if >40y; ? occasionally ? diagnosis	
	Croatia	Can only fertilise 3 oocytes, so all transferred	
	Egypt	2-4 according to age	
	Ghana	2 if <38y; 3 if >39y	
	Hong Kong	Not more than 3, but 4-5 >35y	
	India	3 unless exceptional circumstances	
	Japan	Single embryo transfer, >35y and repeat cycles 2	
	Netherlands	Maximum 2	
	New Zealand	1 for 1and 2 cycle, maximum 2 if <39y	
	Nigeria	2 if <35y; more if >35y	
	Poland	2 if <35y; more if >35y	
	Saudi Arabia	2-3 if <40y, 4 or more if >40y or if >3 previous IVF	
	Singapore	2 with reimbursement, 4 if >35y with 2 failures	
	Sri Lanka	2 preferred; max. 3, single in very selected cases	
	Ukraine	2 if <35y; 3 if >35y	
	UK	2 maximum <40y; 3 maximum >40y; maximum 2 for donated eggs or embryos. All clinics must have a multiple birth minimisation strategy aiming for <10%	Conditions may be placed on the clinic's licence
	Venezuela	1-2 embryos in 60%	
None	Cuba	2 with 3 over 38	
	Ecuador	2-3 depending on age and embryo quality	
	El Salvador	2-3 if <35y; 3-4 if >35y	
	Ethiopia	Decided by clinician	
	Jamaica	2, HFEA Guidelines, maximum 3	
	Kenya	Usually 3, maximum 4	
	Mali	2, maximum 3	
	Romania	3	
	Swaziland	2	
	Trinidad/Toba	2 <30y; 2-3 according to age and embryo quality	
	Uruguay	1-2 if <30y; 2-3 if 31-38y; 4 >39y	

SART: Society for Assisted Reproductive Technology; HFEA: Human Fertilisation and Embryology Authority

CHAPTER 6: Cryopreservation

Sperm cryopreservation has remained a standard technique for donor insemination which has been further documented in Chapter 8. There have been changes in the provision of services due to removal of anonymity and this is further explored in Chapter 9. Attempts are being made to cryopreserve small numbers of sperm from infertile men, which may reduce the need to have recourse to repeat surgical procedures. Methods to protect future spermatogenesis by preserving immature testicular tissue in prepubertal boys suffering from malignancies have not yet been adequately developed.

In the female cryopreservation of fertilised eggs has continued. There has been greater emphasis on blastocyst freezing than on cryopreservation of cleavage embryos and oocyte freezing has developed substantially. Formerly slow freezing was the norm, but vitrification has been well documented and is beginning to displace slow freezing. Vitrification requires simpler equipment, is technically easier and quicker. However spindle and chromosome displacements are seen after cryopreservation and thawing and when they occur are likely to compromise subsequent development.

Transfer of fresh blastocysts produces a better live birth rate than achieved by blastocysts cultured on from thawed cleavage stage embryos. However freezing at the early cleavage stage and then thawing leads to better live birth rates than freezing at the blastocyst stage and then thawing for replacement (1). There has been better development of blastocysts after vitrification of cleavage stage embryos than was obtained by slow freezing of the earlier stage embryos, but as yet there has been no improvement in the pregnancy rates (2). Vitrified blastocysts which have been cryopreserved after preimplantation biopsy may have better outcomes than those subjected to slow freezing. More data are required on these comparisons.

Slow freezing and the newer technique of vitrification of oocytes have shown no differences in fertilisation, pregnancy and implantation rates (3). Data on infant outcome are reassuring for slow freezing of embryos, however neonatal outcome is required for slow freezing of blastocysts and vitrification of early cleavage stage embryos, blastocysts and oocytes. Long-term follow up studies of children are required for all cryopreservation techniques (4) to allay safety concerns.

Although replacement of frozen-thawed fertilised eggs has been used to increase cumulative pregnancy and live birth rates, it has only recently been proposed to supplement single embryo transfer in the initial cycle (5). The economic benefit may commend this approach and more data would be welcome.

Oocyte cryopreservation is being used more widely and its applications are increasing. It has been extended to aspiration of excess follicles at stimulated intrauterine stimulation. It is used in preference to embryo cryopreservation in countries where the laws are influenced by particular ethical or religious viewpoints. Further, it may be a means of conserving potential fertility in women with malignancy, although the restricted experience of subsequent use of such material has yet to provide a clear measure of its effectiveness. To the same end, conservation of ovarian tissue has led to a small number of live births following transplantation, but the practice has been quite limited.

There is scant information available on patient attitudes to freezing and how this may influence donation for reimplantation for other recipients or to research, particularly to stem cell research and subsequent regenerative medicine. These areas will need to develop further.

ANALYSIS OF THE SURVEY

Cryopreservation of fertilised eggs is covered by statute in 42 countries, although it is not referred to in the statutes of four countries, Armenia, Canada, Latvia and South Africa (Table 6.1). There is a variety of supplementary conditions in 24 countries (Table 6.2) covering initial informed consent, the licensing of the clinic, the state of the marriage or the health of the couple and the stage of embryo development in Germany and Switzerland. There is a range of durations for which fertilised egg storage is permitted (Table 6.3). It ranges from three years in Brazil and Montenegro to the more common five and ten years, but possibly longer in the U.K and Finland, up to the age of 50 in Spain, unlimited in Canada and not specified in the Czech Republic.

There are 30 countries that allow the cryopreservation of oocytes. Germany, Croatia and Italy permit the freezing of oocytes but not of embryos. Turkey appears to be the only country that does not allow the cryopreservation of oocytes. It is not mentioned in legislation in 27 other countries; it is practised in 42 countries; Albania, the Czech Republic, Iceland, Kosovo, Kuwait and Tunisia are the only other countries where it is not practised. There is a different range of duration permitted by statute for storage of cryopreserved oocytes in 15 countries commonly extending from 3 years to 10. In the U.K this may be lengthened to the woman's age of 55, but in France it lasts for the life of the patient. In 26 countries there are statutes which allow cryopreservaton of ovarian or testicular tissue, although no reference is made to it in a further 22 countries. In only one, Algeria, is it not permitted. It is practised in 42 countries, which include most of the countries in which the technique is not mentioned in statutes.

Guidelines have been developed in 42 countries relating to cryopreservation of fertilised eggs (Table 6.4) and in 22 of these there have been no statutes enacted, so the guidelines are the defining standards for practice. In 9 countries cryopreservation of fertilised eggs is not mentioned in guidelines. In 14 countries limits to the duration of storage have been specified. Oocyte cryopreservation guidelines have been established in 24 countries, but there is no mention of this in the guidelines of 13. The technique appears not be practised in 10 countries and in Cuba, Malaysia, Netherlands and Serbia it is not practised in spite of being permitted. There are guidelines specifically referring to the use of ovarian or testicular tissue in 13 countries, although it is practised in 22 countries. It is not practised in Belarus, China, Croatia, Ivory Coast, Nigeria, or Saudi Arabia, where it is not specifically allowed in guidelines.

There are 33 countries which have neither statutes nor guidelines relating to cryopreservation (Table 6.5). In 23 of these fertilised eggs are cryopreserved and in 9 oocytes are frozen. Ovarian or testicular tissue is cryopreserved in two, Romania and Uruguay.

SUMMARY

Cryopreservation has spread widely across the world. Few countries do not use the methods to preserve fertilised eggs, although fewer cryopreserve oocytes. Only three countries prohibit the preservation of embryos, but allow the storage of oocytes, There is moderate variation in the duration of storage of both fertilised eggs and oocytes. No data were sought about the use of vitrification rather than slow freezing. The consequences of storage of increasing numbers of fertilised eggs continues to raise concerns and sociological data on egg and embryo donors are limited. The ethical issues about the use of redundant embryos in developing regenerative medicine persist and emphasise the need to clarify informed consent about ultimate disposal at the time of cryopreservation. The results of methods for storage of gonadal tissues are sparse, but it will be quite some time before these data become available.

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Table 6.1
Regulation of cryopreservation by statute

Country	Fertilised eggs		Oocytes			Ovarian / testicular tissue		
	Allowed	Not mentioned	Allowed	Not mentioned	Practised	Allowed	Not mentioned	Practised
Abu Dhabi	+		+		+	+		+
Albania	+			+			+	
Algeria	+		+	+	+			
Armenia		+		+	+		+	
Australia	+		+	+	+	+		
Austria	+		+		+	+		+
Belgium	+		+		+	+		+
Brazil	+		+		+		+	+
Bulgaria	+		+		+	+		+
Canada		+		+	+		+	+
China	+		+	+	+		+	+
Colombia	+		+	+	+		+	+
Croatia			+		+		+	+
Czech Rep.	+			+		+		+
Denmark	+		+		+	+		+
Estonia	+		+		+		+	+
Finland	+		+		+	+		+
France	+		+		+	+		+
Germany			+		+	+		+
Greece	+		+		+	+		+
Hong Kong	+		+		+	+		+
Hungary	+			+	+		+	+
Iceland	+		+			+		+
Indonesia	+		+		+		+	+
Iran	+			+	+		+	+
Israel	+		+		+	+		+

Table 6.1
Continued

Italy				+			+		+	+
Korea	+				+		+		+	+
Kosovo	+				+				+	+
Kuwait	+			+				+		+
Latvia		+			+		+		+	+
Libya	+				+		+	+		
Montenegro	+			+			+	+		+
Netherlands	+			+			+	+		+
Norway	+			+			+	+		+
Portugal	+			+			+	+		+
Russia	+				+		+		+	
Slovakia	+				+		+	+		+
Slovenia	+			+			+	+		+
South Africa		+			+		+		+	+
Spain	+				+		+	+		+
Sweden	+			+			+	+		+
Switzerland	+			+			+	+		+
Taiwan	+				+		+		+	+
Tunisia	+				+				+	
Turkey	+							+		+
UK	+			+			+		+	+
USA	+						+		+	+
Vietnam	+				+		+		+	+

Table 6.2

Regulation of cryopreservation by statute

Country	Comment
Abu Dhabi	Requires written consent of both husbands and wives annually.
Argentina	Informed consent
Belgium	Must be a licensed centre
Chile	Informed consent
Czech Rep.	At the time of donation both partners must have negative sexually transmitted disease screens, and the embryos cannot be stored longer than 7 days after collection
Finland	Storage is subject to European Union Directive on Tissue Storage
France	Both partners must sign consents
Germany	Only eggs at the 2 pronuclear stage can be cryopreserved, embryo freezing is not allowed
Greece	After storage they can be used for research, therapeutic purposes or be destroyed following a specific decision of the Authority after application from the ART Unit. If there is a sufficient number of stored fertilized oocytes, no new cycle of IVF can be initiated before using those cryopreserved
Hong Kong	Legally married couples only
India	Couples must give specific consent to storage and use of their embryos. The Human Fertilization & Embryology Act, UK (1990), allows a 5-year storage period which India will also follow. Consent will be needed from the couple for the use of their stored embryos by other couples or for research in the event of their embryos not being used by themselves. This consent will not be required if the couple defaults on payment of maintenance charges after two reminders sent by registered post. Research on embryos will be restricted to the first fourteen days and will be conducted only with the permission of the owner of the embryos. No commercial transaction will be allowed for the use of embryos for research
Ireland	The guidelines only mention the "preservation of sperm or ova" but do not mention cryopreservation of fertilised oocytes or embryos. i.e. it states simply "There is no objection to the preservation of sperm or ova to be used subsequently on behalf of those from whom they were originally taken."
Japan	Cryopreservation should not be continued after the separation of the couple, and should not be continued beyond their reproductive age. A specific age limit is not mentioned
Kuwait	Cryopreservation of fertilized eggs is carried out in most IVF units without written guidelines, yet it requires a licence from the Ministry of Health
Libya	Written consent from the couple is required
Mexico	Informed consent is required

Table 6.2
Continued

Saudi Arabia	Signed consent by both wife and husband with staff witnesses are required
Sri Lanka	Grades 1 and 2 embryos only may be cryopreserved. Renewal of agreement every year is required.
Switzerland	Only zygote stage (described as preembryos in the law) storage
Taiwan	In case of divorce or death of one or both of the couple, the
Tunisia	Written consent is required
Turkey	The marriage should be intact for transfer of thawed embryo(s)
UK	Consent to storage must specify what may happen to any
USA	A small number of states have variable limits on embryo

Table 6.3
Duration of storage of cryopreserved fertilised eggs

Country	Duration
Abu Dhabi	5 years
Algeria	5 years
Australia	10 years
Austria	10 years
Belgium	5 years and possible extension
Brazil	3 years
Bulgaria	Recommendation is 5 years maximum
Canada	Unlimited
Czech Rep.	Not specified
Denmark	5 years
Estonia	7 years.
Finland	The limit for storage of donor cells/embryos is 15 years. For own use, as long as can safely be usedbut do not mention cryopreservation of fertilised oocytes or embryos. i.e. it states simply "There is no objection to the preservation of sperm or ova to be used subsequently on behalf of those from whom they were originally taken."
France	5 years
Greece	Storage for 5 years and can be renewed for another 5 years. After this period, they can be used for research or therapeutic purposes or destroyed, with a specific decision by the Authority after application from the ART Unit.
Hong Kong	10 years
Hungary	10 years
Iceland	10 years
Israel	10 years
Korea	Up to 5 years
Montenegro	3 years, after which a parent must renew for the next period of 3 years
Netherlands	5 years
Norway	5 years
Portugal	3 years
Slovenia	Five years with possible extension to a maximum of 10 years
Spain	No limit. It has to be determined by the specialist according to each woman's characteristics, although at 50 couples should decide
Sweden	5 years, exceptionally longer
Switzerland	5 years
Taiwan	10 years
Tunisia	5 years, renewable once
Turkey	5 years
UK	10 years initially but can be extended for 5 years in certain circumstances

Table 6.4
Regulation of cryopreservation by guidelines

Country	Fertilised eggs			Oocytes			Ovarian/testicular tissue		
	Allowed	Not mentioned	Limits	Allowed	Not mentioned	Practised	Allowed	Not mentioned	Practised
Argentina	+			+		+		+	+
Australia	+		+	+		+	+		+
Austria		+			+	+		+	+
Belarus		+			+			+	
Belgium		+	+		+	+		+	+
Chile	+		+	+		+		+	+
China		+		+		+			
Croatia				+		+		+	
Cuba	+			+			+		
Egypt	+		+	+		+		+	+
Ghana	+			+		+	+		+
Hong Kong	+		+	+		+		+	+
India	+		+	+		+	+		+
Iran	+			+		+	+		+
Ireland		+		+		+		+	+
Ivory Coast	+				+			+	
Japan	+			+		+		+	
Kuwait		+			+			+	+
Libya	+			+		+		+	
Malaysia	+		+	+				+	+
Mexico	+		+	+		+	+		+
Netherlands		+	+		+			+	+
New Zealand	+		+	+		+	+		
Nigeria		+			+			+	
Pakistan	+		+	+		+	+		
Philippines	+				+	+		+	

Table 6.5
Continued

Country	Fertilised eggs			Oocytes			Ovarian/testicular tissue		
	Allowed	Not mentioned	Limits	Allowed	Not mentioned	Practised	Allowed	Not mentioned	Practised
Poland	+				+	+		+	+
Saudi Arabia	+		+		+			+	
Serbia	+			+				+	+
Singapore	+		+	+		+	+		+
South Africa		+			+	+		+	+
Spain	+			+		+	+		
Sri Lanka	+		+		+			+	+
Thailand	+			+		+	+		+
Ukraine	+			+		+		+	+
USA	+				+	+	+		
Venezuela	+			+		+	+		

Table 6.5
No regulation of cryopreservation

Country	Fertilised eggs	Oocytes	Ovarian tissue
	Used	Used	Used
Bangladesh			
Bosnia	+		
Burkina Faso			
Cameroon	+		
Congo			
Dem Rep Congo			
Dominican Rep	+	+	
Ecuador	+		
El Salvador		+	
Ethiopia			
Jamaica	+		
Jordan	+		
Kenya	+		
Lebanon	+	+	
Lithuania	+		
Mali			
Morocco	+		
Nepal	+		
Nigeria	+		
Panama	+	+	
Paraguay	+	+	
Peru	+	+	
Romania	+	+	+
Senegal	+		
Sudan	+		
Togo	+		
Trinidad and Tobago	+	+	
Uganda	+		
Uruguay	+	+	+
Zimbabwe	+		

CHAPTER 7: Posthumous insemination

Although there has been almost no discussion in the literature on this issue in the past three years, there has been some activity about the legal requirements. The data in Table 7.1 divide the countries according to whether they have statutes and/or guidelines and those that have none. The use of posthumous insemination has spread somewhat in the 63 countries that have statutes or guidelines, but not at all in those 40 countries that have neither. The ethical issues were well discussed in the references in Surveillance 2007 and there appears to have been no fresh thinking on this subject.

ANALYSIS OF THE SURVEY

In some countries such as Abu Dhabi and Iceland, any stored sperm must be destroyed at death. This also applies to donor insemination in Norway and clinics must enquire regularly of a donor to determine whether he is still alive.

Valid written consent of the deceased is required in Argentina, Belgium, Latvia, Netherlands, New Zealand, Spain and the U.K together with some states of the United States. In the UK there must be a named partner. There are varied restrictions on the time after death by which treatment must be started or completed. It must be started within 6 months in Belgium and Greece and must be completed within one year in Spain, 2 years in Greece and Netherlands and within 3 years in Belgium. However in the Czech Republic single women cannot be treated by this method.

The legal situation is more complex in countries such as Brazil, Greece and Israel where any request must be considered by a court. In Japan, a woman had IVF soon after her husband died, but a subsequent action to confirm the paternity of the child was rejected by the court.

In India, at death the stored samples become the property of the deceased's legal nominee, although he cannot use them for insemination of a woman of his choice. If there are no claimants for the samples, they can be destroyed or donated for research.

SUMMARY

Posthumous insemination is not widely used, although the ethical background appears settled and it is more regulated than it was previously. Valid written consent is more frequently required and time limits for use of the stored samples are specified in some countries.

