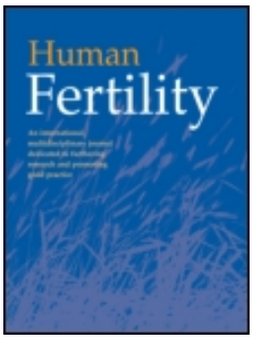

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an international, multidisciplinary journal dedicated to furthering research and promoting good practice

ISSN: 1464-7273 (Print) 1742-8149 (Online) Journal homepage: informahealthcare.com/journals/ihuf20

Association of Biomedical Andrologists – Laboratory Andrology Guidelines for Good Practice Version 3 – 2012

To cite this article: (2012) Association of Biomedical Andrologists – Laboratory Andrology Guidelines for Good Practice Version 3 – 2012, Human Fertility, 15:4, 156-173, DOI: 10.3109/14647273.2012.747888

To link to this article: https://doi.org/10.3109/14647273.2012.747888

Human Fertility, 2012; 15(4): 156–173
© 2012 The British Fertitlity Society
ISSN 1464-7273 print/ISSN 1742-8149 online
DOI: 10.3109/14647273.2012.747888

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GUIDELINES

Association of Biomedical Andrologists – Laboratory Andrology Guidelines for Good Practice Version 3 – 2012

COMPILED & EDITED BY: M. J. TOMLINSON, S. J. HARBOTTLE, B. J. WOODWARD & K. S. LINDSAY ON BEHALF OF THE ABA

The following guidelines have been developed by the ABA to be used in andrology laboratories. They are aimed at providing guidance on current best practice for both diagnostic and treatment-associated andrology and should be seen as the discipline specific supplementary to the Clinical Pathology Accreditation (UK) Ltd (CPA) accreditation 'Standards for Medical Laboratory' and the HFEA Code of Practice for licensed fertility centres (HFEA, 2010). All laboratories are obliged to comply with other legislation such as the Health and Safety at Work Act (1974), Control of Substances Hazardous to Health (COSHH) regulations (1999), the Human Fertilisation and Embryology Act 1990 (as amended) and the European Union Tissue and Cells Directives for the donation, procurement, testing, processing, preservation, storage and distribution of human tissues and cells (2004/23/EC, 2006/17/EC and 2006/86/EC).

The overarching accreditation standards for medical laboratories produced by the CPA (UK) Ltd are presented in the following eight sections: Organisation and Quality Management System; Personnel; Premises and Environment; Equipment, Information Systems and Materials; Pre Examination Process; Examination Process; Post Examination Phase; and Evaluation and Quality Assurance. As such the ABA Guidelines for Good Practice are subdivided along similar lines but with the chief omission of the generic section on quality management.

Guidelines for current best practice have been drawn together from current legislation, from the World Health Organisation (2010), experts in the field of clinical and laboratory andrology (and the ABA as their representative professional body) and from professionals from associated disciplines e.g. embryology, blood and tissue banking. Evidence for best practice is provided where relevant and where possible, otherwise a consensus and pragmatic view of the ABA is provided.