Table 7.1
Posthumous insemination

How ART is governed	Country	Statutes			Guidelines			None
		Allowed	Used	N ment.	Allowed	Used	N ment.	Used
Statutes ± guidelines	Abu Dhabi							
	Algeria							
	Armenia			+				
	Australia	+						
	Austria			+			+	
	Belgium	+	+			+	+	
	Brazil		+					
	Bulgaria							
	Canada							
	China							
	Croatia			+			+	
	Czech Rep.		+					
	Denmark							
	Estonia							
	Finland							
	France							
	Germany							
	Greece	+	+					
	Hong Kong							
	Hungary			+				
	Iceland							
	Indonesia			+				
	Iran			+				
	Italy							
	Korea							
	Kosovo			+				
	Latvia	+						
	Netherlands	+	+		+	+		
	Norway							
	Portugal							
	Russia		+	+				
	Slovakia			+				
	Slovenia							
	South Africa						+	
	Spain	+	+		+	+		
	Sweden							
	Switzerland							
	Taiwan							
	Tunisia							
	Turkey							
	UK	+	+					
	USA	+	+					

Table 7.1
Continued

How ART is governed	Country	Statutes			Guidelines			None
		Allowed	Used	N ment.	Allowed	Used	N ment.	Used
	Vietnam			+				
Guidelines	Belarus						+	
	Cyprus						+	
	Egypt							
	Ghana						+	
	India				+	+		
	Ireland						+	
	Ivory Coast							
	Japan					+		
	Malaysia						+	
	New Zealand				+	+		
	Pakistan						+	
	Philippines						+	
	Poland						+	
	Saudi Arabia							
	Serbia						+	
	Singapore							
	Sri Lanka							
	Thailand						+	
	Ukraine						+	
None	Argentina					+		
	Bangladesh							
	Bosnia							
	Burkina Faso							
	Cameroon							
	Chile							
	Colombia							
	Congo							
	Cuba							
	Dem Rep Congo							
	Dominican Rep.							
	Ecuador							
	El Salvador							
	Ethiopia							+
	Jamaica							+
	Jordan							
	Kenya							
	Kuwait							
	Lebanon							
	Libya							
	Lithuania							
	Mali							

Table 7.1
Continued

How ART is governed	Country	Statutes			Guidelines			None
		Allowed	Used	N ment.	Allowed	Used	N ment.	Used
	Mexico							
	Montenegro							
	Morocco							
	Namibia							
	Nepal							
	Nigeria							
	Panama							
	Paraguay							
	Peru							
	Romania							
	Senegal							
	Sudan							
	Swaziland							
	Togo							
	Trinidad/Tobago							
	Uganda							
	Uruguay							
	Venezuela							
	Zimbabwe							

Chapter 8: Donation

Sperm donation has been practised for half a century and is widely used. It has been standard practice to test for HIV and other sexually transmitted diseases, cryopreserve the samples for 6 months and then retest the samples before use. A report by the ASRM Practice Committee in 2008 provides the latest recommendations for optimal screening and testing for sexually transmitted diseases, genetic diseases and psychological assessment of all gametes and donors (1). Updated guidelines have also been provided in the United Kingdom (2). The practice of oocyte donation began with the advent of IVF using freshly harvested oocytes. This was expanded later to the use of vitrified oocytes as this procedure was further refined. These technologies are now well established and the number of offspring from these procedures is growing yearly. Embryo donation using either fresh or freshly thawed, frozen embryos is less widely practised. Embryo donation to a recipient is the choice often reached by couples with supernumerary frozen embryos, but there is increasing acceptance of donation for stem cell research. Gamete donation is motivated by several reasons including altruism, compensation, research and the desire to use a surrogate. While the interests of the offspring and parents are often stressed there also are important interests, obligations and rights of the donor in gamete donation. These have been carefully outlined in a recent Ethics Committee Report of the ASRM (3).

This survey examined sperm donation for both IVF and non-IVF indications, oocyte donation and embryo donation (Tables 8.1 and 8.2). The latter was not included in the 2007 IFFS study. Tissue donation, in very limited use, was not studied in the current survey.

ANALYSIS OF THE SURVEY

Countries With Statutes

There were 50 countries governed by statutes in this survey. It was of interest to note the countries that do not permit donation. Donor sperm for use in IVF is not allowed in 10 of 50 (20%). In the majority of these it is because they conform to Islamic law. Donor sperm for non-IVF purposes is not allowed in 9 of 50 (18%). Austria does not allow sperm donation for use in IVF but does allow it for non-IVF infertility. The law does not mention the use of sperm in non-IVF infertility in 8 countries. Oocyte donation is not allowed in 13 countries (26%). Of note, in two countries, Germany and Norway, oocyte donation is not allowed, although sperm may be donated for IVF. Embryo donation is allowed in 22 of 50 (44%) of the countries surveyed, not allowed in 22 of 50 (44%), not mentioned in the statute in five and in a sixth the respondent was uncertain.

The statutes in most countries stipulate the degree of screening, generally the current recommendations, that is required before gamete donation for IVF (Table 8.3). In at least 4 countries, Germany, Hungary, Switzerland and Hong Kong, the recipient must be married. In Montenegro it is used in single women and in Estonia it is used in lesbian and single women. In Slovenia it is used only to prevent severe hereditary disease when the problem cannot be solved by PGD. In two countries, Czech Republic and Russia, the statute stipulates the donor must be under age 40 and in Latvia under age 45.

Several countries specifically prohibit financial compensation to the donor. These include Canada, Greece, Korea, Vietnam, France and The Netherlands (Tables 8.3 and 8.4). Only limited compensation is allowed in Taiwan. The number of offspring permitted by a donor varies considerably in the statutes. Some of these are as follows: Montenegro 2, Latvia 3 except for twins, Bulgaria 5, Spain 6, Greece and the UK, 10. In Slovenia the indication for donation must be approved by a national committee. In the USA the Food and Drug (FDA) agency regulates donor eligibility. In Portugal only sperm provided by an authorized sperm bank may be used and in Montenegro all donor sperm are imported from the EU sperm bank since they have no sperm bank.

With regard to donor sperm for non-IVF infertility in countries under statutes, there is a stipulation that units doing the infertility procedures in South Africa and the UK must be licensed (Table 8.4). In Norway a new law enacted in January 2009 allows homosexuals to marry and be accepted as infertility patients. Sweden requires couples to have been stable for one or more years before treatment.

Donors for oocyte donation in countries governed by statutes must be under age 35 in six countries. These are Czech Republic, Hungary, Latvia, Russia and Vietnam (Table 8.5). In Bulgaria they must be under age 34. No payment for oocytes is permitted in 9 countries. Of these, in Korea and Taiwan, payment is allowed specifically for expenses incurred. Hong Kong prohibits commercial advertising. Mandatory counseling is required in Croatia and The Netherlands. Belgium prohibits eugenic application of these embryos and there may be no sex selection. Genetic and serological testing is stipulated by statute in some countries. While there may be up to 5 live births per donor in Bulgaria, in Taiwan this is limited to one.

The law with regard to embryo donation requires a certificate of infertility and court permission in Iran (Table 8.6). Genetic and serological testing as well as counseling is specifically stipulated in a few countries. No financial compensation is permitted in Canada and France. In Greece the couple may only donate the supernumerary embryos they themselves will not use. In Hungary, with signed consent, they may be used for IVF and also for scientific purposes. Embryo donation is not mentioned in the statutes of Albania, Columbia, Korea, Latvia and Romania.

Countries With Guidelines

There were 39 countries practising under guidelines in this survey. Sperm donation for IVF is not allowed in 11 of 39 (28%) counties. Sperm donation for non-IVF purposes is used in 25 of 39 (64%) countries. In two thirds of the countries there is no mention in the guidelines of sperm for non-IVF purposes. This is specifically mentioned in only 12 of 39 (31%). Oocyte donation is not allowed in 10 of 39 (26%) countries and not mentioned in 5. Embryo donation is not allowed in 12 of 39 (31%) countries and not mentioned in 5.

The guidelines regarding donor sperm used in IVF specify the standard screening and guaranteeing of the specimens in many countries (Table 8.7). In Argentina and Cyprus there may be no financial compensation. In Japan the recipient must be married. Regarding donor sperm for non-IVF infertility, in Saudi Arabia only the parent's gametes may be used and they must have permission from Islamic

authorities. In Ireland all sperm are imported from outside the country. In Japan the recipient must be married.

Guidelines for use of donor eggs in IVF specify that there may be no financial compensation in Argentina, Cyprus, Hong Kong and Singapore and South Africa limits compensation (Table 8.8). Compensation is permitted in the USA (4). Informed consent is stressed in Argentina, Chile, Mexico and Thailand. Donors in Argentina must be age 21 to 35, in Ghana 20 to 32 years and in Sri Lanka under age 35. This is not practised in Japan as ART guidelines limit this practice to married couples. Appropriate screening is stipulated in Chile, India, Nigeria, South Africa and the USA. In Ireland the donor must undergo counseling. Oocyte donation is not mentioned in the guidelines of Belarus, Belgium, Cuba, Japan and The Netherlands.

Guidelines for the use of donor embryos in Singapore require that the husband be azoospermic and the wife have ovarian failure (Table 8.9). New Zealand requires the approval by an Ethics Committee on ART and in Vietnam there must be agreement on this by both husband and wife.

Countries With Neither Statutes nor Guidelines

There were 31 countries practising under neither statutes nor guidelines. Sperm donation in IVF as well as in non-IVF infertility is used in 20 of 31 (65%) of these countries. Oocyte donation is used in 19 of 31 (61%) and embryo donation in 12 of 31 (39%).

Donor sperm in IVF, is used primarily for male infertility. However it is also used in single women in the Dominican Republic, Ecuador, El Salvador and Uruguay. Its use in lesbian couples was cited in Trinidad and Tobago and in Uruguay. In the Republic of Congo the husband's brother is usually the donor. In Nepal counseling is very important because in this country cast and religion are of much concern in dealing with donor samples.

In non-Muslin countries where insemination is permitted, donor sperm in non-IVF infertility is used primarily for conventional intrauterine insemination. It is used for single women in El Salvador and Trinidad and Tobago. There are among these countries some that have special directives, other than IVF directives, that deal with donor sperm in non-IVF infertility (Table 8.10). These range from proper screening and financial compensation to issues of record keeping and anonymity.

Oocyte donation was cited as being used primarily for premature ovarian failure and menopause in Chile, Columbia, Ecuador, El Salvador, Mali, Nigeria, Peru, Togo, Trinidad and Tobago and Uruguay.

Embryo donation is used in special circumstances in several countries. In Nigeria it is used in older patients and in Uruguay patients are accepted for it up to age 50. In Columbia embryos may be donated voluntarily and in Peru donation may occur between patients. In Ecuador it is used for poor responders and male azoospermia while in Togo embryos may be frozen and stored when patients voluntarily delay implantation.

Many respondents to the survey questions on donation made comments regarding anonymity or the requiring of identifying information. These will be addressed in the following chapter on Anonymity.

SUMMARY

Gamete donation is practised worldwide. Religious and cultural traditions greatly influence its use. In most countries that follow Islamic law donation is not allowed or is restricted. Sperm donation is not allowed in approximately one fifth of countries under statutes. Oocyte donation is not allowed in one fourth of them. Embryo donation is not allowed in nearly half of these countries. Gamete donation, sperm, oocyte and embryo, is practised in nearly two thirds of countries under guidelines. Similarly, in counties that have neither statutes nor guidelines, sperm and oocyte donation is practised in nearly two thirds of them and embryo donation to a slightly lesser extent.

Recommended optimal screening and testing of gametes and donors is becoming more widely accepted and required. More countries are requiring licensing and regulation of sperm banks and infertility centres. Compensation, influenced by moral and ethical consideration, is far from being standardised and continues to be a challenging issue. While many countries prohibit financial compensation of donors, others allow compensation for expenses incurred and yet others do allow some compensation.

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Table 8.1
Donation of gametes

How ART is governed	Country	Sperm donation						Donor sperm in non-IVF infertility		Oocyte Donation		Embryo Donation		
		IVF			Non-IVF									
		Allowed	Not Allowed	Not Mention.	Allowed	Not Allowed	Used	Yes	No	Allowed	Not Allowed	Allowed	Not Allowed	Not Mention.
Statutes	Abu Dhabi		+			+					+		+	+
	Albania	+					+			+				
	Algeria		+			+					+		+	
	Armenia	+			+		+			+		+		
	Australia	+			+		+	+				+		
	Austria	+			+		+		+				+	
	Belgium	+			+		+		+	+		+		
	Brazil	+			+		+			+		+		
	Bulgaria	+				+				+		+		
	Canada	+			+		+			+		+		
	China	+				+			+	+			+	
	Columbia	+			+		+			+				+
	Croatia	+							+	+			+	
	Czech Rep	+			+		+			+				
	Denmark	+			+		+						+	
	Estonia	+			+		+			+		+		
	Finland	+			+		+			+		+		
	France	+			+		+			+		+		
	Germany	+			+		+				+		+	
	Greece	+			+		+			+		+		
	HongKong	+			+		+		+	+		+		
	Hungary	+			+		+			+		+		
	Iceland	+			+		+			+			+	

Table 8.1
Continued

How ART is governed	Country	Sperm donation						Donor sperm in non-IVF infertility		Oocyte Donation		Embryo Donation		
		IVF			Non-IVF									
		Allowed	Not Allowed	Not Mention.	Allowed	Not Allowed	Used	Yes	No	Allowed	Not Allowed	Allowed	Not Allowed	Not Mention.
	Israel	+					+			+			+	
	Italy		+				+				+		+	
	Korea	+					+			+				+
	Kosovo	+			+					+			+	
	Kuwait		+			+			+		+		+	
	Latvia	+					+			+				+
	Libya		+			+			+		+		+	
	Montenegro	+					+			+			+	
	Netherlands	+			+		+	+		+		+		
	Norway	+			+		+				+		+	
	Portugal	+			+		+			+		+		
	Romania	+		+			+							+
	Russia	+			+		+			+		+		
	Slovakia	+			+		+			+		+		
	Slovenia	+					+			+			+	
	SouthAfrica	+			+		+			+		+		
	Spain	+			+		+			+		+		
	Sweden	+			+		+			+			+	
	Switzerland	+			+		+				+		+	
	Taiwan	+					+			+			+	
	Tunisia		+				+				+		+	
	Turkey		+			+					+		+	
	UK	+			+		+			+		+		

Table 8.1
Continued

How ART is governed	Country	Sperm donation						Donor sperm in non-IVF infertility		Oocyte Donation		Embryo Donation		
		IVF			Non-IVF									
		Allowed	Not Allowed	Not Mention.	Allowed	Not Allowed	Used	Yes	No	Allowed	Not Allowed	Allowed	Not Allowed	Not Mention.
	Tunisia		+				+				+		+	
	Turkey		+			+					+		+	
	UK	+			+		+			+		+		
	USA	+			+		+		+	+		+		
	Vietnam	+			+		+	+		+		+		
Guidelines	Argentina	+					+		+	+				
	Australia	+			+		+	+		+		+		
	Austria		+						+	+			+	
	Belarus	+					+		+				+	
	Belgium			+			+					+		
	Chile	+					+		+	+		+		
	China			+					+	+			+	
	Croatia	+							+	+			+	
	Cuba		+						+					
	Cyprus	+							+	+		+		
	Egypt		+						+		+		+	
	Ghana	+					+		+	+		+		
	HongKong	+					+		+	+		+		
	India	+					+		+	+		+		
	Iran		+						+	+		+		
	Ireland	+					+		+	+		+		
	Ivory Coast	+					+		+	+		+		
	Japan		+				+	+					+	

Table 8.1
Continued

How ART is governed	Country	Sperm donation						Donor sperm in non-IVF infertility		Oocyte donation		Embryo Donation		
		IVF			Non-IVF									
		Allowed	Not Allowed	Not Mention.	Allowed	Not Allowed	Used	Yes	No	Allowed	Not Allowed	Allowed	Not Allowed	Not Mention.
	Kuwait		+						+		+			
	Libya		+						+		+		+	
	Malaysia		+						+		+		+	
	Mexico	+					+		+		+	+		
	Netherlands			+			+	+						
	NewZealand	+					+	+		+		+		
	Nigeria	+					+		+	+		+		
	Pakistan		+						+		+		+	
	Philippines		+						+		+		+	
	Poland	+					+	+		+				
	SaudiArabia		+						+		+		+	
	Serbia	+							+	+			+	
	Singapore	+					+	+		+		+		
	SouthAfrica	+					+	+		+		+		
	Spain	+					+	+		+		+		
	SriLanka	+					+		+	+		+		
	Thailand	+					+	+		+		+		
	Ukraine	+					+	+		+		+		
	USA	+					+		+	+		+		
	Venezuela	+					+		+			+		
	Vietnam						+	+		+		+		

Table 8.2
Donation of gametes

How ART is governed	Country	Sperm donation				Oocyte donation		Embryo donation	
		in IVF		in non-IVF infertility					
		Used	Not used	Used	Not used	Used	Not used	Used	Not used
Governed by neither statutes nor guidelines	Bangladesh	+		+			+		+
	Bosnia		+				+		
	Burkina Faso		+		+		+		+
	Camaroon	+		+		+		+	
	D R of Congo	+			+		+		+
	Dominican Rep	+		+		+			+
	Ecuador	+		+		+		+	
	ElSalvador	+		+		+			+
	Ethiopia		+		+		+		+
	Jamaica	+			+	+			
	Jordan		+		+		+		+
	Kenya	+		+		+			+
	Lebanon		+		+	+			
	Libya		+		+		+		+
	Lithuania		+		+		+		+
	Mali	+		+		+			+
	Namibia		+		+				+
	Nepal	+		+		+		+	
	Nigeria	+		+		+		+	
	Panama	+		+		+		+	
	Paraguay	+		+		+		+	
	Peru	+		+		+		+	
	Romania	+				+		+	

Table 8.2
Continued

How ART is governed	Country	Sperm donation				Oocyte donation		Embryo donation	
		in IVF		in non-IVF infertility					
		Used	Not used	Used	Not used	Used	Not used	Used	Not used
	Senegal		+		+		+		+
	Sudan		+		+		+		+
	Swaziland		+		+		+		+
	Togo	+		+		+		+	
	Trinidad & Tobago	+		+		+			+
	Uganda	+		+		+		+	
	Uruguay	+		+		+		+	
	Zimbabwe					+		+	

Table 8.3
Donation of gametes

Restrictions to IVF law that allow sperm to be used in IVF	
Country	**Comment**
Albania	Medical control of donor
Armenia	Donor must be tested for HIV/STD
Australia	There are different State laws governing this.It is a national requirement that all donors must give their consent to release of identifying information when the child reaches age 18
Belgium	Must follow European guidelines for tissue and gamete handling
Brazil	Anonymous donor, not commercially involved, with cryopreserved samples negative for sexually transmitted diseases and Hepatitis B and C
Bulgaria	Anonymous donor, healthy, good quality semen, without sexually transmitted diseases, maximum of 5 children per donor
Canada	Testing of donor must be Canadian compliant, no donor financial compensation
China	Gametes taken from sperm bank
Columbia	Follow ASRM guidelines
Croatia	Couple must have legal and psychological counseling
Czech Rep	Anonymous donor, negative genetic exam, negative serological testing including STD, HIV, Hepatitis B and C, Chlamydia, and repeated negativity of STD 6 months after donation, be under age 40
Denmark	Anonymous donor
Finland	Donor must be registered and identifying information available after child reaches 18 years
France	Usual requirements for the use of donor sperm
Germany	Recipient must be married, donor data stored, anonymous donation is not allowed
Greece	Consent, no payment but compensation for expenses, anonymity, proper screening, less than 10 children per donor, not more than one donor per cycle.
Hong Kong	ART centre must send identifying information of donor to Council on Human Reproductive Technology
Hungary	Married recipient, donor negative genetic exam, normal semen analysis
Korea	No donor compensation with money or property
Kosovo	Donor must be known and tested
Latvia	Maximum of 3 children per donor except twins, age of donor 18-45 years, healthy according to Regulation of Cabinet Ministers
Montenegro	All donor sperm imported from EU sperm bank since we have no sperm bank, sperm serological testing negative 6 months after donation, maximum 2 children per donor
Netherlands	Donor registered centrally, identifying information available to children later
Norway	Donor anonymous until child age 18