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1. Personnel and Training

1. Laboratory management and professional direction should be carried out by a scientist from a relevant discipline with delegated authority. The individual should be a healthcare scientist with a minimum of 8 years of relevant experience and should be at healthcare scientist grade 7 or above (or an equivalent).
2. If such an individual is not available, then centres should seek the direction from a scientist at another centre. This should be carried out by formal arrangement with an appropriate contract and take account of the need of the appointed individual to be named on the centre's HFEA licence to permit access to confidential information, if appropriate.
3. The precise personnel requirements should be appropriate for the service. Each service should have a consultant lead and the relationship between the consultant and the laboratory lead should be defined within the Centre's quality manual and in the relevant laboratory documentation.
4. Staff number and skill mix should be appropriate for the workload.
5. As an approximate guide, there should be a minimum of 1.0 'whole time equivalent' (WTE) staff in place per 1500 specimens per year if the individual is engaged in all pre-examination, examination and post-examination procedures relating to those specimens. If sufficient administrative support is available for appointments, specimen reception and reporting this number could be extended. These figures are approximate and based on workforce calculations relating to diagnostic semen analysis only. An increased number of tests of lower complexity e.g. post vasectomy semen analysis could therefore be substituted for the above. Centres must therefore base their workforce calculations on the service mix and complexity of testing provided and whether licensed procedures resulting in treatment are offered. Centres providing a storage service for oncology patients should be able to provide cover for 'out of hours' emergencies. Those providing treatment should be able to provide weekend cover as directed, in order to meet the needs of patients.
6. All new staff should undergo a comprehensive orientation and induction programme both at an institutional level e.g. the parent organisation, as well as at laboratory level.
7. All members of the laboratory should have documented evidence of their competence for each laboratory process that they undertake. Recommendations and information on appropriate training should be offered where appropriate. Maintenance of competence should be demonstrated by ongoing continuing professional development (CPD), a continued programme of direct observation of procedures (DOPS) and/or measureable examination audits. Membership of a formal CPD scheme would be beneficial for scientists working in andrology.
8. Centres providing sperm storage should ensure that staff are trained and competent in cryopreservation including the safe use of cryogenic gases and equipment, including pressurised liquid nitrogen delivery vessels, nitrogen dewars and if necessary nitrogen vapour storage systems. Staff should also be competent in the use of appropriate PPE, gas

extract system and oxygen depletion monitoring equipment as well as the maintenance and monitoring of their cryostore and be familiar with the actions required in the event of an alarm event during or outside of normal working hours.
9. All staff should undergo annual appraisal/joint review and keep and maintain a personal development folder, documenting all relevant training, whether it is 'in-house' or external.
10. There should be administrative and support staff in post to meet the needs of the service and ensure satisfaction of patients and clinical users.
11. There should be adequate cover by fully trained and competent personnel for 'out of hours' working and emergency cover, staff holiday/sickness.
12. There should be an ongoing relevant and funded training programme for scientific staff including the opportunity to attend relevant clinical and scientific meetings. All training should be formally recorded as part of each individual staff member's personal development portfolio.

2. Premises and Environment

Generally, the premises and environment should be designed and constructed to a specification which suits its intended purpose. The main considerations for the facility are the well-being of staff and patients, the maintenance of quality of cells or tissues being processed and its general suitability for the activities required of it.

1. The andrology laboratory should provide adequate space for the levels of staff, equipment and activity within it.
2. Laboratory security must take account of the need for environmental control, safety and confidentiality.
3. An emergency power supply should be provided for all critical items of equipment, including incubators, freezers and monitoring equipment.
4. Equipment should be used within sufficient and safe operating space in accordance with the manufacturers' specifications.
5. Laboratory surfaces including working surfaces, floors, and walls must have non-porous surfaces that can be cleaned easily.
6. There should be clear separation between laboratory and clerical areas.
7. Attention should be paid to general working conditions, such as ergonomic bench and seating height, ambient temperature, air quality and lighting.
8. Where appropriate, specimens should be processed in a Class II Biological Safety Cabinet.
9. Appropriate personal protective equipment (PPE) must be provided to all staff handling biological and/or cryopreserved specimens.
10. Specimen production/collection areas should be designed and equipped with careful consideration to the following:
    a. The clutter free and safe decontamination
    b. The safe delivery of samples
    c. The effective and efficient receipt of samples
    d. The comfort, privacy, security, hygiene and safety of patients
    e. The security and safety of staff
    f. Access for disabled persons
    g. Requirements for couples
11. There must be secure designated controlled access areas for the storage of laboratory records.
12. Processing of sperm for treatment or cryogenic storage must only take place in premises licensed by the HFEA for these purposes and in a designated clean area that complies with legislation. This might include use of a Class II hood in order to minimise either particulate or microbial contamination of the specimen. Microbial and particulate monitoring should be implemented to ensure grade D background air quality with a minimum of grade C but ideally grade A within the immediate processing area.
13. Storage of frozen cells and tissues should be carried out in a dedicated area within a designated secure and safe licensed facility. Access to this area should be limited to trained and competent staff authorised under the terms of the licence. A senior member of staff should be designated as 'supervisor' and the main contact for the cryostorage facility. Risk assessments should be carried out with respect to the following:

    a. The location, which must allow the safe delivery of frozen specimens and liquid nitrogen, with respect to staff and members of the public. Where possible this should be sited adjacent to an external wall with clear access to an exit and have suitable ventilation. Lower ground floor location MUST be avoided. Centres must take into account ease of access, floor space, the need for ventilation, and security.
    b. PPE comprising: eye, hand, arm, foot and body protection must be provided to staff working with liquid nitrogen and its associated equipment
    c. The depletion of oxygen. There must be low-level forced mechanical extraction and air flow through the room which is adequate for the volume of nitrogen stored. The storage room must have an oxygen depletion monitor, linked to an external warning system. Alarms and early warning systems should be checked and serviced regularly for correct operation. The oxygen detection cell must be regularly replaced in accordance with manufacturer's instruction. The use of personal portable oxygen depletion monitoring is recommended, particularly during cryostorage audit procedures.
    d. In the event of significant spillage, emergency procedures must be in place to deal with nitrogen

hazards e.g. burns and asphyxiation and allow the increased volume of gas generated to escape.

e. Centres should take steps to avoid lone working with liquid nitrogen.
f. There should be an alarm system for the early warning of an inappropriately high temperature (or inappropriately low liquid nitrogen level) within a storage vessel which must be tested on a regular basis. There should be a formal staff on call rota to respond to out of hours alarms and all staff should be fully trained in the appropriate action to be taken in the event of an emergency,
g. Low level alarms should be fitted to liquid storage vessels. High temperature alarms are not recommended for liquid storage vessels. Ultra low temperature will be maintained with very low levels of nitrogen which, once expired, will result in an exponential rise in vessel temperature.

3. Equipment, Information Systems and Materials

Documented procedures must be in place to manage any piece of equipment, consumables or reagents, which have a direct impact on the quality of the laboratory output.

General

a. There must be clear and unambiguous traceability between any piece of equipment, consumable or reagent and any patient's sperm or testicular tissue.
b. Any piece of equipment or reagent, which comes into contact with patients or their biological material, should comply with the Medical Devices (Amendment) Regulations (2008).
c. Media to be used for the preparation and culture of sperm must be manufactured under conditions observing good manufacturing practice (GMP). Any additional reagents or media should be of purity appropriate for the intended purpose.
d. Any item of laboratory equipment or an accessory which is used either as part of a diagnostic or therapeutic process should be fully validated and CE marked in line with EU regulation.
e. Any equipment or reagents which has been modified in any way and used not in accordance with manufacturer recommendation, must have documented evidence of compliance with regulation for *in vitro* manufacture. This should comply with the *In Vitro* Diagnostic Medical Devices (IVD) Directive (2003): In House Manufacture.

Third party agreements (TPAs) should be established with suppliers of media and consumables to ensure continual and unwavering quality of the product, its specification and its delivery.

Equipment

a. The service and calibration schedule for all equipment should be in line with manufacturer's recommendations and supported by relevant documentation.
b. Laboratory equipment must be fit for its purpose and suitable for cleaning and decontamination.
c. There should be a procedure in place for, and documented evidence of, the decontamination of all items of equipment prior to service and maintenance.
d. Critical pieces of equipment such as incubators, cryostorage vessels, refrigerators and monitoring equipment must be connected to emergency power supplies and linked to a suitable early warning system in the event of failure.
e. Safety cabinets used for the processing of gametes and tissues should be routinely monitored to ensure appropriate air quality.
f. New equipment should be fully validated prior to use. Laboratories should not view CE marking as a substitute for independent validation.

Media and Reagents

a. Media and reagents must be stored according to manufacturer's instructions. Where storage at a defined temperature is specified, ongoing records of the storage temperature should be documented.
b. Where possible temperature critical consumables should be split between two temperature-controlled storage units to prevent total loss in the event of equipment failure.
c. All seals and packaging on commercial products should be checked on arrival.
d. Certificates of analysis and details of quality control measures should be supplied by manufacturers and checked for correspondence with the batch delivered.
e. Culture medium or cryoprotectant should not contain any material of animal origin.
f. Media, consumables and reagents should be logged into a stock and batch control system and used in date order or as appropriate.