Table 8.3
Continued

Restrictions to IVF law that allow sperm to be used in IVF	
Country	**Comment**
Portugal	Donor sperm provided only by authorized sperm banks
Russia	Donor sperm quarantined for 6 months and rechecked for STD, donor must be healthy, screened for HIV, Hepatitis B, and C and age 20-40 years
Slovenia	Indications must be approved by National Committee for Biomedically Assisted Procreation
Spain	Donor anonymous. Maximum 6 children per donor
Sweden	Not with egg donation in the same treatment
Switzerland	Recipient must be married
Taiwan	Anonymous donor but may use brother, only limited reimbursement (usually around USD 150-250), one live child per donor
UK	Since April 2005, donor anonymous only until child is age 18. Donor used for a maximum of 10 family groups unless donor stipulates a lower number
USA	The FDA (Food and Drug Agency) regulates donor eligibility which requires extensive screening of all gametes (and gestational carriers indirectly) for sexual infection
Vietnam	Donor anonymous, no financial interest

Table 8.4
Donation of gametes

Country	Restrictions by law to use of donor sperm in non-IVF infertility
Armenia	Donor must be tested for HIV/STD
Austria	Couples have signed informed consent form at notary office or official court office
Belgium	European guidelines for tissue and gamete handling must be followed
China	Donor sperm must be from a sperm bank
Columbia	We follow ASRM guidelines
Czech Rep	Same criteria as for intrauterine insemination
Estonia	Used also in lesbian and single women
Finland	Donors must be registered with identification available after children reach age 18
France	Anonymous, no financial compensation
Germany	Donor data stored, anonymous donation not allowed, recipient must be married
Greece	Anonymity, no financial compensation expect for expenses, proper screening, less than 10 children per donor, not more than one donor per cycle
Hong Kong	Married couples only
Kosovo	Donor must be known and properly tested
Montenegro	Used also in single women.
Netherlands	Donor registered, not anonymous, no financial compensation except for expenses
Norway	Donor must be known, new law 1-1-09 allows homosexuals to marry and be accepted as parents
Russia	Donor age 20-40, good health, negative serological tests including HIV, Hepatitis B ,Hepatitis C and 6 months quarantine with rescreening
Slovenia	Indications approved by national committee for Biomedically Assisted Procreation. Used only to prevent severe hereditary disease when problem canot be solved with PGD
South Africa	Several requirements as specified by Human Tissue Act. Unit must be registered with the Dept. of Health, procedure performed by a gynaecologist, certain documents and records must be kept
Spain	Anonymity. The Spanish law 14/2006 (ART law) is not only for IVF
Sweden	Stable couple for one or more years
Switzerland	Married couples only
Taiwan	Every case is registered at the Central Office before treatment
UK	Donor sperm may be used in any infertility procedure in a licensed centre
USA	FDA requirements apply

Table 8.5
Donation of gametes
(Note: many respondents commented on anonymity here - see Anonymity chapter)

Country	Special requirements if the law allows eggs to be used in IVF
Australia	No payment allowed. Consent to release identifying information when offspring reach 18 years
Belgium	No payment. No eugenic applications. No sex selection. Anonymous
Bulgaria	Donor under age 34, healthy, with one healthy child. Donor can be used until five children are born
Canada	No payment allowed
Croatia	Couples must be counseled, have written approval from psychologists and lawyers
Czech Rep	Donor under age 35 , normal genetic and serological testing
Finland	Donors registered with anonymity only until offspring age 18
France	No payment, anonymity
Greece	No payment except for expenses, (other limitations as under sperm donation)
Hong Kong	No commercial advertising
Hungary	Donor under age 35, may be a close relative but must have declaration signed by a notary, minimum of one previous delivery.
Korea	No payment except for expenses, up to 3 cycles at 6 month intervals
Latvia	Donor age 18-35
Netherlands	Donor registered, not anonymous. Embryo Law states indications for treatment, donor requirements, mandatory counseling
Russia	Donor age 20-35, negative serological testing
South Africa	No more than 6 children born to same donor, anonymous
Taiwan	No payment but reimbursement allowed around USD $3000. One live birth per donor, registered at central office
USA	Donors may be compensated
Vietnam	Donor age up to 35, recipient age up to 45

Table 8.6.
Donation of gametes
(Note: many respondents commented on anonymity here - see Anonymity chapter)

Country	Special requirements If the law allows donor embryos
Armenia	Informed consent needed
Australia	Same comments as noted for sperm and egg donation
Belgium	Donating couple must undergo serological and karyotype screening
Canada	No financial compensation
Czech Rep	Donating couple must undergo serological and genetic screening
Finland	Donor registration
France	No financial compensation, both partners must be sterile, anonymous
Greece	May donate only supernumerary embryos couple will not use. Other comments same as noted in sperm and egg donation
Hong Kong	No commercial advertising
Hungary	Signed consent for donation of supernumerary embryos. May be used for other IVF patients or scientific purposes
Iran	Require certificate of infertility, court permission, good health of both donating and recipient couples
Netherlands	Donors registered, not anonymous, donors and recipients must undergo counseling, all requests approved by Medical Ethics Committee
Portugal	Informed consent and screening
Russia	Donors must be age 20-35, in good health, have at least one child
Spain	Same comments as noted for sperm and egg donation
USA	Same comments as noted for sperm and egg donation

Table 8.7
Donation of gametes

Country	Restrictions in guidelines to donor sperm used in IVF
Argentina	Consent form by donor and recipient, donor agreeable to offspring being informed of genetic issues but otherwise anonymous, no financial gain to donor, limit on number of children created
Cyprus	No financial compensation. Specimen studied serologically, including HIV and Hepatitis. Quarantined for 6 months and retested.
Hong Kong	The ART centre has to send identifying information on donor to Council on Human Reproductive Technology
India	Specimen studied serologically for STD and Hepatitis B and C Separately accredited ART banks established that store and quarantine specimens for 3 months. Specimen and donor retested.
Ireland	Source of specimen/donor must be carefully studied.
Japan	Recipient must be married
Poland	Adequate screening
Singapore	Anonymous donor
Sri Lanka	Anonymous donor
Thailand	Adequate screening

Table 8.8
Donation of gametes

Country	Guideline restrictions for donor eggs used in IVF
Argentina	Donor age 21 to 35 years. No compensation
Chile	Informed consent with negative serological testing
Ghana	Donor age 20 to 32 years
Hong Kong	No financial compensation
India	Donor registered in ART bank, anonymous, may donate only 6 times, negative testing for HIV and Hepatitis B and C
Ireland	Donor must undergo counseling
Japan	Not practised since ART guidelines limited to married couples
Mexico	Informed consent
Nigeria	Negative serological testing including HIV
Singapore	No financial compensation
South Africa	Specific guidelines establish requirements for selection, screening and limits to compensation
Sri Lanka	Donor age under 35, had one previous pregnancy, in good health
USA	Follow FDA regulations and established SART/ASRM guidelines

Table 8.9
Donation of gametes

Country	Special requirements if guidelines allow donor embryos
Argentina	Informed consent by donor and recipients, anonymity, no compensation
Chile	Informed consent
Hong Kong	No commercial dealing
India	Donor relinquishes in writing all parental rights to offspring May donate supernumerary embryos, anonymity
Mexico	Informed consent
New Zealand	Approval by Ethics committee on ART no financial compensation
Singapore	Husband must be azoospermic and wife have ovarian failure
Thailand	Informed consent
Vietnam	Agreement of both husband and wife

Table 8.10
Donation of gametes
Directives other than IVF guidelines that refer to the use of donor sperm in non-IVF infertility in nations governed by neither laws or guidelines

Country	Comments
India	Suitable records kept at central sperm bank on all donors for 10 years. Semen samples tested and quarantined for 3 months and retested before release.
Japan	No financial compensation. Anonymous. Recipients must be married. Maximum number born from one donor is 10
New Zealand	No valuable consideration for donors. Donor must be identifiable to parents any time after birth and to the child at age 18
Nigeria	Semen sample quarantined for 6 months and retested before use
Philippines	Registration required of all IUI-related pregnancies and births
Thailand	Informed consent forms signed and legal status established for any offspring born from the use of donor sperm

Chapter 9: Anonymity

In the past the practice of gamete donation, particularly sperm donation, has been shrouded in secrecy largely because of the stigma associated with male factor infertility. Legislation requiring donors to provide information on themselves to parents and to offspring over age 18 was first introduced in Victoria, Australia and Sweden in the 1980's (1). Since then the importance of knowing one's genetic background has gained public awareness and the ethics of anonymity of gamete donors has been challenged in many countries. As a result, there are today at least 10 countries with statutes requiring donor identification to offspring. Most countries that have enacted this legislation also prohibit or limit donor compensation. From this has evolved the principle of non-commercial, voluntary and altruistic donation seen most notably in Europe and the UK, Canada and Australia. There are now also, as has been shown in this survey, at least 9 countries practising under guidelines that allow offspring to be provided with identifying information. In the USA where there are no statues, anonymity has been assumed in the past but this has been successfully challenged in the courts in recent years. Because of public awareness of genetic implications, open-identity sperm programmes are rising in the USA (2).

The lack of anonymity has become a major factor in the reduced availability of gametes in a number of countries. In the United Kingdom one study showed this reduced by one half the number of those willing to consider donation in all age groups (3). In the Netherlands, during the debate over abolition of donor anonymity, over one 15 year period, semen donors decreased over 70% and the number of semen banks decreased by 50% (4). The resulting shortage of donor gametes, particularly of oocytes, has led to reproductive travelling and its inherent perils. In such cases the infertile couples travel to countries where there is gamete availability. Swedish law provides for offspring to obtain identifying information while Denmark protects anonymity. Interestingly, one study of Swedish sperm donors showed that annually more than 250 donors, themselves, driven by altruism, travel to Denmark where there is a shortage of donors (5).

Many countries have set limits to the number of offspring an anonymous sperm donor may father because of the issue of consanguinity and unwitting sibling mating. These numbers vary considerably. As reported in the preceding chapter on donation, the laws in Montenegro allow 2 offspring per donor, Latvia 3 except twins, Bulgaria 5, Spain 6, Greece and the UK 10. There is a recognized need to develop a new internationally recognized and applicable model for calculating limits (6).

ANALYSIS OF THE SURVEY

The survey on anonymity of gamete donors analyzed data from 52 countries. In 18 of 52 (35%) there is some provision for providing information to the offspring. Of these 52 countries, 20 are practising under statues, 17 under guidelines and 15 under both statutes and guidelines (Tables 9.1 & 9. 2). There are 10 of 35 (29%) countries with statutes that on request provide offspring with *identifying* information. These are Brazil, Germany, Montenegro, Slovakia, Sweden, Australia, Finland, Hong Kong, the Netherlands and the UK. There 5 of 15 (33%) countries with guidelines, Australia, Argentina, New Zealand, USA and Vietnam, that do so. In total there are 14 of 52 (27%) countries with directives for providing donor *identifying* information. The 15th, Australia, has laws and guidelines both providing for this.

Some countries provide *non-identifying* information. The 9 of 32 (26%) countries with these guidelines are Ghana, India, Ivory Coast, Mexico, Venezuela, Australia, New Zealand, Spain and USA. Both Spanish and Vietnamese laws and guidelines prohibit providing *identifying* information but *non-identifying* information is allowed by Spanish guidelines and Vietnamese guidelines do not mention this.

In general the laws and guidelines allowing donor information stipulate it can be made available to offspring after the age of 18. For this reason donors and sperm banks must be registered in most countries. In Chile, where guidelines make no mention of providing information, this is available only by court order (Table 9.3). In Argentina too, where the guidelines do allow for providing identifying information, it requires a court order to release information. In Brazil, where the law allows identifying information to be provided, it is limited to very serious health situations. In South Africa, where both identifying and non-identifying information is prohibited by both the law and guidelines, it would require a court order to disclose information. To date this has not occurred. In Thailand, where guidelines make no mention of providing information, donors are anonymous and cannot be traced. In the USA identifying information is provided only if consent and agreement has been made in advance.

Also surveyed were 30 countries which have neither statutes nor guidelines. Of these, in 8 of 30 (27%), it is customary to provide the offspring with *non-identifying* information about the donor. These countries are Cameroon, Columbia, Democratic Republic of the Congo, El Salvador, Jamaica, Peru, Togo and Uruguay.

SUMMARY

As discussed above, greater understanding and awareness of genetic and hereditary issues has brought about changes in laws and guidelines for providing donor information to the parents and offspring. However, the number of countries that have addressed this issue has not changed significantly since Surveillance 2007. At that time 18 of the 54 countries surveyed had such provisions. This has not changed from the 18 of 52 countries in the current survey. The significant limiting of donor compensation and lack of anonymity continue to make recruitment of donors difficult in many countries. The number of donor offspring allowed by law varies widely among countries. There is a need to establish an internationally recognized model for calculating the limits allowed.

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Table 9.1
Donor Anonymity

How ART is governed	Country	Offspring provided on request with donor identifying information			Offspring provided on request with donor non-identifying information			Offspring provided on request with donor identifying information			Offspring provided on request with donor non-identifying information		
		Yes	No	Not mentioned	Yes	No	Not mentioned	Yes	No	Not mentioned	Yes	No	Not mentioned
Governed by statutes	Armenia			+	+								
	Belgium		+			+							
	Brazil	+				+							
	Bulgaria		+			+							
	Canada			+			+						
	Denmark		+			+							
	Estonia		+		+								
	France		+			+							
	Germany	+			+								
	Greece		+		+								
	Hungary		+		+								
	Iran		+		+								
	Israel		+			+							
	Korea			+			+						
	Latvia		+		+								
	Montenegro	+				+							
	Portugal		+		+								
	Slovakia	+			+								
	Sweden	+					+						
	Taiwan			+			+						
Covered by guidelines	Argentina							+					+
	Belarus								+			+	

Table 9.1
Continued

How ART is governed	Country	Offspring provided on request with donor identifying information			Offspring provided on request with donor non-identifying information			Offspring provided on request with donor identifying information			Offspring provided on request with donor non -identifying information		
		Yes	No	Not mentioned	Yes	No	Not mentioned	Yes	No	Not mentioned	Yes	No	Not mentioned
	Chile									+			+
	Cuba									+			+
	Ghana								+		+		
	India								+		+		
	Ireland									+			+
	Japan									+			+
	Kuwait											+	
	Mexico								+		+		
	Poland									+			+
	Saudi Arabia									+			+
	Sri Lanka								+				+
	Thailand									+			+
	Ukraine								+			+	
	Venezuela									+	+		
By statutes	Australia	+						+			+		
and by	Austria				+					+			+
guidelines	China								+			+	
	Czech Rep		+										
	Finland	+			+								
	Hong Kong	+					+		+			+	
	Netherlands	+			+								
	New Zealand							+			+		
	Singapore									+			+

Table 9.1
Continued

How ART is governed	Country	Offspring provided on request with donor identifying information			Offspring provided on request with donor non-identifying information			Offspring provided on request with donor identifying information			Offspring provided on request with donor non-identifying information		
		Yes	No	Not mentioned	Yes	No	Not mentioned	Yes	No	Not mentioned	Yes	No	Not mentioned
	South Africa		+		+				+			+	
	Spain		+			+			+		+		
	UK	+			+								
	USA			+			+	+			+		
	Vietnam		+			+		+					+

Table 9.2
Donor Anonymity

How ART is governed	Country	Offspring provided on request with donor	
		Customary	Not customary
Governed by neither statutes nor guidelines	Bangladesh		+
	Bosnia		
	Burkina Faso		+
	Cameroon	+	
	Columbia	+	
	Dem Rep Congo	+	
	Dominican Rep		+
	Ecuador		+
	El Salvador	+	
	Ethiopia		
	Jamaica	+	
	Kenya		+
	Lebanon		+
	Libya		
	Mali		+
	Montenegro		
	Morocco		+
	Nepal		+
	Nigeria		+
	Panama		+
	Paraguay		+
	Peru	+	
	Romania		
	Senegal		+
	Swaziland		+
	Togo	+	
	Trinidad/Tobago		+
	Uganda		+
	Uruguay	+	

Table 9.3
Modifications to anonymity

Country	Main modifications to statutes
Australia	Identifying information must be available once offspring are age 18
Brazil	Identifying information must be disclosed in serious health situations
Finland	Donors must be registered. Information available once offspring are age 18
Greece	Donor medical information kept in secret archives of ART authorities
Iran	Donors must be screened medically but remain unidentified to recipients. Identifying information provided only if couple has legal eligibility certified by the court
UK	Not before 2023, as law amended in 2005
USA	Efforts are under way to establish a voluntary Gamete Donor Registry

Country	Main modifications to guidelines
Argentina	Offspring of donated gametes can request information from legal authorities upon reaching adulthood
Chile	Donor and recipient remain anonymous with no financial compensation
India	Identifying information provided only by court order
Spain	Donor's age and blood type revealed to parents
Sri Lanka	Parents of offspring are provided with donor's non-identifying information about the donor
Thailand	Usually gamete donation is anonymous and it is not possible to trace the donor
USA	Identifying information only allowed if consent and agreement has been provided by court order obtained in advance

Chapter 10: Micromanipulation

Intracytoplasmic sperm injection (ICSI), first introduced in 1993, is the treatment of choice for a variety of male factor infertility issues. These include obstructive and non-obstructive azoospermia and it is used for those who require preimplantation genetic diagnosis (PGD). Because men with severely impaired spermatogenesis often have a high degree of Y-chromosomal microdeletions as well as other karyotypic anomalies, genetic evaluation is required before ICSI. The procedure has been found to be safe. However, offspring have a small statistically significant increase in congenital anomalies, chiefly hypospadias. In severe azoospermia there has been shown to be a direct transmission of Y chromosome microdeletions to the offspring. Long term follow up studies are still critically needed. These are ongoing in several centres.

Assisted hatching (AH) is a therapeutic option to improve the capacity of embryos to implant. The original technology was a mechanical one but this has been replaced by non-contact laser. The technique used is either a thinning of the zona pellucida (ZP), drilling a hole in the ZP or totally removing the ZP. It now appears that AH is of no benefit in patients with advanced age or recurrent implantation failure as was originally believed, but does improve the implantation rates and pregnancy rates in frozen-thawed embryos (1, 2, 3). Except for the risk of transmission of genetically based infertility, there appears to be no health risk (4).