Semen Analysis

All semen analyses should be carried out according to validated methods and procedures and where available evidence based guidelines including those published by WHO, ABA and ESHRE. In that:

a. Phase contrast microscopes should be used for all examinations of live sperm.
b. Heated microscope stages should be used for all examinations of sperm motility at 37°C
c. Multichannel counters should be used for performing differential counts such as those for motility or morphology.

d. Bright field microscopy should be available for the examination of sperm morphology. Slides should be stained using WHO recommended methods.
e. Positive displacement pipettes should be used for accurate dispensing of semen.
f. Neubauer haemocytometers should be used for assessing sperm concentration. An alternative counting chamber can be used but must be validated against this chamber.
g. Slides with 22 × 22 mm coverslips or specialised chambers with a fixed 20 μm depth should be used for the assessment of sperm motility. Slides used for assessment of motility should allow for a 20 μl depth to allow for full rotation of the motile sperm.
h. MAR or Immunobead tests may be used for the assessment of antisperm antibodies.
i. Seminal pH should be assessed using pH test paper.
j. Daily logging is required for any temperature-controlled items of equipment.

    a. Heated microscope stages
    b. Incubators
    c. Heating blocks
    d. Refrigerators and freezers
    e. Water baths

Logs should be regularly reviewed to ensure no deviation from specified temperature range.

Laboratories using any alternatives to those recommended above should provide full comparative and clinical validation.

Sperm cryopreservation

a. Marker pens, printed adhesive labels and additional RFID (radio frequency identification) or barcode labels can be used to label frozen stored samples. Such devices must be able to withstand immersion in liquid nitrogen and ultralow temperatures (−196°C) for long term storage (see F5).
b. Labels should contain a minimum of 3 items of identifiable information pertaining to the patient or donor.
c. Freezing equipment. There should be validation of the cooling rate and methodology used to freeze sperm or testicular tissue. Contingency plans should be in place in the event of equipment failure and technical failures of controlled rate freezers.
d. Packaging materials for the cryopreservation of sperm must be used according to manufacturers' instruction. The integrity of cryo-packaging should withstand long-term storage at ultralow (liquid nitrogen) temperatures. Packaging should be sterile and have an effective sealing method, to prevent contact between liquid nitrogen and the frozen contents. Plastic ampoules and glass vials are not recommended for storage of samples immersed in liquid nitrogen due to the risk of viral contamination and explosion.
e. Vacuum lined storage vessels (dewars) should be used for storing sperm in liquid nitrogen or the vapour phase of nitrogen. Storage should be carried out in suitable vessels purchased from reputable manufacturers. All dewars should be regularly inspected, monitored and tied into a suitable equipment replacement cycle. Any catastrophic vessel failure should be reported to the relevant regulatory authorities. Evaporation rates should be monitored by assessing liquid levels weekly as part of routine maintenance to allow early prediction of a potentially failing dewar. Centres should avoid subjecting cryogenic vessels to mechanical stress.
f. All new storage vessels should comply with the standards required as a class IIa medical device.
g. All storage vessels should be secured with locks.
h. 'Dry Shipping' containers should be used for the transport of samples and primed to manufacturer's instructions. Centres should ensure that:

    i. Excess liquid nitrogen should be decanted from the shipper prior to its use.
    ii. Centres should validate shipping vessels and regularly monitor their performance (static holding time).
    iii. Centres should use the empty and fully primed weight of the vessel as an indicator of nitrogen absorption.
    iv. Shippers should be stored upright during transit and placed within a protective shipping container, specifically manufactured for this purpose. This should be clearly labelled according to current regulations.
    v. The transport conditions, including the temperature and time limit should be specified and recorded according to the legislative guidance.
    vi. Data loggers may be used to verify internal shipper temperature during transport.
    vii. Glass vacuum flasks should not be used for the storage or transportation of liquid nitrogen.

i. Alarms must be in place for storage dewars, vapour refrigerators and for room oxygen level. These should be linked to a suitable external warning system such as an autodialler or building management system which has a defined mechanism to contact on call staff out of working hours.
j. Laboratories must have sufficient spare and appropriate capacity to rapidly transfer samples to in the event of a dewar failure.