Other types of micromanipulation such as cytoplasmic transfer using heterologous cytoplasm are used infrequently throughout the world. As described in Surveillance 2004, *"Mitochondria are self-replicating, maternally inherited organelles that use the oxidative phosphorylation pathway to supply adenosine triphosphate for all energy requiring cellular activities. It has been suggested that a reduction in embryo development competence may be related to an inadequate capacity to generate levels of adenosine triphosphate sufficient to support normal chromosomal segregation. Normal development potential has been restored to eggs with ooplasmic deficiencies by transfer of ooplasm from a normal donor egg."* The use of heterologous cytoplasm introduces third-party mitochondrial DNA that appears to be maintained in the offspring. For this reason it is prohibited by statute, guidelines and custom in many countries.

ANALYSIS OF THE SURVEY

Intracytoplasmic sperm injection (ICSI) is generally accepted worldwide (Table 1). Of the 49 countries governed by statutes in this survey, ICSI is allowed by statute in 45 and is not mentioned in the statutes of 4 others. The next category, those governed by guidelines, consists of respondents from 38 counties. While ICSI is allowed in most of them it is not mentioned in the guidelines of 9 of them. Only one respondent, from Cuba, indicated it is not allowed in that country. The third category surveyed consists of 41 countries where ICSI is governed by neither statutes nor guidelines. This procedure is being used in 35 of the 41 countries. Of the 6 not using it, 5 are in developing countries in Africa and the other is Cuba.

Assisted hatching (AH) too has achieved general acceptance. Of those 49, under statutes it is allowed in 28 and not mentioned in the statutes of 20 countries and not allowed in one. Only in Norway is it not allowed. Of those 38 under guidelines, it is allowed in 16, not mentioned in the guidelines in 20 and not allowed in one, China.

The survey also attempted to determine how widespread the use of AH is at this time. Of the 49 countries under statutes, it is being used in 43. Of the 36 respondents under guidelines it is being used in 30. Of the 41 under neither statues nor guidelines, AH is being used in 16.

The survey inquired about the acceptance of other types of micromanipulation such as cytoplasmic transfer. Many countries under statutes or guidelines do not allow this. However 5 under statutes, Algeria, Australia, Belgium, Iran, and Montenegro, do allow it. There are 4 under guidelines, Australia, Ghana, India and Japan, that allow it. Of those countries under no directives, these technologies are being used only in Chile, Peru and Uruguay. In approximately half of the countries under statutes and guidelines there is no specifically mention of cytoplasmic transfer or other types of micromanipulation.

DISCUSSION

Assisted hatching is being used with a degree of scepticism. As noted by the respondents' comments, which undoubtedly reflect recently published data questioning some of the benefits of AH, its applications are being carefully reconsidered in a number of countries (Table 2). While still being widely used in the USA, a few other countries such as the Netherlands, the Scandinavian countries, Germany, Spain, Slovenia, the UK and South Africa are either not using it or are limiting its use.

Other types of micromanipulation such as cytoplasmic transfer are in very limited use primarily because of concerns over introducing third-party DNA. In many countries these procedures are either considered experimental, carry governmental restrictions or are not permitted for religious reasons (Table 2).

SUMMARY

Intracytoplamic sperm injection continues to be the treatment of choice for a variety of male factor infertility conditions such as impaired spermatogenesis. Satisfactory results have been observed consistently for many years. Because there is a high incidence of Y-chromosome deletions in some of these men and the risk of directly transmitting this as well as other chromosomal abnormalities to their offspring, genetic evaluation is recommended.

Assisted hatching has the potential of improving the capacity of embryos to implant. The original mechanical technology has now been replaced by non-contact laser technology. Its primary benefit today appears to be that of improving the implantation rates and pregnancy rates in frozen–thawed embryos.

Cytoplasmic transfer using heterologous cytoplasm is in very limited use primarily because of concern over the introduction of third party DNA. It is allowed in only 9 of the countries with statutes or guidelines. In many it is considered experimental or prohibited by the government.

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Table 10.1
Micromanipulation

How ART is governed	Country	ICSI allowed under statute			Assisted hatching allowed/used under statute					Other micro-manipulation allowed*		
		Yes	No	N/mentioned	Yes	No	N/mentioned	In some units	N/used	Yes	No	N/mentioned
By statutes	Abu Dhabi	+					+	+			+	
	Albania			+			+	+				+
	Algeria	+			+			+		+		
	Armenia	+					+		+			+
	Australia	+			+			+		+		
	Austria	+			+			+			+	
	Belgium	+			+			+		+		
	Brazil	+			+			+			+	
	Bulgaria	+			+				+			+
	Canada	+					+	+				+
	China	+			+			+				+
	Columbia			+			+		+			+
	Croatia	+					+	+			+	
	Czech Rep	+			+			+				+
	Denmark	+			+			+			+	
	Estonia	+					+	+				+
	Finland	+			+			+				+
	France	+			+			+			+	
	Germany	+			+			+			+	
	Greece	+			+			+				+
	Hong Kong	+			+			+			+	
	Hungary	+			+			+				+
	Iceland	+			+			+				+
	Indonesia	+					+	+				+
	Iran	+					+	+		+		

Table 10.1
Continued

How ART is governed	Country	ICSI allowed under statute			Assisted hatching allowed/used under statute					Other micromanipulation		
		Yes	No	N/mentioned	Yes	No	N/mentioned	In some units	N/used	Yes	No	N/mentioned
	Israel	+			+			+			+	
	Italy	+					+	+			+	
	Korea			+			+	+				+
	Kosovo	+					+	+			+	
	Kuwait	+			+			+				+
	Latvia			+			+	+				+
	Libya	+			+			+		+		
	Montenegro	+			+			+			+	
	Netherlands	+			+			+			+	
	Norway	+				+	+		+		+	
	Portugal	+			+			+			+	
	Russia	+			+			+				+
	Slovakia	+			+			+				+
	Slovenia	+					+		+			+
	South Africa	+					+	+				+
	Spain	+			+			+			+	
	Sweden	+			+			+				+
	Switzerland	+			+			+			+	
	Taiwan	+					+	+			+	
	Tunisia	+					+		+			+
	Turkey	+			+			+			+	
	UK	+			+			+			+	
	USA	+					+	+			+	
	Vietnam	+					+	+				+

Table 10.1
Continued

How ART is governed	Country	ICSI allowed under statute			Assisted hatching allowed/used under statute					Other micromanipulation		
		Yes	No	N/mentioned	Yes	No	N/mentioned	In some units	N/used	Yes	No	N/mentioned
Guidelines	Argentina	+			+			+				+
	Australia	+			+			+		+		
	Austria	+					+	+				+
	Belarus			+			+	+				+
	Belgium			+			+	+				+
	Chile			+			+	+				
	China	+				+					+	
	Croatia			+			+		+			+
	Cuba		+				+		+			+
	Egypt	+					+	+				
	Ghana	+			+			+		+		
	Hong Kong			+			+	+			+	
	India	+			+					+		
	Iran	+			(no response)					(no response)		
	Ireland			+			+				+	
	Ivory Coast	+					+		+		+	
	Japan	+					+	+		+		
	Kuwait	+					+	+				+
	Libya			+			+	+				+
	Malaysia			+			+		+		+	
	Mexico	+			+			+			+	
	Netherlands	+					+		+			+
	New Zealand	+			+						+	
	Nigeria	+			+			+				+

Table 10.1
Continued

How ART is governed	Country	ICSI allowed			Assisted hatching allowed/used					Other micromanipulation allowed*		
		under statute			under statute							
		Yes	No	N/mentioned	Yes	No	N/mentioned	In some units	N/used	Yes	No	N/mentioned
	Pakistan	+			+			+				+
	Philippines			+			+	+				+
	Poland	+					+	+				+
	Saudi Arabia	+			+			+			+	
	Serbia	+			+			+			+	
	Singapore	+			+			+			+	
	South Africa	+					+	+				+
	Spain	+			+			+			+	
	Sri Lanka	+					+		+		+	
	Thailand	+			+			+				+
	Ukraine	+			+			+				+
	USA	+			+			+				+
	Venezuela				+			+				+
	Vietnam		(no response)				+	+			(no response)	
By neither	Bangladesh	+				+					+	
statutes or	Bosnia	+				+					+	
guidelines	Burkina Faso		+			+					+	
	Cameroon	+				+					+	
	Chile	+			+					+		
	Columbia	+			+						+	
	Congo		+			+					+	
	Cuba		+			+					+	
	D R Congo		+			+					+	
	Dominican Rep	+				+					+	

Table 10.1
Continued

How ART is governed	Country	ICSI allowed			Assisted hatching allowed/used					Other micromanipulation allowed*		
		under statute			under statute							
		Yes	No	N/mentioned	Yes	No	N/mentioned	In some units	N/used	Yes	No	N/mentioned
	Ecuador	+				+					+	
	El Salvador	+				+					+	
	Ethiopia	+				+					+	
	Israel	+			+						+	
	Jamaica	+			+						+	
	Jordan	+			+						+	
	Kenya	+				+					+	
	Kuwait	+			+						+	
	Lebanon	+			+						+	
	Libya	+			+						+	
	Lithuania	+			+						+	
	Mali	+			+						+	
	Mexico	+			+						+	
	Montenegro	+				+					+	
	Morocco	+				+					+	
	Namibia	+				+					+	
	Nepal		+			+					+	
	Nigeria	+			+						+	
	Panama	+				+					+	
	Paraguay	+				+					+	
	Peru	+			+					+		
	Romania	+				+					+	
	Senegal	+				+					+	
	Sudan	+				+					+	

Table 10.1
Continued

How ART is governed	Country	ICSI allowed			Assisted hatching allowed/used					Other micromanipulation allowed*		
		under statute			under statute							
		Yes	No	N/mentioned	Yes	No	N/mentioned	In some units	N/used	Yes	No	N/mentioned
	Swaziland		+			+					+	
	Togo	+				+					+	
	Trinidad/Tobago	+			+						+	
	Uganda	+				+					+	
	Uruguay	+			+					+		
	Venezuela	+			+						+	
	Zimbabwe		(No response)			+					+	

N/mentioned: Not mentioned; N/used: Not used

*(e.g.cytoplasmic transfer). For cloning see Cloning Chapter

Table 10.2
Micromanipulation

1. Under statute. ICSI	
Abu Dhabi	The most popular procedure
Belgium	ICSI was invented in Belgium and popularized in other Belgian centres
Norway	Requires a special licence
Russia	Ministry of Health is involved
UK	Transfer of embryos created with ICSI should not be transferred with embryos created by any other methods of fertilization
USA	ICSI is performed in over half of all cases
2. Under statute. Assisted hatching	
Belgium	Has been used in the Ghent centre for over 20 years
Bulgaria	Practised without being under any special program
Finland	Used less frequently than in the past
Germany	Believed lacking in evidence that it improves outcome but used in some centres
Netherlands	Believed useless in improving outcome
Norway	Not mentioned in statute but no licence has been granted to perform assisted hatching
Russia	Ministry of Health is involved
Slovenia	No evidence that it improves outcome
Spain	Limited use
Sweden	Limited use
UK	Is not mentioned in HFEA code of practice. Survey respondent is unaware of its being practised in any centres in the UK
USA	Widely used
3. Under statute. Other types of micromanipulation such as cytoplasmic transfer	
Abu Dhabi	Must conform to Islamic jurisdiction
Australia	Only under very limited conditions
Austria	Statute states ”intervention into germ cell pathway” is not allowed
Belgium	Considered to be embryo research requiring ethical approval from both local and federal committees for medical ethics
Finland	Not practised
France	Considered research and ruled as such
Greece	Considered research (experimental) and requires approval from the authorities
Montenegro	Requires special permission from Ethics Committee
Norway	Requires special approval
Slovenia	Requires special approval as research from national Ethics Committee
UK	Considered research and requires special licence
USA	In a letter the governmental FDA (Food and Drug Agency) has prohibited somatic cell nuclear transfer and cytoplasmic transfer

Table 10.2
Continued

4. Under guidelines. ICSI	
Chile	Requires informed consent
India	Practised in majority of tertiary care IVF centres
Japan	Only for couples with low possibility of success without ICSI
Philippines	Nearly all fertilisation is done with ICSI
Saudi Arabia	Freely allowed
5. Under guidelines. Assisted hatching	
Chile	Requires informed consent
India	Performed in the majority of tertiary care IVF centres practising frozen cycles
Kuwait	In older age group and recurrent failures
Philippines	No ethical issue against its use
Saudi Arabia	Only technique used is $C0_2$ Laser
South Africa	Used in one centre, Tygerberg, as a research programme with ethical clearance from its university
Thailand	Widely used laser AH technique in older women
USA	Widely used in women over age 38 with frozen/thawed embryo transfer, embryos with thick zonas and patients with poorer prognosis
6. Under guidelines. Other types of micromanipulation such as cytoplasmic transfer	
India	Growth of human embryo outside of body beyond 14 days is not permitted
Saudi Arabia	Prohibited by Islamic law
USA	Cytoplasmic transfer is expressly prohibited by FDA. Other types of micromanipulation are not addressed.
7. Under neither statutes nor guidelines. ICSI	
Chile	Used in over 70% of cycles
Columbia	Used in over 80% of cycles
El Salvador	Particularly helpful when sperm counts are below 1 million
Kuwait	Commonly used
Libya	Commonly used
Montenegro	Used in over 60% of cases
Nigeria	Used in most cases of IVF
Trinidad & Tobago	Used in severe oligozoospermia
Uruguay	Used for over 13 years
8. Under neither statutes nor guidelines. Assisted hatching	
Chile	Not used routinely
Kuwait	Used in older age group and recurrent failures
Mexico	Few clinics have the laser or embryologists skilled in its use
Peru	Rarely used

Table 10.2
Continued

8 Continued Under neither statutes nor guidelines. Assisted hatching	
Trinidad & Tobago	Rarely used
9. Under neither statutes nor guidelines. Other types of micromanipulation such as cytoplasmic transfer	
Kenya	Technology not available locally
Libya	Prohibited by Islamic law
Mexico	Nuclear and cytoplasmic transfer are considered research
Morocco	Not used for ethical and moral reasons

CHAPTER 11: Oocyte maturation

When there is a high risk of ovarian hyperstimulation syndrome, regimes other than human chorionic gonadotrophin administration have been used. Schedules of gonadotrophin releasing hormone (GnRH) antagonist in the follicular phase followed by a GnRH agonist to trigger final maturation have been employed (1).

However more attention has been paid to *in vitro* maturation of immature oocytes. Oocytes from smaller follicles have been shown not to improve their fertilisation rates even after *in vitro* maturation (2). There has been greater emphasis on retrieval of immature oocytes from small follicles in patients with polycystic ovary syndrome followed by *in vitro* maturation. The technique has also been used to conserve fertility by cryopreservation in those with malignancy and to a lesser extent for social reasons, against the possibility of failure to find a partner at an appropriately young age. There is a better live birth rate after *in vivo* maturation followed by vitrification than by immediate vitrification and subsequent *in vitro* maturation (3). Vitrification is better performed at metaphase II stage rather than the germinal vesicle (GV) stage, as oocyte maturation is different and poorer *in vitro* than *in vivo* (4).

ANALYSIS OF THE SURVEY

A small number of countries have both statutes and guidelines (Table 11.1), Australia, Hong Kong, Iran, Libya and U.K. A greater, comparable number have either statutes or guidelines and only six have neither, but use these techniques, Ethiopia, Jordan, Kuwait, Panama, Trinidad and Tobago and Uruguay. The method is awaiting approval in New Zealand. In the Philippines maturation of oocytes retrieved at IVF is acceptable but deliberate retrieval of immature oocytes is not.

Use in limited in Abu Dhabi, Belarus, Belgium, Chile, Egypt, Finland, India, Japan, Jordan, Montenegro and Saudi Arabia. In Australia ethical approval is required, and it is considered a research procedure in Argentina, Denmark, India, Japan, Netherlands, Slovenia and USA. An Authority needs to be approached in Greece, Norway and Russia. In U.K. information about the risks involved and the experience of the centre performing the technique must be given to the patient.

SUMMARY

In vitro maturation of oocytes is being used more widely and is the subject of much research. The live birth rate has improved, although the outcome following long term storage has not been securely established. Vitrification has been shown to achieve better results than slow freezing, but a larger database of outcome following vitrification needs to be established. There are still only small numbers that have used frozen-thawed cells after cancer treatment and the use for social indications is not yet well established.

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Chapter 11.1
Oocyte maturation

Country	Regulation by Statute		Regulation by Guidelines		None
	Allowed	Not mentioned	Allowed	Not mentioned	Used
Abu Dhabi		+			
Albania		+			
Algeria	+				
Argentina				+	
Armenia		+			
Australia	+		+		
Austria		+		+	
Belarus				+	
Belgium	+			+	
Brazil		+			
Bulgaria	+				
Cameroon					
Canada		+			
Chile				+	
China		+		+	
Colombia		+			
Croatia		+		+	
Czech Rep.	+				
Denmark		+			
Egypt		+		+	
Ethiopia					+
Finland		+			
France	+				
Germany	+				
Ghana			+		
Greece		+			
Hong Kong	+		+		
Hungary		+			
Iceland		+			
India			+		
Indonesia		+			
Iran	+		+		
Ireland				+	
Israel	+				
Italy	+				
Ivory Coast			+		
Japan				+	
Jordan					+
Korea		+			
Kuwait	+			+	+
Latvia		+			
Libya	+		+		
Malaysia				+	

Chapter 11.1
Continued

Country	Regulation by Statute		Regulation by Guidelines		None
	Allowed	Not mentioned	Allowed	Not mentioned	Used
Mexico			+		
Montenegro	+				
Netherlands		+		+	
New Zealand					
Nigeria			+		
Norway	+				
Pakistan			+		
Panama					+
Philippines				+	
Portugal	+				
Russia	+				
Saudi Arabia			+		
Serbia			+		
Singapore				+	
Slovakia	+				
Slovenia		+			
South Africa		+		+	
Spain		+	+		
Singapore				+	
Sweden	+				
Switzerland	+				
Taiwan		+			
Thailand			+		
Trinidad/Tobago					+
Tunisia		+			
Turkey		+			
Ukraine			+		
UK		+	+		
Uruguay					+
USA		+		+	
Venezuela			+		
Vietnam		+			

Chapter 12: Welfare of the child

The United Kingdom's Human Fertilisation and Embryology Act (1990) was the first to stipulate non-clinical criteria for treatment of any candidate for assisted conception. It stated that: " A woman shall not be provided with treatment services unless account has been taken of the welfare of any child who may be born as a result of treatment (including the need of that child for a father), and of any other child who may be affected by the birth". This was defined further in a Code of Practice, which has now reached the 8th edition (2008). Currently it involves making "an assessment of risk of harm to the welfare of the child" (1). This should cover serious physical, psychological or medical harm or neglect and it includes identification of the potential parents and who would have parental responsibility. This statement was included as one condition for granting of a licence to a clinic. The 1990 Act was revised in 2008 and the "need for a father" was removed, as it was increasingly difficult to apply that criterion in the case of single women and lesbian partnerships, which were otherwise perceived to practise good parenting. The original discussion centred on whether fertility treatment should be restricted to married couples, a view that was only narrowly defeated when put to the vote in Parliament (2). Furthermore, societal attitudes and the law had moved on to prevent discrimination and clinicians had been instructed not to deny treatment to lesbian couples. The HFE Act needed to be made consistent. That phrase was replaced with the expression, "supportive parenting", which was explained as "Where the child will have no legal father, the centre should assess the prospective mother's ability to meet the child's/children's needs and the ability of other persons within the family or social circle willing to share responsibility for those needs."

This statement has chimed with the views in many countries and there has been an increased acceptance of this as one factor to assess in the evaluation of candidates for ART. However it could be said that the effort to have clinicians decide who should be accepted for treatment is an infringement of liberty, which should allow patients themselves to decide whether or not they become parents, in the same way as fertile couples do (2).

In New Zealand the concept of parenting has developed differently as the notion of family has come to be perceived differently. It has diverged from the Western idea of a nuclear family to the more traditional Maori concept of family formation, which includes a well accepted traditional practice of guardianship and a more open and extended family structure (3). These views have been represented in their Human Assisted Reproductive Technology Act (2004). Many Western societies seem to be moving more toward this structure of society.

A different ethical basis has been proposed to consider this issue. Although the welfare of the child constraint is well intentioned, it is argued, such a process has not prevented harm to children. Furthermore, a potential person cannot be harmed. By reducing the importance of this principle of the welfare of the child in policy statements and clinical deliberations, we could concentrate on what really matters, the intention to become a functional parent and the parental project itself. The primary focus should be on how the child might affect us. That would exclude those who are incapable of functioning as parents (4) and so would achieve similar objectives.

The bioethical debate about ART, of which the welfare of the child is only one part, is conducted widely in some communities, but not in others. An analysis of the debate in Ireland suggests that it is shaped and constrained by the historical relations of power between church, state and medicine. As the state moves towards a post-religious, plural republic, bioethical discussion becomes central to cultural and political discourse. However the church tries to shape the public debate as a powerful institution *vis-à vis* the state and medicine, dictating views on the contentious issue of abortion and the constitutional protection afforded to the "unborn". As its social power declines with increasing

secularisation, and with recent scandals denting its moral authority, a broader bioethical discussion should develop (5). Many European countries have a similar traditional religious history, but have managed that broader debate; it remains to be held in many South American countries. In other religious domains there are different restrictions, which are not open to public bioethical dialogue.

ANALYSIS OF SURVEY

There were 17 countries reporting that the welfare of the child was covered by statute. These were Australia, Belgium, Denmark, Finland, Germany, Greece, Hong Kong, Latvia, Montenegro, the Netherlands, Norway, Portugal, Russia, Slovenia, Taiwan, Tunisia and the UK. These vary from a pre-treatment assessment, a simple explanation of the risks to the need to provide follow up data to a central registry (Table 12.1).

The 12 countries covered by guidelines were Argentina, Australia, Egypt, Hong Kong, India, Ivory Coast , Japan, Mexico, New Zealand, Singapore, Thailand and USA. The 8 countries that follow custom in the absence of statutes or guidelines are Chile, the Dominican Republic, Ecuador, Kuwait, Panama, Togo, Uganda and Uruguay. In Chile patient acceptance of the welfare of the child was implied by signing of the consent form. In Kuwait it was stated that in their culture to have twins was more important than a consideration of the children's welfare.

CONCLUSION

Since Surveillance 2007 there has been an increase in both statutes and guidelines that cover the idea of assessment of the potential parents on behalf of the future child prior to agreement to treatment. At the same time some questions have been raised about the philosophical basis of the concept and a more practical approach that may be helpful to clinicians has been proposed. The type of family structure that initially drove these considerations has also changed in many communities. The nuclear family may not even represent the reality in different societies or in different sections of a society. This is a concept that may develop further as the sociological impact of assisted conception is experienced in different cultures.

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Table 12.1
Welfare of the child

How ART is regulated	Country	Comment
By statute	Belgium	In general terms, the centre is held to examine and assess whether the creation of a child is or is not "desirable" from a societal point of view. Psychologists and counsellors see many, though not all, patients in order to rule out dubious situations (we have internal criteria for thess but they are complicated and lengthy to explain and have no official status). Otherwise, physicians are held to recognise, explain and, if possible, treat or prevent risk factors to patients.
	Greece	The law mandates that in applying ART, the welfare of the child to be should mainly be taken into account
	Montenegro	Centres are responsible for reporting the result of every pregnancy and the main authority in the Ministry of Health will provide long term surveillance of all children born from IVF
	Netherlands	Centres are required to consider the wellbeing of the child when deciding whether or not to proceed with IVF. However, the criteria are not stated.
	Norway	A psychosocial evaluation of the couple must be carried out prior to ART treatment. Couples deemed to be unfit as parents cannot be offered treatment. As a standard routine in the evaluation of new techniques or treatment modalities, an evaluation of the potential effect on the welfare of the future children must be carried out
	Tunisia	The physician only has to inform the couple about the possible risks for offspring
	UK	An assessment of the social circumstances is made before any treatment is given in order to determine the welfare of any child born or of any existing children.
By guidelines	Australia	Welfare of offspring is of paramount importance.
	Japan	Couples should be well physiologically and psychologically for the further pregnancy, delivery and parental care.
	New Zealand	One of the principles of the Human Assisted Reproductive Technology Act (2008) is that the health and wellbeing of the child should be an important consideration

Table 12.1
Continued

How ART is regulated	Country	Comment
	USA	There are only general comments in the ASRM Practice guidelines about considering the welfare of the offspring.
By custom	Chile	When signing consent forms, couples accept that the welfare of offspring can be impaired
	Kuwait	Generally speaking, to have twins as an outcome overshadows the issue of offspring welfare in this culture
	Togo	The donors must be in a good health without any hereditary defect

Chapter 13: Fetal reduction

Fetal reduction is the technique used to reduce the number of fetuses in a high order multiple pregnancy (HOMP), or to selectively terminate an abnormal pregnancy or an ectopic pregnancy.

Because of the relatively high incidence of HOMPs generated by ovulation induction (OI), insemination techniques and *in vitro* fertilization (IVF), multi-fetal pregnancy reduction (MFPR) has been employed to reduce the maternal and neonatal risks of HOMP. In recent years there has been a steady decline in HOMPs, because of the increasing trend to transfer only one or two embryos, rather than the three, four or more, that have previously been transferred following IVF and intra-cytoplasmic sperm injection (ICSI). Reducing the number of HOMPs arising from OI and insemination techniques continues to be difficult.

Importantly, the safety and success of MFPR is high, with reported pregnancy loss rates of 4.7% (1), which, when contrasted with the high morbidity rates for both mothers and fetuses of HOMPs, demonstrates the benefits of the use of MFPR in selected cases.

This Survey, as with previous ones, addresses MFPR and its use in reducing the risks of HOMP.

ANALYSIS OF THE SURVEY

Of the 105 countries surveyed, 101 responded. Of these, 7 have specific laws prohibiting fetal reduction (FR), 25 allow it by statute, and 25 make no mention of it. Thirteen countries allow FR under guidelines and 3 state that no mention of FR has been made in either statute or guidelines. Of the countries where there are no statutes or guidelines, 8 stated that they practised FR and 15 did not practise FR. Of the 34 countries in which FR is allowed by statute or guidelines and where the respondent answered 'yes' to the question – 'Is selective reduction practised in your country?' –32% of them are practising FR, similar to the 36% shown in the 2007 Surveillance. As can be seen from Table 13.1, 11 countries, which do not allow FR, either by statute or guidelines, do, in fact, practise it.

DISCUSSION

In times when numbers of embryos greater than one or two are still being transferred to women and OI and insemination cycles are inadequately monitored, the incidence of HOMP continues to be too high. With improving implantation rates, practitioners are willing to monitor cycles more diligently and to transfer fewer embryos. However, a recent report (2) shows that, in 2005 some European countries 3 embryos were still being replaced in up to 50% of cases and 4+ embryos in up to 36%. These resulted in twins being delivered in up to 28% and triplets in up to 6% of cases. A recent World Collaborative Report (3) gives the data for 2002 and shows similar results to the European data, with 4+ embryos being replaced in between 20 and 54% of cases, producing HOMP rates of up to 10% of cases.

Unfortunately, there is a paucity of follow-up data on the outcomes of MFPR pregnancies. What few data there are indicate that the outcomes are better compared to the outcomes of HOMPs which did not have MFPR as far as the prevalence of cerebral palsy is concerned. This is probably related to the fact that the reduced pregnancies were delivered at a later gestational age than the non-reduced pregnancies. Importantly, the emotional effects on the

mother, of both the decision to attempt MFPR and of the (usually beneficial) consequences of the procedure, have been little investigated, although at least one follow-up study has been published (4).

The ethical issues surrounding MFPR, like the abortion issue, are controversial – hence the fact that a number of countries (7%) have banned it, while 28% have not been able or have been unwilling to address the issue. Both in Europe and in the United States the ethical issues (5, 6) surrounding MFP have been carefully considered. The ESHRE Task Force on Ethics and the Law (5), when considering MFPR states:

"The ethical dilemmas of MFPR are closely connected to the problem of abortion. The main difference is that in the case of MFPR it is explicitly the intention not to terminate the pregnancy but to increase the chance of development of the remaining fetuses. Especially for higher order pregnancies, not performing a reduction will increase the risk of losing the pregnancy and all the fetuses. In that sense, the reduction is medically indicated. The first priority lies with the well-being of the children that will be born. MFPR is morally acceptable if the physician has acted according to the rules of good clinical practice and has tried to minimize the risk of a multiple pregnancy. The benefits for the remaining embryos of reducing a higher order multiple pregnancy exceed the disadvantages of carrying the pregnancy to term or risking miscarriage. Prevention of multiple pregnancies should be preferred to MFPR."

The American College of Obstetricians and Gynecologists in its 2007 Report on Multifetal Pregnancy Reduction (6) states:
"The first approach to this problem is and should be prevention. In almost all cases it will be preferable to terminate a gonadotropin cycle or limit the number of embryos to be transferred to prevent a situation in which the patient and physician need to consider fetal reduction."

SUMMARY

Fetal reduction is accepted in many countries to improve the outcomes of high order multiple pregnancies, which have been generated as a result of poorly managed ovulation induction and insemination cycles and from IVF and related treatments in which three or more embryos have been transferred. When MFPR is practised by experienced clinicians, the outcome of the multiple pregnancies is better than if they were left as HOMPs. The emotional consequences of MFPR, both in the decision making process and later, are profound for the patient and her partner. There has been little long term follow up of either the babies born following MFPR or of the emotional effects. Best practice is prevention of HOMP by the careful monitoring of OI and insemination cycles and the transfer of only one embryo, or two in selected patients receiving treatment by IVF and related techniques.

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Table 13.1
Fetal Reduction

Country	By Statute			By Guidelines	Practised by programme	Generally practised
	Allowed	Not allowed	Not mentioned			
Abu Dhabi			+			
Albania			+			
Algeria		+				
Argentina						
Armenia			+			
Australia	+			+		
Austria			+			
Bangladesh					+	
Belarus	+				+	
Belgium	+					
Bosnia						+
Brazil		+				
Bulgaria	+					
Burkina Faso						
Cameroon					+	+
Canada	+					
Chile						
China	+					
Columbia		+			+	
Congo						
Croatia			+			
Cuba						
Cyprus						
Czech Rep	+					
Dem Rep Congo						
Denmark	+					
Dominican Rep						
Ecuador						
Egypt						
El Salvador					+	
Estonia		+				
Ethiopia						
Finland	+					
France			+			
Germany	+					
Ghana				+		
Greece			+			
Hong Kong	+					
Hungary	+					
Iceland			+			
India				+		

Table 13.1

Continued

Country	By Statute			By Guidelines	Practised by programme	Generally practised
	Allowed	Not allowed	Not mentioned			
Indonesia		+				
Iran			+			
Ireland						
Israel	+				+	+
Italy	+					
Ivory Coast						
Jamaica						
Japan			+	+		
Jordan		+				+
Kenya					+	
Korea			+			
Kosovo			+			
Kuwait			+			
Latvia			+			
Lebanon			+		+	+
Libya	+					
Lithuania						
Malaysia						
Mali						
Mexico					+	
Montenegro			+			+
Morocco						+
Namibia						
Nepal					+	+
Netherlands	+					
New Zealand	+			+		
Nigeria				+	+	
Norway		+				
Pakistan						
Panama					+	
Paraguay						
Peru					+	
Philippines			+	+		
Poland						
Portugal			+			
Romania						+
Russia	+					
Saudi Arabia						
Senegal						
Serbia						
Singapore						
Slovakia	+					

Table 13.1

Continued

Country	By Statute			By Guidelines	Practised by programme	Generally practised
	Allowed	Not allowed	Not mentioned			
Slovenia	+					
South Africa			+			
Spain			+			
Sri Lanka				+		
Sudan						+
Swaziland						
Sweden			+			
Switzerland	+					
Taiwan	+					
Thailand	+			+		
Togo						+
Trinidad & Tobago						
Tunisia			+			
Turkey	+					
Uganda			+		+	
UK	+			+	+	
Ukraine				+		
Uruguay						
USA			+	+	+	
Venezuela				+	+	
Vietnam			+			
Zimbabwe						

CHAPTER 14: Preimplantation genetic diagnosis

Preimplantation genetic diagnosis (PGD) was introduced in 1990 for genetic diagnosis of embryos developed through IVF. It has become increasing popular in the many countries in which it is allowed (1). This technology permits couples at risk of genetic aberrations the opportunity to transfer only unaffected embryos. The technology most commonly used involves the removal of one or two blastomeres at around the eight-cell stage at day 3 of development. This is typically followed by genetic analysis using fluorescent *in situ* hybridization (FISH) analysis of 5-12 chromosomes or by polymerase chain reaction (PCR) for molecular diagnosis. Additional new technologies are emerging. Unaffected embryos are transferred back on day 4 or 5. Since embryos with genetic abnormalities are discarded, it requires couples to make a moral distinction between abortion and the discarding of affected non-transferred embryos.

The six general categories for which PGD testing is used are as follows:

1. Autosomal single gene disorders such as thalassaemia, cystic fibrosis, Tay-Sachs disease, and sickle cell disease
2. Chromosomal rearrangements (inherited chromosomal abnormalities)
3. Aneuploidy
4. X-linked diseases
5. Non medical sex selection
6. Human leukocyte antigen (HLA) typing

This testing is being used in an ever widening array of genetic disorders and the literature over recent years has been flooded with clinical reports. Its increasing use poses many challenging clinical, psychological, social, ethical, legal and policy dilemmas.
One category that is particularly controversial is non-medical sex selection. Several counties such as the United Kingdom, Canada and Taiwan prohibit its use by statute for this indication.

Testing for aneuploidy or chromosomal numerical abnormalities and patterns in embryos had become one of the most frequent indications for its use in some countries, such as the USA. However such testing has now come into question. This application of PGD has become popular because increased aneuploidy has been reported in women with impaired fertility, such as women over age 35, those with recurrent abortion and IVF patients with recurrent implantation failure. However, recent reports now contradict past beneficial reports of PGD. A number of reports since 2007 suggest it is of no benefit in these conditions and may in fact be deleterious (2, 3, 4, 5, 6).

ANALYSIS OF THE SURVEY

Preimplantation genetic diagnosis practised under statute was the first category studied. It is allowed in 48 of the 50 countries governed by statutes. It is not allowed in Algeria and Switzerland. The statute does not mention PGD in 12 of these 50. It is being used in 37 of the 48 countries in which it is allowed. In some countries, such as Albania and Norway, this is because there are no licensed laboratories for PGD. Norway and

Columbia send their samples abroad for testing. The number of centres licensed to do PGD in different countries varies widely from the Netherlands with one, Latvia two, Belgium eight and the USA numerous. The technology is permitted only for specific hereditary disorders in six countries (Table 14.1).

The second category in the survey was countries with established national guidelines for PGD. There are 38 countries under guidelines. The procedure is not allowed in four countries, which are Chile, China, Ivory Coast and the Philippines. The guidelines do not mention PGD in 13 countries. It is not used in 12 (includes the 4 in which it is not allowed) of the 38 countries. Where it is being used several respondents, such as from Poland and Saudi Arabia, indicated that their countries have very few licensed centres. Some have no licensed centres and samples are sent abroad for testing, such as in Belarus and Ireland. Japan requires individual approval by an Ethics Committee of the Japanese Society of Obstetrics and Gynecology. In India it is not allowed for sex selection unless for sex-linked disorders. In the USA it is still considered experimental except for single gene disorders and selected chromosomal defects (Table 14.1).

The third category surveyed were the countries practising with neither statutes nor guidelines. In these 33 countries PGD is being practised in only 8.

The use of PGD for aneuploidy screening was specifically surveyed. It is being used for such screening in 23 (46%) of the 50 countries governed by statutes, 22 (59%) of the 38 under guidelines and in 5 (15%) the 34 under neither statutes nor guidelines.
Of those under statutes, five do not allow it. These are Algeria, France, Germany, Norway and Switzerland. Of those under guidelines the two that do not allow it are Chile and the Philippines. The five using it for this indication, among the 34 countries with neither statutes nor guidelines, are Lebanon, Libya, Panama, Peru and Uruguay.

In countries under statutes several respondents indicated it is in very limited use. Others such as the UK, Greece and Russia commented on its use only in licensed centres or under a licensing authority and supervision. In the Netherlands its general use has been stopped since its value has come into question and now is restricted to research programmes (Table 14.2).

In countries under guidelines the most frequent comment by the respondents was that it is used very little and is limited to only a few licensed centres. In Japan it required approval by the Ethics Committee of their national Society of Obstetrics and Gynecology. In the USA it is considered experimental and has been much less widely used in the past two years, since its value has come into question (Table 14.3).

DISCUSSION

Now a well established and reliable procedure, PGD has a low error rate when performed in skilled hands. Drawbacks remain the high cost of the procedure and the fact that it leaves fewer embryos to transfer. This survey shows that PGD is becoming increasingly available throughout the world although often in a limited and restricted way. It is not allowed in only 6 countries. Although it is being used in 71 (59%) of the 121 countries

surveyed, it is practised the least in those without statutes or guidelines. Because this survey was expanded to include many more developing countries than in past Surveillance studies, the overall percent using PGD has decreased over previous studies. Surveillance 2004 reported its use in 34 (69%) of 49 countries and Surveillance 2007 in 34 (63%) of 54 counties.

Of particular interest was the data on use of PGD for aneuploidy. Looking only at countries under statutes and guidelines, slightly over half, 43 (53%) of 84, reported that it was being used for this indication. Although many more countries were included in this survey than in the past, this percentage has changed very little over the Surveillance 2007 data that reported its use in 23 (51%) of 47 such countries. As already discussed, since 2007 a number of studies from different countries now question the benefits of PGD for this indication and some, in fact, suggest it may be deleterious. Already it is being used far less frequently in countries such as the USA where this had become the most common indication for PGD use. Predictably, future IFFS surveys will report markedly different data for this indication (2, 3 4, 5, 6).