Laboratories using any alternatives to those recommended above should provide full validation.

4. Pre-Analytical Processes

Information for service users

a. Referring clinicians

All centres must provide comprehensive service user information. This should include:

- Introduction to the service
- Location and useful contacts
- Key personnel
- Normal working hours
- Scope of services
- Where relevant, how to refer a patient for:

  i. Diagnostic Semen Analysis
  ii. Post Vasectomy Semen Analysis
  iii. Post Chemotherapy Semen Analysis
  iv. Sperm storage
  v. Sperm Donation
  vi. Assisted Conception

- Selection/referral criteria
- Consent forms according to the current law and statutory codes of practice (where appropriate)
- Provision of information for the patient
- Instruction for the collection and delivery of the specimen
- Procedures for repeating semen analysis (where applicable)
- Results and interpretation of diagnostic tests
- Funding

  i. Storage specific procedures
  ii. Patients who are unwell/dying
  iii. Notification of patient's death/change of address
  iv. Dealing with adolescents
  v. Problems with producing a specimen

b. Patient information

(a) Patient information for *semen analysis* should cover the following:

- A brief outline of the tests carried out and why they are necessary
- How the samples are collected and delivered both for samples produced 'on' and 'off' site, including:

  i. The required period of sexual abstinence
  ii. The importance of collecting the entire sample
  iii. The need for personal hygiene
  iv. The need to use the specimen container provided
  v. Transportation to the lab
  vi. The need for accurate labelling

- Where the andrology laboratory is located
- How the patient obtains an appointment
- Why repeat tests are sometimes requested
- How the result is obtained
- Andrology laboratory contact details
- Additional information should be available for patients with (or with suspected) retrograde ejaculation
- Account should also be taken of patients with disabilities

(b) Additional information for those having *post vasectomy testing* should cover:

- How long after surgery testing should take place
- Definition of clearance
- Definition of special clearance
- The need to use other forms of contraception until advised otherwise by the referring clinician or specialist

(c) Patient information for sperm storage (sperm banking) should cover the following:

- A brief outline explaining exactly why sperm storage is required, what is involved and who it is appropriate for
- How the samples are collected and delivered, both those samples produced 'on' and 'off' site
- Where the andrology laboratory or sperm bank is located
- How the patient obtains an appointment
- Payment details if relevant
- The process of sperm storage, consent, sample collection, processing and storage
- Duration and conditions of storage
- Registration of fathers in posthumous treatment
- The right to modify or withdraw consent
- How frozen sperm are used in ART to achieve a pregnancy
- Risks associated with long-term storage including limitations of equipment/materials
- Risk associated with storing sperm once any therapy has commenced
- Family planning, during and immediately after therapy (e.g. chemotherapy for oncology patients)
- Counselling
- Follow-up semen analysis for patients in whom spermatogenesis may return.
- The need to keep the clinic up to date with any changes to contact details

The ABA recommends that adolescent patients receive information (written and verbal) which is distinct from the above and addresses their specific needs.

(d) Information for prospective sperm donors should cover the following:

- Why sperm donors are required and what the donations are used for
- How sperm donors are selected
- What screening tests are performed before becoming a donor
- What is involved in the donation process
- Sperm donation and legal requirements including the need to disclose identity to a national register
- The right to modify or withdraw consent
- Whether there is any compensation for donating
- How to become a donor, contact details and where to find the laboratory
- National support agencies and organisations for donors and patients

Request forms

Should be explicit and unambiguous.

(a) Request forms for semen analysis should include the following:

- Sufficient information about the patient to permit unequivocal identification
- Details of the referring clinician and GP (if different)
- Address of the laboratory
- Unique patient number
- Laboratory accession number
- Details of investigations required
- Details of previous investigations/tests including screening for infectious diseases
- Relevant clinical details and history
- Notification if patient constitutes an infection risk

If testing takes place as part of the investigation of a couple, the laboratory must emphasize to requesting clinicians, the need for testing to be carried out under the male name and a unique identifying reference.