As noted in Surveillance 2007, *"Although these data offer valuable information about how available PGD is worldwide and in what countries it is actually being used, it does not attempt to provide information about how often it is performed, its overall efficacy, by who it is performed, and with what clinical outcomes"*. There are several regional organisations focusing on these issues by collecting data and comparing cumulative data in an attempt to answer some of these questions. One such is the ESHRE PGD Consortium whose Collection VII report, published in 2008, covered data from 39 centres. This report included a follow up of the babies born in those centres (1). Another is the collaborative report between the European Commission, European Society of Human Genetics and ESHRE, interfacing genetics and medically assisted reproduction with respect to technical, social, ethical and legal issues (7). Yet another related comprehensive report, although focusing more on the indications for PGD use in the United States, was that of the Genetics and Policy Center at Johns Hopkins University. At the time of that report the most common indication for PGD in the USA was for aneuploidy (66%, 8).

This technology has undeniable benefits but continues to raise concerns in several areas. Among these are the moral and ethical issues, the potential for parents to exercise excessive concern over the characteristics of their offspring, costs and availability dependent on the parents' financial status, safety, accuracy, regulation and monitoring. In countries without statutes to govern its use, self-regulation continues to be a challenging issue.

SUMMARY

Preimplantation genetic diagnosis has become increasingly available worldwide. This technology provides couples with significant benefits. It is generally considered safe with a low frequency of errors. It prevents women from delivering offspring with serious genetic disorders and avoids abortions. The use of PGD for some indications such as

aneuploidy screening varies considerably among countries. Its application for this indication has become increasingly controversial.

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Table 14.1
USE OF PGD

How ART is governed	Country	PGD allowed/used					PGD for embryo screening (aneuploidy)				
		Allowed	N/allowed	N/mentioned	Used	N/used	Allowed	N/allowed	N/mentioned	Used	N/used
Governed by statute	Abu Dhabi	+			+		+			+	
	Albania			+		+			+		+
	Algeria		+			+		+			+
	Armenia			+		+			+		+
	Australia	+			+		+			+	
	Austria			+	+				+		+
	Belgium	+			+		+			+	
	Brazil	+			+		+			+	
	Bulgaria	+				+	+			+	
	Canada	+			+				+	+	
	China	+			+				+		+
	Columbia			+	+				+		+
	Croatia			+		+			+		+
	Czech Rep	+			+		+			+	
	Denmark	+			+		+				+
	Estonia			+		+			+		+
	Finland	+			+		+				+
	France	+			+			+			+
	Germany	+			+			+			+
	Greece	+			+		+			+	
	Hong Kong	+			+		+		+	+	
	Hungary	+			+				+		
	Iceland	+				+	+				+
	Indonesia			+		+			+		+
	Iran	+			+		+				+
	Israel				+		+			+	

Table 14.1
Continued

How ART is governed	Country	PGD allowed/used					PGD for embryo screening (aneuploidy)				
		Allowed	N/allowed	N/mentioned	Used	N/used	Allowed	N/allowed	N/mentioned	Used	N/used
	Italy	+			+		+			+	
	Korea	+			+				+	+	
	Kosovo			+	+				+		+
	Kuwait	+			+		+				
	Latvia			+	+				+	+	
	Libya	+				+	+				+
	Montenegro	+				+	+				+
	Netherlands	+			+		+			+	
	Norway	+				+		+			+
	Portugal	+			+		+				+
	Romania	+			+						+
	Russia	+			+		+			+	
	Slovakia	+			+		+			+	
	Slovenia	+			+				+		+
	South Africa			+	+				+	+	
	Spain	+			+		+			+	
	Sweden	+			+		+			+	
	Switzerland		+					+			+
	Taiwan	+			+		+			+	
	Tunisia	+				+			+		+
	Turkey	+			+		+			+	
	UK	+			+		+			+	
	USA			+	+				+	+	
	Vietnam			+		+			+		+
Guidelines	Argentina			+	+				+	+	
	Australia	+			+		+			+	

Table 14.1
Continued

How ART is governed	Country	PGD allowed/used					PGD for embryo screening (aneuploidy)				
		Allowed	N/allowed	N/mentioned	Used	N/used	Allowed	N/allowed	N/mentioned	Used	N/used
	Austria			+		+	+			+	
	Belarus			+	+				+		+
	Belgium			+	+				+	+	
	Chile		+			+		+			+
	China		+		+				+		+
	Croatia			+		+			+		+
	Cuba	+				+	+				+
	Egypt	+			+				+		+
	Ghana	+				+	+				+
	Hong Kong			+	+				+		
	India	+			+		+			+	
	Iran	+			+		+			+	
	Ireland			+		+			+		+
	Ivory Coast		+			+			+		+
	Japan	+			+		+				+
	Kuwait			+	+				+	+	
	Libya			+		+			+		+
	Malaysia			+	+				+	+	
	Mexico	+			+		+			+	
	Netherlands			+	+				+		+
	NewZealand	+			+		+			+	
	Nigeria	+				+	+			+	
	Pakistan	+			+		+			+	
	Philippines		+			+		+			+
	Poland	+			+		+			+	
	Saudi Arabia	+			+		+			+	
	Serbia	+				+	+				+

Table 14.1
Continued

How ART is governed	Country	PGD allowed/used					PGD for embryo screening (aneuploidy)				
		Allowed	N/allowed	N/mentioned	Used	N/used	Allowed	N/allowed	N/mentioned	Used	N/used
	Singapore	+			+		+			+	
	South Africa	+			+				+	+	
	Spain	+			+		+			+	
	SriLanka					+			+		+
	Thailand	+			+		+			+	
	Ukraine	+			+		+			+	
	USA	+			+		+			+	
	Venezuela	+		+	+		+			+	
	Vietnam			+	+				+		+
None	Bangladesh				+						+
	Bosnia					+					+
	BurkinaFaso					+					+
	Camaroon					+					+
	Columbia				+					+	
	Congo					+					+
	Dem Rep Congo	x				+					+
	DominicanRep					+					+
	Ecuador					+					+
	ElSalvador					+					+
	Ethiopia					+					+
	Jamaica					+					+
	Jordan				+						+
	Kenya					+					+
	Kuwait				+						+
	Lebanon				+					+	
	Libya				+					+	

Table 14.1
Continued

How ART is governed	Country	PGD allowed/used					PGD for embryo screening (aneuploidy)				
		Allowed	N/allowed	N/mentioned	Used	N/used	Allowed	N/allowed	N/mentioned	Used	N/used
	Lithuania					+					+
	Mali					+					+
	Morocco					+					+
	Namibia					+					+
	Nepal					+					+
	Panama				+					+	
	Paraguay					+					+
	Peru				+					+	
	Senegal					+					+
	Sudan					+					+
	Swaziland					+					+
	Togo					+					+
	Trinidad/Tobago					+					+
	Tobago										+
	Uganda					+					+
	Uruguay				+					+	
	Zimbabwe					+					+

N/allowed: Not allowed; N/mentioned: Not mentioned; N/used: Not used

Table 14.2
Preimplantation genetic diagnosis

How ART is governed	Country	Comments
By statute	Albania	No good genetic laboratory for PGD exists
	Austria	Polar body diagnosis only
	Belgium	Only 8 medical genetic centres are licensed so all PGD must be performed in these larger centres
	Columbia	Blastomeres are sent out of the country for FISH
	Denmark	Permitted only for specific diseases
	Finland	Centralized in Helsinki University Hospital and some private laboratories
	Germany	Polar body diagnosis only
	Greece	Consent required and specific licence and approval required from authority
	Hungary	Approval by Ethical Committee is required
	Korea	Approved only for specific genetic diseases
	Latvia	Practised in only one or two clinics
	Netherlands	Only one licenced centre exists
	Norway	No clinic is licenced so patients must be sent abroad for PGD
	Russia	Ministry of Health is involved. Used only for translocations and single gene disorders
	Slovenia	Used only for severe hereditary disorders
	Switzerland	Although not allowed today a law permitting its use is under consideration
	Taiwan	Not allowed for gender selection
	UK	Performed only in licensed centres
	USA	Widely practised
By guidelines	Belarus	Done in cooperate with colleagues from RGI in Chicago, Russia and Ukraine
	Chile	Only polar body biopsy
	India	Not allowed for sex selection unless for sex- linked disorders
	Ireland	Referred for PGD outside of Ireland
	Japan	Need approval of Ethical Committee of Japanese Society of Obstetrics and Gynecology (JSOG)
	Kuwait	Some units have developed guidelines for PGD
	Mexico	Done in some clinics but no written permission exists
	Nigeria	Done at Medical ART Centre in collaboration with centres in India and USA
	Philippines	Resistance to PGD rests in disposition of embryos that test positive
	Poland	Done in two programmes

Table 14.1
Preimplantation diagnosis

How ART is governed	Country	Comments
	Saudi Arabia	Done in few centres
	Thailand	Done for alpha and beta thalassemia in three centres
	USA	PGD is considered experimental. PGD for single gene defects and selected chromosomal problems (e.g. translocation) is recognized as clinically useful and not experimental.

Table 14.3
Preimplantation genetic diagnosis for embryo screening

How ART is governed	Country	Comment
By statute	Abu Dhabi	Very limited use
	Belgium	Very limited use
	Finland	Very limited use
	Greece	Approval required by licensing authority
	Latvia	Very limited use
	Netherlands	Restricted to research programmes. More general use stopped after recent reports that it is ineffective
	Russia	Ministry of Health is involved. Used in women over 35 and for repeated IVF failures
	Spain	Used for screening but without alterations that may impair development
	Sweden	Very limited use
	Taiwan	In repeated IVF failures and for hereditary diseases, but not for sex selection
	UK	Performed only in licenced centres
	USA	Much less widely used in past 2 years because of recent evidence concluding it is not effective
By guidelines	Austria	Guidelines mention polar body diagnosis but not screening
	Chile	Restricted by federal legislature
	India	Performed in few centres
	Japan	Need approval of Ethical Committee of JSOG
	Kuwait	Done in few centres
	Mexico	Seldom done
	Philippines	Not done
	Poland	Done in only one centre
	Saudi Arabia	Done in few centres for selected patients with IVF failure or repeat abortions
	Singapore	PGS carried out as research programme in one centre only
	Thailand	Done in several centres
	USA	PGS for aneuploidy screening is considered experimental. Much less widely used since 2008.

Chapter 15: IVF Surrogacy

There has always been confusion about the definitions of the different forms of surrogacy. It is common practice to use the term "surrogate host", "surrogate mother" or "surrogate" for the woman who carries and delivers a baby for another couple. "IVF surrogacy", "gestational surrogacy", or "full surrogacy" are defined as treatments by which the gametes of the "genetic couple", "commissioning couple" or "intended parents" in a surrogacy arrangement are used to produce embryos, which subsequently are transferred to a woman who agrees to act as a host for these embryos. The "surrogate host" is therefore genetically unrelated to any offspring that may be born as a result of this arrangement. This survey is concerned only with this form of surrogacy. It does not cover "natural surrogacy" or "partial surrogacy", in which the intended host is inseminated with the semen of the husband of the "commissioning couple"; any resulting child from this arrangement is therefore genetically related to the host. This type of surrogacy does not require the assistance of fertility clinics or the sophisticated techniques of *in vitro* fertilization.

Owing to the complexity of treatment by IVF surrogacy, it is essential that the legal situation in each country is fully understood. Careful medical assessment of both parties to an IVF surrogacy arrangement is essential and full counseling should be offered to all parties. Full and informed legal advice from an adviser experienced in the laws of the country in which the treatment is to be carried out, and, if different, in the country of domicile of the couple, is mandatory. In this survey, only treatment by "gestational surrogacy" is considered. The couple who initiate the surrogacy arrangement and whose gametes are used will be known at the "genetic couple" and the woman who subsequently carries the child will be known as the "surrogate host".

Indications for "gestational surrogacy"

The principal indications for treatment by "IVF surrogacy" are:

(1) Patients without a uterus, but with one or both ovaries functioning:
    (a) Women with congenital absence of the uterus
    (b) Women who have had an hysterectomy for carcinoma or other reasons
(2) Women who suffer repeated miscarriage and for whom the prospect of carrying a baby to term is very remote. In this group, women who have repeatedly failed to achieve a pregnancy following IVF treatment may also be considered.
(3) Women with certain medical conditions which may make pregnancy life-threatening, but for whom the long-term prospects for health are good.
(4) Requests for career or social reasons are not considered to be reasonable indications.

ANALYSIS OF THE SURVEY

This analysis is limited by the number of replies to the worldwide questionnaire that was sent out. Of a total of 105 countries polled, only 71 (68%) responded to the questions about surrogacy. Of those countries which did not respond, it is known that most do not condone IVF surrogacy for religious reasons. From Table 15.1, it can be seen that of the 71 responding countries, 15 (21%) allow IVF surrogacy by statute, 13 (23%) countries have guidelines, 30 (42%) do not allow it, and 10 countries (14%) do not mention IVF surrogacy at all. In 17 of the 71 countries (24%), IVF surrogacy is practised, but 9 of these countries have no statutes or guidelines.

A few countries make quite specific stipulations about IVF surrogacy:

- In Australia the birth mother must be on the birth certificate, however, different States have different regulations.
- Belgium will be regulated by a separate Law on IVF surrogacy.
- In Brazil, the surrogate host must be related to the commissioning husband or wife, and no payment is allowed.
- In Greece, there must be good medical indications, Court approval is required, and no payment is allowed.
- Hong Kong only allows "full" or IVF surrogacy.
- The Parliament of Israel has passed a special Law on surrogacy.
- Most countries which practise the Islamic faith do not allow surrogacy.
- In New Zealand, each IVF surrogacy case must be submitted to The National Ethics Committee on ART (ECART).
- Russia requires that any surrogate host is 20-35 years of age and already has at least one child of her own.
- South Africa requires that IVF surrogacy is only provided to residents and Court approval is required. IVF surrogacy only is allowed and the host must have had at least one child herself.
- In Thailand the birth mother is the legal mother and the genetic couple must adopt any child.
- In the United Kingdom there should be a medical indication and no payment to the host, other than for "expenses" is allowed.
- In the United States there are generally no limitations, but some States do not allow payment.

DISCUSSION

Treatment by IVF surrogacy remains a controversial issue worldwide. Of the 71 countries from which replies were received, only 17 (24%) state that they actually practise IVF surrogacy. Regulation of some kind exists in 21% of countries, while 14% have not even discussed the issue. In those countries in which IVF surrogacy is practised and from which statistics are available, IVF surrogacy appears only to account for some 0.05 – 0.2% of IVF treatment cycles. However, there are a number of countries in which surrogacy increasingly is being offered to couples travelling from other countries – popularly known as "reproductive tourism" – to receive treatment, because it is either banned in their own countries, or because the treatment is much less expensive. This trend is causing universal concern and recently has resulted in some commissioning couples being unable to adopt or gain citizenship for their children on returning to their own countries. Even in cases in which legal contracts were drawn up between the parties involved, problems have arisen, particularly when the treatment is conducted in a country other than the country of residence.

Payment of surrogate hosts continues to be an issue that provokes much debate. Many countries ban payment to hosts, which effectively ensures there are not enough women who are willing to become surrogate hosts. In these countries, hosts tend more often to be related to or be personal friends of the commissioning couple, and they are willing to go through treatment, pregnancy and labour for their family member or friend. They are only allowed to receive "reasonable expenses". Other countries do allow payment of hosts, which tends to make available more hosts, but, particularly in some less developed countries, that promotes the commercialisation of surrogacy and encourages "reproductive tourism".

Recent relatively small studies have shown that there is little cause for concern about the children born as a result of IVF surrogacy treatment or for the surrogate hosts and the commissioning couples (1, 2).

In most countries, the "birth mother" has always been the legal mother of a child. IVF surrogacy, in which any child born is not genetically related to the birth mother, has complicated this general rule, and many countries or their states, have changed the rules to allow the "genetic parents" to be the legal parents at the birth of the child. These issues, as well as others - for example when the host has changed her mind and wished to keep the child, and when couples separate, have made IVF surrogacy a treatment fraught with problems. However, the majority of cases, if managed with the utmost care with regard to the compatibility of the couples and with appropriate counseling and legal advice, proceed without problems and provide a positive and successful treatment option for a small group of women who otherwise would be unable to have their own genetic children.

Both the European Society of Human Reproduction and Embryology (ESHRE) and the American Society of Reproductive medicine (ASRM) have considered the difficult issue of surrogacy and the ethical issues surrounding it (3, 4).

SUMMARY

IVF surrogacy is a useful treatment option for women who have no uterus, or are unable to bear children for other medical reasons. It allows the commissioning couple to have their own genetic children. It must be conducted with the utmost attention to counseling and legal issues. However, IVF surrogacy still is not allowed in the majority of countries. Where it is allowed, there are concerns about the commercialisation of surrogacy, exploitation of the hosts and an increase in inter-country reproductive tourism.

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Table 15.1
IVF Surrogacy

Country	Allowed by Statute	Not allowed	Not mentioned	Covered by Guidelines	IVF Surrogacy Used
Abu Dhabi		+			
Albania		+			
Algeria		+			
Armenia	+				
Australia	+			+	
Austria		+			
Bangladesh					+
Belarus	+				+
Belgium	+				
Brazil	+				
Bulgaria		+			
Cameroon					+
Canada	+				
China		+			
Columbia					+
Croatia		+			
Czech Rep			+		
Denmark		+			
El Salvador					+
Estonia		+			
Finland		+			
France		+			
Germany		+			
Ghana				+	
Greece	+				
Hong Kong	+				
Hungary		+			
Iceland		+			
India				+	
Indonesia		+			
Iran			+		
Israel	+				+
Italy		+			
Japan			+	+	
Jordan		+			
Kenya					+
Korea			+		
Kosovo		+			
Kuwait		+			
Latvia			+		
Lebanon			+		+

Table 15.1
Continued

Country	Allowed by Statute	Not allowed	Not mentioned	Covered by Guidelines	IVF Surrogacy Used
Mexico					+
Montenegro		+			
Nepal					+
Netherlands	+				
New Zealand	+			+	
Nigeria				+	+
Norway		+			
Panama					+
Peru					+
Philippines			+	+	
Portugal		+			
Russia	+				
Slovakia		+			
Slovenia		+			
South Africa	+				
Spain		+			
Sri Lanka				+	
Sweden		+			
Switzerland		+			
Taiwan		+			
Thailand	+			+	
Tunisia		+			
Turkey		+			
Uganda			+		+
UK	+			+	+
Ukraine				+	
USA			+	+	+
Venezuela				+	+

CHAPTER 16: Experimentation on the embryo

Research on the embryo is not easy to define. For example, variations in the culture media in an effort to improve development of an embryo would certainly appear to be research on the embryo. But, generally speaking, many laboratories around the world use varying culture media in an attempt to improve results without considering this to be experimentation. However, if the experimental design results in the destruction of the embryo, as for example in obtaining cells from the inner cell mass, this can be considered experimentation.

The availability of embryos for research is very controversial and often is a bottleneck in research plans. For the most part, availability of embryos is related to the moral status of the embryo, which is discussed in chapter 19. Many entities confine research to so-called spare embryos. Indeed, in a presidential decree in the United States authorizing the use of federal funds to develop stem cell lines, it was specified that the available embryos must be discarded embryos from those created for reproductive purposes. Furthermore, some states in the United States and other nations have specifically passed legislation prohibiting the creation of embryos for research. However, such was certainly performed at one time in the United Kingdom and has been performed in the United States.

All of this raises the question about the genetic background of the material available for research. Discarded material is just that—designated for discard. It can be strongly argued that for research, it would be very desirable to have the best possible genetic material that could be obtained by genetic screening of designated donors. It is to be noted that many contracts signed before cryopreservation specify that the genetic contributors to the cryopreserved material have the right to designate the use of any cryopreserved material not used for reproduction. Among these options is research, and it is this material that has for the most part been used in such cases that have involved experimentation on the embryo. This, of course, raises the moral issue of the appropriateness of using material, that was intended for reproduction, for purposes other than the original intention.

ANALYSIS OF THE SURVEY

Of the 101 nations replying to a question as to whether human embryos can be used for experimentation, 42 replied in the affirmative and 59 in the negative (Table 16.1). Generally speaking, the reply was consistent with the cultural/religious background of the particular political entity.

It should be noted that for nine nations where there were two respondents, the two answers were disparate. Further investigation indicated that this was due either to vagueness in the guidelines/regulations or the particular respondents were unfamiliar with the guidelines/regulations.

It was a universal finding that, if experimentation was to be undertaken, third party approval was necessary. This could be “internal” as from an institutional review board or “external” as for example by the Ministry of Health. There were numerous variations. For example, in the United Kingdom a licence was required from the Human Fertilization and Embryology Authority (HFEA), which requires all details of the experimental design before issuing a licence to proceed. In the United States, experimentation is allowed but only with private money. Thus, any federal funding from grants from the National Institutes of Health, the principal grant-funding body in the United States, cannot be used. Furthermore, individual states have special requirements. There are some states, as for instance California and Massachusetts, which provide state funds for stem cell research. On the other hand, Louisiana prohibits experimentation on the embryo regardless of the funding source. Similar particular requirements characterise several other nations.

For most countries where embryonic tissue is used for experimentation it must be done prior to 14 days after fertilisation. It is relevant to recall that the 14-day rule arose from an American Ethics Advisory Board in 1978 which realized that it was necessary to identify a period of early embryogenesis during which it was uncertain as to whether a biological entity with individuation would develop or whether the outcome might be a tumour, as for instance a hydatidiform mole or choriocarcinoma. It was later found that this arbitrary 14-day limit roughly corresponded to the time when the primitive streak developed which guaranteed biological individuation.

There are some exceptions to the 14-day rule, for example, Brazil designates five days, Cyprus six, France five. Korea avoids a particular day and simply states that experimentation can be done "before the appearance of a primitive streak."

There were 97 replies to the question of whether or not research could be conducted on fetal stem cells. There were 48 entities in which this was possible and 49 in which it was not. Thus, a number of jurisdictions prohibited experimentation on early embryos but allowed research on fetal stem cells. Among these are Austria, Columbia, Ecuador, El Salvador, Germany, Italy, Kuwait, Latvia, Panama, Philippines, Poland, South Africa, Trinidad and Tobago, Uruguay and Venezuela.

The fact that a number of entities are prepared for experimentation on fetal stem cells, but not on the early embryo, does not mean that active investigation on fetal stem cells is ongoing in these entities.

The analysis of the permissibility of the use of adult stem cells was very similar to the use of fetal cells and does indicate great ambivalence with respect to the origin of the stem cells. This is somewhat surprising as advocates of adult stem cells point out that their use eliminates ethical concerns about using embryonic tissue.

The attitude concerning gene therapy research in general followed the attitude concerning embryonic research. However, there were a few notable exceptions. Thus, Germany, Ireland, Italy, Japan, Mexico and Turkey had no problem with gene therapy research while being opposed to research on embryonic stem cells. Israel was opposed to gene therapy while accepting embryonic research.

SUMMARY

There is certainly no international consensus concerning the use of embryonic tissue for research, that is research that requires the destruction of the embryo, even though available embryos are usually in excess of those required for their initial purpose of reproduction.

In general, about one half of the political entities surveyed is prepared to use embryonic material for research with strict oversight while the other half is not.

With notable exceptions, there has been little change in the proportion of political entities in favour of or opposed to research on the human embryo since the Surveillance 2007.

Table 16.1
Experimentation on the pre-embryo

Acceptability of the use of human embryos for experimental purposes								
Country	**Yes**	**No**	**Country**	**Yes**	**No**	**Country**	**Yes**	**No**
Abu Dhabi		+	Greece	+		Paraguay		+
Albania		+	Hong Kong	+		Peru		+
Algeria		+	Hungary		+	Philippines		+
Argentina		+	Iceland	+		Poland		+
Armenia		+	India	+		Portugal	+	
Australia	+		Indonesia	+		Romania		+
Austria		+	Iran	+		Russia	+	
Bangladesh		+	Ireland		+	Saudi Arabia		+
Belarus		+	Israel	+		Senegal		+
Belgium	+		Italy		+	Serbia		+
Bosnia		+	Ivory Coast		+	Singapore	+	
Brazil	+		Jamaica	+		Slovenia	+	
Bulgaria	+		Japan		+	South Africa	+	
Burkina Faso		+	Jordan		+	Spain	+	
Cameroon		+	Kenya		+	Sri Lanka		+
Canada	+		Korea	+		Sudan	+	
Chile		+	Kosovo		+	Swaziland		+
China	+		Kuwait		+	Sweden	+	
Colombia		+	Latvia		+	Switzerland	+	
Congo		+	Lebanon		+	Taiwan	+	
Croatia		+	Libya		+	Thailand		+
Cuba		+	Lithuania		+	Togo	+	
Dem Rep Congo		+	Malaysia	+		Trinidad/Tobago		+
Denmark	+		Mali		+	Tunisia		+
Dominican Rep		+	Mexico		+	Turkey		+
Ecuador		+	Montenegro	+		Uganda	+	
Egypt	+		Morocco		+	UK	+	
El Salvador		+	Namibia		+	Ukraine	+	
Estonia	+		Netherlands	+		Uruguay		+
Ethiopia		+	New Zealand		+	USA	+	
Finland	+		Nigeria		+	Venezuela		+
France	+		Norway	+		Vietnam	+	
Germany		+	Pakistan	+		Zimbabwe		+
Ghana	+		Panama		+			

CHAPTER 17: Cloning

The current IFFS survey on cloning is limited to reproductive cloning and therapeutic cloning. Reproductive cloning implies a technology designed to generate an animal with the same nuclear DNA as another or previously existing animal. Reproductive cloning, therefore, does not mimic normal reproduction which implies the union of haploid chromosomes from two separate individuals, male and female, to create a diploid individual which is unique. Reproductive cloning in essence creates a twin of the donor nucleus. However, the twin is not an identical twin in the sense that the cloned twin would have the mitochondrial DNA of the recipient egg and therefore in a sense has heterologous DNA.

The sheep, Dolly, was a product of such reproductive cloning. The process is sometimes referred to as somatic cell nuclear transfer (SCNT). The somatic cell is usually a convenient cell and it is remarkable that it works. It had long been assumed that somatic cells were programmed to be whatever they are, for instance, fibroblasts, which had experienced an irreversible genetic change that would not allow it to have a non-specific change reactivated. However, in the process referred to, this seems to have happened.

Reproductive cloning is extremely inefficient. The number of transferred cells which develop is in the 1-2% range. Furthermore, there is a troubling incidence of abnormalities among the developed animals, so that reproductive cloning on the basis of experimental data certainly does not seem anywhere near ready for human application. It is therefore not surprising that in all nations which responded about the use or legality of reproductive cloning it was universally rejected.

Therapeutic cloning is quite different. It is the production of a human embryo which is allowed to go to blastocyst, at which time a stem cell is harvested from the inner cell mass. The stem cell is allowed to perpetuate itself with the intent of having it undergo controlled differentiation for therapeutic purposes. It is well beyond the scope of this survey to discuss stem cell technology; rather it is limited to the question of whether therapeutic cloning can even be allowed. It is to be noted that stem cells could be created by the somatic cell nuclear transfer technique referred to above from a particular person or animal, in which case the recipient of any product of that particular stem cell technology would presumably not be able to reject the product of the stem cell technology.

ANALYSIS OF THE SURVEY

All replying countries uniformly rejected reproductive cloning. This is consistent with the experimental data, which shows that it is an extremely inefficient process and furthermore shows that there is a troubling percentage of abnormal newborns.

Some 51 nations replied to the therapeutic cloning questionnaire and among these 10 countries indicated that therapeutic cloning was allowable (Table 17.1). However, in many instances special situations were mentioned. For instance, in Korea a presidential decree is required for efforts to cure an otherwise incurable disease. In South Africa, it is allowed with permission of the Minister of Health, using only adult umbilical cord stem cells. In the United

States, it is allowed, but only with certain stem cell lines if federal funds are used, although there is no limitation if private funds are used.

DISCUSSION

In spite of the fact that reproductive cloning is very inefficient and produces a troubling number of abnormal newborns, it has been used successfully in a number of species, for instance, in cats, pigs, cows, sheep, mules, dogs, horses and a gaur. It is often mentioned that it should be useful in cloning species that are on the verge of extinction, but there do not seem to have been reports of exotic species being perpetuated by the cloning technique.

Experimental cloning does offer great research potential, but it is beyond the scope of this survey to deal with stem cell technology.

SUMMARY

Reproductive cloning is beset by many biological problems and its clinical application for reproduction is uniformly rejected by nations replying to the questions in this survey. It is unlikely that this will be pursued for the human in the immediate future.

Therapeutic cloning, i.e., stem cell technology, theoretically has great therapeutic potential. The reality of this concept is, until now, elusive except in experimental circumstances.

Table 17.1
Cloning

Country	Cloning Allowed	Comment
Abu Dhabi	–	
Albania	–	
Algeria	–	
Argentina	-	
Armenia	–	
Australia	+	
Austria	–	
Belgium	–	Considered to be embryo research
Brazil	–	
Bulgaria	–	
Canada	–	
China	+	
Colombia	–	
Croatia	–	
Czech Rep	–	
Denmark	–	
Estonia	–	
Finland	–	Situation is unclear
France	–	
Germany	–	
Greece	+	Not forbidden, so it is considered to be allowed and for this reason the law mentions the use of supernumerary fertilized oocytes for "therapeutic purposes".
Hong Kong	–	
Hungary	–	
Iceland	–	
Indonesia	–	The new Health Law (2009) specifically prohibited the creation and use of embryonic stem cells
Iran	+	
Israel	–	
Italy	–	
Korea	+	Only for research on rare or incurable diseases, designated by the Presidential Decree.
Kosovo	–	
Kuwait	–	
Latvia	–	
Libya	–	
Montenegro	+	Only after permission of National Committee for ART (licensing body) and Ethics Committee
Netherlands	–	
Norway	–	
Portugal	–	

Table 17.1
Continued

Country	Cloning Allowed	Comment
Romania	–	
Russia	–	The prohibiting statute was repealed in 2007, a new bill continuing prohibition is now being presented to the Russian parliament
Slovakia	–	
Slovenia	+	Allowed if approved as a research programme by the Ethical Commitee of Slovenia and by the Biomedically Assisted Procreation Committee of Slovenia. Creation of embryos for research is prohibited.
South Africa	+	Only with permission from the Minister of Health using adult or umbilical cord stem cells
Spain	–	
Sweden	–	
Switzerland	–	
Taiwan	–	
Tunisia	–	Not mentioned in the regulations
Turkey	–	
UK	+	Human embryos may be used for therapeutic cloning in the UK under a licence from the HFEA
USA	+	Allowed, not by this regulation, but strictly regulated.
Vietnam	–	

Chapter 18: Gamete intrafallopian transfer

Gamete intrafallopian transfer (GIFT) has declined in clinical practice since Surveillance 2007 and now warrants only minimal attention. Its decline has been brought about by the need for laparoscopy, requiring a more prolonged and complicated procedure, its lower success rates compared with modern IVF, and association with multiple oocyte transfer and resultant multiple pregnancy. The fact that there is no confirmation of fertilisation (ideally limiting it to couples with strict "infertility of unknown cause") and no bonus of associated embryo cryopreservation limits its use.

ANALYSIS OF THE SURVEY

The question asking about the recognised difference between IVF and GIFT produced some confused but enlightening answers. Of the 172, 9 did not answer. Of the remainder, 42 stated that their country recognized a difference and 121 did not. Some countries with more than one respondent produced opposite answers, suggesting that the question was confusing or that there was a variation between different clinics within the country. The latter differences may have reflected the practice in some countries where units within Roman Catholic institutions may have a GIFT-only programme with the unsuccessful couples transferred elsewhere to an IVF programme. In California it was commented that, as the State may have mandated employers who provide medical insurance to subsidise employee IVF, they may be forced to offer GIFT to their employees where there are religious objections to IVF. The question about the limits on the number of oocytes to be transferred had 27 saying yes, and 121 saying no. The use of multiple oocytes was limited to 4 as a maximum, with maternal age over 35 years being the critical factor.

DISCUSSION

Some respondents stated that GIFT was not practised any more, and in the absence of sufficient numbers to reflect success rates and multiple pregnancy rates, it may not be necessary to include GIFT separately in future surveys.

SUMMARY

GIFT remains a very small, niche market, chiefly where the major obstacles to GIFT are outweighed by strict religious objections, that cannot be circumvented by alternatives.

CHAPTER 19: Status of the conceptus

An understanding of the moral, ethical and legal status of the developing human conceptus is key to decision making with regard to the fate of the fertilised human oocyte, i.e., the conceptus. The words, *moral* and *ethical* are often used interchangeably. However, as used herein they have specific meanings. A moral judgment is made against a previously established code. An ethical judgment on the other hand is not made against any particular code but is evaluated entirely on the basis of natural reason. The legal status is determined by legislative action, either at the national level or at a subdivision level, as in the United States one of the states, where common law will provide decisions based on individual suits. A decision about the moral/ethical/legal status of the conceptus is key to any experimentation on the conceptus. This matter is discussed in Chapter 16. In this particular chapter, the status of the conceptus is considered in the abstract. Every worker in the field of assisted reproductive technology sooner or later must resolve this issue concerning the status of the conceptus to be comfortable with the daily decision making in deciding the fate of a particular conceptus with which he or she may be working.

An analysis of the thinking around the world as collated in this chapter is intended to serve as a resource for resolving these issues. The principal issue is that of personhood, i.e., the state of development of the conceptus when society offers protection. There is general agreement that the newborn at term deserves societal protection. However, as noted below, there is no international agreement on when societal protection is acquired prior to a term birth.

ANALYSIS OF THE SURVEY

Among the 103 nations responding to the question, *"for your country by statute, guideline, cultural practice, or recognized and prevailing religious decree, is there a recognized time during human development after which a human person is considered to exist,"* 61 nations indicated that there was a time during development when personhood was acquired at least by one of the criteria mentioned in the question (Table 19.1). However, 42 nations replied in the negative. Among the 61 nations which stated that personhood was acquired during development, there was a wide variation as to the exact time. This varied from "at conception," i.e., at the completion of fertilisation to viability, i.e., very late in pregnancy. The variations are noted in the table (Table 19.1). Many nations settled on 14 days. The history of the 14-day rule is of interest. This arose from the decision by the United States Ethics Advisory Board of 1978. The Board, in discussing this issue, recognised that it was necessary to designate a period of time early in development before which biological individuation was not determined. They could not agree on a time but it was finally suggested by one of the members that 14 days would be a round number and would be close to what they were seeking. This was adopted. It was only subsequent to this that it was realized that the primitive streak, i.e. the beginning of the spinal column and a guarantee of biological individuation, appeared at about 14 days. This was a lucky coincidence. The 14-day rule has therefore been widely adopted as indicating that period after which biological individuation was guaranteed and before which it was not guaranteed and during which period something other than a human fetus could develop, for example a hydaditiform mole or a chorioepithelioma, or a gross genetic mismatch which would have the consequence of a failure to develop.

The answers to the question as to whether the time of the acquisition of personhood is determined by law, guideline, cultural practice, or recognised prevailing religious decree are recorded in Table 19.1. One of the major differences in Surveillance 2010 as compared to

that of 2007 is the increase in the number of countries, particularly in Latin America where there now is a non-constitutional provision that personhood is acquired with conception.

It is likely that the initiative occurred in Costa Rica, where a number of years ago the Constitutional Court ruled that personhood was acquired with fertilisation. This effectively prevented assisted reproductive technology from developing in Costa Rica and it is likely that the spread of the constitutional approach to this question in Latin American countries is an extension of the effect of the ruling in Costa Rica. There seems to be an organised effort to get constitutional action on this in Latin American countries. However, it is interesting to note that, except for Costa Rica, there does not seem to be any other country which has failed to continue to use assisted reproductive technology in spite of the constitutional rulings.

The legal status of the conceptus is not adequately surveyed for all nations. It may be of interest to comment on the legal status in the United States. At the national level, the overriding decision is that of Roe v Wade which established that personhood, i.e., societal protection, was not acquired until viability, i.e., very late in pregnancy. Thus, elective termination of pregnancy is quite legal from a national point of view in the United States.

However, at the state level, the courts have had to determine the nature of the conceptus in several individual cases. In 1989 there was a case involving the dispute over the control of a cryopreserved embryo. The court decided about the nature of the embryo under property principles, i.e., there was no need for the court to consider the nature of the IVF embryo. In short, the court regarded the embryo as property. The implication here is that if the embryo is property it could not be a person. However, in the same year there was a divorce case in Tennessee involving a dispute over the control and disposition of cryopreserved IVF embryos and the court applied custody law implying that the cryopreserved embryos indeed were persons. However, this court ruling was overturned by a higher court which adopted the American Fertility Society guideline characterizing "preembryos" as neither property nor persons but *"occupying an intermediate category that entitles them to special respect because of their potential for human life."* It is also generally held that the parents' directions about the disposition of cryopreserved embryos would not be valid if they were considering the disposition of persons. Therefore, the direction of the parents as to the fate of cryopreserved embryos implies that they are not dealing with individuals, as such would be illegal. In general then, the state courts in ruling have made decisions which are not inconsistent with the national ruling of the Supreme Court in Roe v Wade.

SUMMARY

There is no international agreement about the moral/ethical/legal status of the developing human conceptus. It is clear that in many nations – the Latin American nations are an example – that religious doctrine has been a deciding factor in formulating public policy. A major change in Surveillance 2010, as compared to that of 2007, is that several nations in Latin America have had constitutional rulings which indicate that personhood is acquired with fertilisation. It is also significant that in no nation, except for Costa Rica, have these constitutional rulings had an adverse influence on the prevalent use of assisted reproductive technology.

While a consensus after discussion is unlikely on this subject, the subject of the status of the conceptus represents a topic which would be extremely suitable for a discussion at future international meetings.

Table 19.1
Status of the conceptus

Country	Recognised time	What is this time?	Determined by law, guideline, cultural practice or recognised and prevailing religious decree
Abu Dhabi	+	40 days after implantation	Cultural practice and recognized by religious decree from the sayings of the Prophet Mohammed (PBUH).
Albania	–		
Algeria	+	15 days	
Argentina	+	From syngamy	Civil Code Art 70. The existence of persons begins from conception
Armenia	–		
Australia	+	From the completion of fertilisation	Defined in legislation (Prohibition of Human Cloning Act, 2007
Austria	+	Induced abortion is allowed until a certain gestational age, or for any medical reason; however the embryo (depending on the definition of what is an embryo) outside of the body is strictly regulated by law	Law
Bangladesh	+	40 days	This is cultural practice and religious decree.
Belarus	–		
Belgium	+		
Bosnia	–		
Brazil	+	More than 500 g	Law
Bulgaria	–		
Burkina Faso	–		
Cameroon	–		
Canada	–		
Chile	+	After fertilisation.	Law and religious decree
China	–	14 days	
Colombia	+	At the time of fertilisation	The religious decree prevailing
Congo	–		

Table 19.1
Continued

Country	Recognised time	What is this time?	Determined by law, guideline, cultural practice or recognised and prevailing religious decree
Dem Rep Congo	+	From conception (fertilisation) there is a human person.	Law
Denmark	+	14 days	Law
Dominican Rep	–		By a recently modified law human development is considered to start from conception
Ecuador	+	From the time of fertilization ("moment of conception")	By law and prevailing Roman Catholic religion
Egypt	–	Not defined	Conflicting opinions between religious people, lawyers and medical experts.
El Salvador	+	From fecundation (pre-embryo)	Catholic Religion
Estonia	+	Fertilisation	Cultural practice.
Ethiopia	+	24 hours after birth, by statute	Law and clinical guideline
Finland	+	Baby born ≥24 weeks or ≥500g	Cultural practice
France	–		
Germany	+	At the first cleavage	Law
Ghana	–		
Greece	+	At birth	Interpretation of law by legal experts and court decisions
Hong Kong	+	Appearance of the primitive streak	By law
Hungary	+	7 days	Guideline
Iceland	–		
India	+	14 days	Guideline
Indonesia	–	Depends on religion, culture and other factors	
Iran	+	Depends on religion, culture and other factors.	Law and recognized and prevailing religious decree

Table 19.1
Continued

Country	Recognised time	What is this time?	Determined by law, guideline, cultural practice or recognised and prevailing religious decree
Ireland	+	Depends on religion, culture and other factors	Law protecting the unborn
Israel	–		
Italy	–		
Ivory Coast	–		Cultural practice
Jamaica	–		
Japan	–		
Jordan	+	14 days	Cultural practice and religious decree
Kenya	+	From age of viability	
Korea	–		
Kosovo	+	22 weeks of pregnancy	By guideline
Kuwait	+	6 weeks with heartbeats	Law and religion
Latvia	–		
Lebanon	+		
Libya	+	28 week intrauterine	law
Lithuania	+	After fertilisation	Recognised by religious decree
Malaysia	+	120 days by the Muslim culture, taken by the public administration	Prevailing religious decree
Mexico	+	By religious decree, at time of conception	By law
Montenegro	+	after 10 weeks	Law
Morocco	+		
Namibia	–		
Nepal	–		
Netherlands	–		
New Zealand	+	14 days	Law (HART Act)
Nigeria	+	At birth	Cultural practice
Norway	+	14 days after fertilization.	Law
Pakistan	+	After 4 months (time of quickening)	Prevailing religious decree

Table 19.1
Continued

Country	Recognised time	What is this time?	Determined by law, guideline, cultural practice or recognised and prevailing religious decree
Panama	+	As soon as fertilisation has occurred	Religious and cultural practice, but it is not binding; needing to be followed legally.
Paraguay	+	After fertilisation	Cultural practice recognised and prevailing religious decree
Peru	+	Fertilisation	By national constitution
Philippines	+	Time of fertilisation	Guideline in the 2006 Philippine Soc for Reprod Endocr & Infertility workshop and also based on the guidelines of the Phil. Obstet & Gyne Society Guidelines (2002?) and cultural practice
Poland	+	Zygote	Religion - statements of Catholic Church
Portugal	–		
Romania	+	Not regulated but generally considered after 14 days or when the primiive streak appears	
Russia	–		
Saudi Arabia	+	40 days after conception by Islam	By religious decree
Senegal	–		
Serbia	–		
Singapore	+	14 days after fertilisation	Guidelines
Slovakia	–		
Slovenia	+	Sperm, oocytes and early embroys may be used for Biomedically Assisted Procreation only. The treatment must result in pregnancy	

Table 19.1
Continued

Country	Recognised time	What is this time?	Determined by law, guideline, cultural practice or recognised and prevailing religious decree
South Africa	–		
Spain	+		
Sri Lanka	+	14 days	Guidelines + religious practices
Sudan	+	120 days starting on the first day of LMP	By both law and recognised, prevailing religious decree
Swaziland	–		
Sweden	+	A child: after 22 weeks	Law
Switzerland	+	12 weeks	By law
Taiwan	+	24 weeks of gestation	No induced abortion allowed after 24 weeks, unless for medical reason
Thailand	+	14 days	Medical guideline (and perhaps also religious belief)
Togo	+	From implantation. The implantation period is defined from the time of the missed menstruation	Cultural practice
Trinidad/ Tobago	–		
Tunisia	–		
Turkey	+	As soon as fetal cardiac activity exists	By religious decree
Uganda	–		
UK	+	At birth	Law
Ukraine	–		
Uruguay	–		
USA	+	Viability (Roe v Wade)	Law (Roe v Wade)
Venezuela	+	Conception	Law
Vietnam	–		
Zimbabwe	–		

Chapter 20: Gender selection

Gender selection may be accomplished by embryo biopsy and sexing of a blastomere, or by techniques devised to sort spermatozoa into Y-bearing male and X-bearing female sperm, followed by insemination with sperm of the selected sex. Gender selection is used in efforts to balance families and to prevent sex-linked inherited disorders. Generally, sex selection for family balancing is only practised in a few countries, while its use to prevent inherited sex-linked disorders is more commonly allowed.

Sperm sorting techniques followed by insemination or *in vitro* fertilization (IVF) with the selected spermatozoa have been quoted as having success rates of up to 75% for boys and 85% for girls – there is therefore still a considerable risk of having a child of the non-chosen sex. Selection of embryos of the desired sex by pre-implantation genetic diagnosis (PGD) is much more precise, being successful in up to 99% of cases.

Gender selection by termination of pregnancy of an unwanted sex is considered to be entirely unethical, but regrettably is practised still in a number of countries – invariably against the law. This form of gender selection is not considered in this review.

ANALYSIS OF THE SURVEY

Of 105 countries surveyed, 104 responded. Only 15 countries stated that gender selection was allowed by law or statute, 43 that it was not allowed and 15 that there was "no mention" of gender selection in that country's law or regulation. There were 12 countries that could only practise gender selection by IVF, 2 only by insemination and 12 by both techniques. When responding to the question: *"Is gender selection practised by programmes in your country?"*, 37 stated that it was not practised, even though in three of these countries it is allowed. Only 5 countries answered that gender selection is practised. However, when Table 20.1 is studied, it will be seen that there are inconsistencies in the responses, which it has not been possible to resolve.

None of the countries which responded that Gender Selection was not mentioned in law, and therefore by implication could perform it, do so.

In view of the fact that gender selection was not considered in the Surveillance 2007, it has not been possible to ascertain if there has been an increase in the use of this technique worldwide.

DISCUSSION

Gender selection by analysis of blastomeres from IVF-derived embryos is accepted technology and is allowed and practised in 12 of the 104 countries which responded to this questionnaire. The technique is accurate in its predictions and may be suitable for use in the selection of embryos of the appropriate gender for transfer to the uterus of women who are at high risk of conceiving a child with a serious sex-linked disorder. It is an expensive procedure, since it involves IVF and PGD and is relatively rarely used. From this survey, it appears that gender selection by IVF and PGD of blastomeres is only practised in twelve countries by IVF alone, and another twelve countries responded that it is practised by both techniques. Generally these countries are among the more affluent in the world. It is noteworthy that of the 26 countries which practise sex selection by one or both techniques, 9 are predominantly of the Muslim faith, 14 predominantly Christian and 3 of other religions. The reason that so few countries have considered sex selection is almost certainly because it

is such a contentious issue and ethically difficult to condone without clear medical indications (1).

Enquiry was not made in this survey as to whether sex selection was allowed for 'family balancing' as well as for the prevention of the passing on of serious sex-linked genetic conditions or both. The characteristics of couples seeking sex selection for non-medical reasons (2) and the medical indications (3) have been reviewed, and there is extensive debate in the literature on the ethics of both.

SUMMARY

Of the 105 countries surveyed, gender selection by either sperm sorting techniques and/or embryo biopsy is allowed by statute in only 15 countries, not allowed in 43 and not mentioned in law in 15, but is practised by one or both techniques in 26 countries.

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Table 20.1
Gender Selection

Country	By Statute		Guideline			Used by		Not Used
	Allowed	Not mention	Allowed	Not allowed	Not mention	IVF	Insem	
Abu Dhabi	+					+	+	
Argentina				+				
Armenia		+		+				
Australia			+	+				
Austria				+	+			
Bangladesh								+
Belarus		+		+	+			
Belgium	+				+	+		
Bosnia				+				+
Brazil				+				
Bulgaria				+				
Burkina Faso								+
Cameroon								+
Canada				+				
Chile				+				+
China				+				
Columbia		+				+	+	
Croatia		+		+	+			
Cuba		+		+	+			+
Czech Rep	+					+		
Dem Rep Congo								+
Denmark				+				
Dominican Rep								+
Egypt				+	+			
El Salvador				+				+
Estonia				+				
Ethiopia				+				+
Finland	+					+		
France				+				
Germany				+				
Ghana				+				
Greece	+					+		
Hong Kong	+			+	+			
Hungary		+		+				
Iceland		+		+				
India				+				
Indonesia							+	
Iran		+	+			+		
Ireland		+		+	+			
Israel	+					+		+
Italy				+				
Ivory Coast		+		+	+			

Table 20.1
Continued

Country	By Statute		Guideline			Used by		Not Used
	Allowed	Not mention	Allowed	Not allowed	Not mention	IVF	Insem	
Jamaica								+
Japan					+		+	
Jordan						+	+	
Kenya				+				+
Korea				+				
Kosovo				+				
Kuwait	+				+	+	+	
Latvia				+				
Lebanon						+	+	
Libya				+				+
Lithuania								+
Malaysia		+		+	+			
Mali								+
Mexico						+	+	
Montenegro				+				+
Morocco				+				+
Namibia								+
Nepal				+				+
Netherlands				+	+			
New Zealand								
Nigeria	+		+			+	+	
Norway				+				
Pakistan	+		+			+	+	
Panama				+				+
Paraguay				+				+
Peru						+		+
Philippines					+	+	+	+
Poland		+		+	+			
Portugal				+				
Romania				+				+
Russia		+				+		
Saudi Arabia	+		+			+	+	
Senegal								+
Serbia	+			+				
Singapore				+				
Slovakia						+		
Slovenia				+				
South Africa				+	+			
Spain				+				
Sudan								+
Swaziland								+
Sweden	+					+		

Table 20.1
Continued

Country	By Statute		Guideline			Used by		Not Used
	Allowed	Not mention	Allowed	Not allowed	Not mention	IVF	Insem	
Venezuela	+		+			+		
Vietnam				+				
Zimbabwe								
Switzerland				+				+
Taiwan				+				
Thailand						+	+	
Togo								+
Trinidad/Tobago								+
Tunisia				+				
Turkey				+				
Uganda								+
UK				+			+	
Ukraine		+			+	+		
Uruguay								+
USA	+		+			+	+	

Not mention: Not mentioned

Chapter 21: Conclusions

The expansion of the data collected in this volume is striking. ART has also developed markedly in higher resource economies. Those countries have also elaborated the legal and guideline envelope within which ART is practised. In Surveillance 2007 there were few comments on changes that had occurred in the previous three years, but at the time of this volume, there has been major activity in many countries. The detailed comments have been presented in a new Table, 21.1. Although much has changed in the area of regulation, it is also clear that more activity is in progress. This Table should allow a better appreciation of the recent and forthcoming changes.

In this edition the Statement of general purpose of 1997 and the earlier Prefaces have been retained, as they show clearly the direction that Surveillance has taken in recent years.

A new chapter 20 has been added on Gender selection. The Chapter on GIFT has provided little new information. The material discussed shows the evolution of ART. The questions have been broadly similar to those of previous editions, as they are still relevant and allow for data accumulation leading to comment. Issues that emerge could influence the nature of future questionnaires.

The editors are grateful to all contributors for their patience and persistence in answering such a large questionnaire. It is hoped that it will be a useful compendium that charts changes in the field as it expands globally.

In the 30 years since IVF had its first success, it has transformed the management of infertility. It has also had a powerful impact on society, raising fundamental ethical questions. The economic and regulatory aspects need continuing assessment, so that in all societies infertile couple can have access to life changing treatment.

Table 21.1
Changes from Surveillance 2007 to 2010

Country	Comment
Argentina	Parliament is evaluating a Bill considering regulation of ART practice and insurance coverage.
Australia	The RTAC accreditation process has become more system-based with the appointment of professional accreditors rather than the previous system of assessment of units by a team of volunteers. The previous legislation governing the prohibition of certain acts (Prohibition of Human Cloning Act, 2002) and the regulation of research using human embryos (Research into Human Embryos Act, 2002) was modified in 2007 to allow the use of somatic cell nuclear transfer in some situations and to better define the human embryo.Fertilisation compatible with human development is now accepted as formation of two pronuclei and syngamy. Fetal stem cell research only possible in non-destructive manner usually on umbilical cord derived cells.
Austria	Start of application of the European Law on Tissue Banking; increase of gamete storage possibillity from one to ten years
Belgium	New legislation regulating ART in 2007 and reimbursement of gonadotrophins in 2009
Brazil	The number of centres is about the same, but those registered ones through Redlara show that ART has increased both in cycles and in awareness of accreditation. There is law on frozen embryos and research. The National Surveillance Agency together with the Federal Council of Medicine (CFM) are more strict in terms of practices. There is a new resolution by CFM (Sept 24th, 2009) specifying ART.
Croatia	New law
Czech Rep	ART is covered by statute but also nowspecified by guidelances.There is a licensing body. Two embryos were recommended by the Czech Society for Assisted Reproduction in 2009. Some activity to describe surogacy as a legal method of treatment. Experimental methods used on human pre-embryos are allowed. There is a statute specifying experimental method in relation to embryonic stem cells.
Ecuador	There is no consensus as to the time a frozen embryo can be kept . The fate of these embryos is not usually disclosed by most centres, it is assumed they are kept frozen indefinitely. There are at least 4 centres qualified by "REDLARA" (Red Latino Americana de Reproduccion Asistida), but there are more small clinics.
Finland	The law regulating ART came ino operation in September, 2007
France	Authorization for embryo research and stem cells under certain conditions

Table 21.1
Changes from Surveillance 2007 to 2010

Country	Comment
Greece	The only change is the incorporation into our legal system of the EU Tissue Directives
India	The ART guidelines changed quite a lot after 2007
Ireland	Sperm donation allowed for IVF and non-IVF, oocyte donation allowed. It was not specified in the 2004 guidelines, which were in place at the time of the 2007 survey, that the couple should be in a stable relationship, though it was stipulated in previous editions of the guidelines. New Medical Council guidelines are expected in late 2009.
Italy	PGD/PGS are now allowed. No limitation to the number of embryos to be generated.
Japan	No of centres
Jordan	Guidelines has been written by the Jordanian Society of Obstetricians and Gynecologists and submitted to the Ministry of Health and the Jordanian Medical Association for approval.
Korea	The Bioethics and Safety Act was amended by limiting the frequency of oocyte donation and compensation for actual expenses. Registration and use of stem cell lines.
Libya	No change, but after an international infertility symposiumat the Libyan Obstetric and Gynecological Society in 2009 many issues have been adressed and recommendations have been made for next year's meeting
Malaysia	An ART law has been drafted and is awaiting approval from parliament to come into effect in 2010. The area of research in embryonic stem cells has been given cabinet approval and funding. Private centres are presently doing PGD andPGS.
Mexico	Although guidelines are in place, these are not official and not widely available. PGD is performed in very few centres in Mexico
New Zealand	Frozen eggs can now be thawed and transferred.
Norway	Legislation allowing preimplantation diagnosis for specified indications. The use of embryos for training and research, after the consent from the donors and after application to an ethical board. Treatment of lesbian couples allowed with the use of non-anonymous donor semen.
Portugal	Regulation is now by law with a regulatory authority, on-site inspections and financial and criminal penalities-partial coverage by National Health Service, but only heterosexual couples, either married or co-habiting
Russia	Governmental reimbursement for 10% IVF cycles

Table 21.1
Changes from Surveillance 2007 to 2010

Country	Comment
Singapore	PGS is now allowed as a research program in one IVF centre. Partial reimbursement of IVF in public hospitals was introduced in 2008.
South Africa	Reproductive cloning not allowed according to National Health Act, 2007; therapeutic cloning allowed under specific circumstances
Spain	New ART legislation in 2006, access permitted for every woman without sexual or religious restrictions. Extension of posthumous insemination to 12 months instead of 6. HLA-PGD allowed. New law on research in 2007.
Switzerland	New law regulating PGD under development. Expected to be another 3-4 years until completion
Taiwan	Penalties have changed, as have the number of embryos transferred,
Turkey	The number of embryos transferred is limited to 3 in normal circumstances; it could be 4 in women over 40. Storage limit increased from 3 to 5 years for embryos. Embryonic stem cell research banned.
Uruguay	Oocyte cryopreservation
USA	There is greater flexibility in the federal government to consider support for stem cell research and to create a national environment in which this can occur. Some states are taking the initiative through laws that apply just to their own states. Some state legislatures are responding to well-publicized clinic problems (e.g. octuplets) by iniating legislation to limit the number of embryos transferred or to licence IVF clinics specifically. ASRM is actively involved in many of these legislative processes. SART and ASRM have increased their surveillance and sanctioning of members who do not follow their guidelines.This is a dynamic process and it is not clear how all of these initiatives federally and in the states will evolve. The number of embryos recommended for transfer has been reduced and oocyte cryopreservation has been defined as experimental.