(b) Requests for sperm storage should include the following:

- Contact details for the referring clinician and GP
- Contact details for the patient
- NHS number
- Address of the laboratory
- Reason for storage
- Diagnosis (if relevant)
- Therapy details (if relevant)
- Relevant clinical details and history
- Results of screening for HIV and Hepatitis B and C (if available)

The Referring/requesting centres should inform the storage facility if the patient has special needs or is unwell. Storage centres should ensure that a care pathway for the medical care of oncology patients is clearly defined. In such cases, alternative arrangements for specimen collection, transport and patient consent should be made. In circumstances where semen is collected offsite there should be a TPA in place between the collection site and the storage centre.

Note: Referring centres should be aware that any patient storing sperm will require legal consent if he intends his partner to use his gametes posthumously. In addition, any patient who wishes to register as the legal father of any child born posthumously must complete the relevant consent form. This is of particular importance for acutely ill patients with a poor prognosis or in situations where the health of the patient may compromise their ability to give informed consent.

Specimen collection

a. Standard specimen containers should be CE marked*, have a secure air tight lid and be wide mouthed. Where possible sperm toxicity testing of batches of specimen containers should be performed. For samples to be used in treatment or storage, the selection of containers which have undergone mouse embryo assay (MEA) testing is preferable.
b. Alternative methods of sample collection should be available, such as use of non-spermicidal condoms.
c. Samples should not be collected using the withdrawal method (*coitus interruptus*).
d. Centres providing a treatment or storage service must have facilities for sample production. These should be private, comfortable and provide basic washing facilities. These should not be a staff or public toilet (carrying out a sexual act in a public toilet is a criminal offence).
e. Where there is the need to establish a chain of custody e.g. legal/forensic cases, samples must be produced 'on-site'.
f. Where samples are delivered by third parties a chain of custody must also be established.
g. Patients providing specimens for sperm banking, donation or licensed treatment should be encouraged to produce their sample 'on-site'
h. Patients producing samples 'off-site' should follow the 'instructions to patients' and attend the andrology centre within one hour of production. The identity of the patient should be established by written confirmation.
i. Sample pots must be labelled with at least 3 identifiers. Where identifying information is incomplete laboratories should risk assess the processing or disposal of the sample on a case by case basis.

*Centres should be aware of the limitations of CE marking of low risk products as this does not indicate that sperm toxicity testing has been carried out.

Specimen reception

There should be adequate facilities and procedures for specimen reception. For each patient, centres should obtain information on:

a. The practitioner who requested the test or procedure
b. Whether the sample was complete.
c. Whether the sample was produced on or off site.
d. Whether the specimen production procedure was followed.
e. The duration of sexual abstinence
f. Any recent illness or relevant medication.
g. Centres should have procedures in place for decontamination of the specimen production room between patients.
h. Staff must ensure that sample pots are labelled with at least 3 identifiers.
i. There should be a witnessing procedure in place in order to verify that the details on the specimen pot, request and report forms correspond.
j. Unlabelled samples arriving at the laboratory should be discarded if identity cannot be confirmed beyond reasonable doubt.

k. All samples should be given a unique accession number.
l. Time of collection, delivery and analysis

Specimen rejection

Centres should develop their own 'specimen rejection' criteria. These may be applied differently to samples used for diagnosis (semen analysis, PVSA) or therapy (assisted conception, cryopreservation) and take into account the risk associated with partial or non compliance with the specimen acceptance criteria listed (a-l) above. ABA recommends that samples are rejected outright if:

i. Unequivocal identification of the patient's sample is not possible.
ii. Samples provided for PVSA are incomplete

5. Analytical Processes

Diagnostic semen analysis

a. All examinations of live sperm should be carried out using phase contrast or differential interface contrast microscopy.
b. Macroscopic measures including pH, volume, liquefaction and viscosity should be routinely recorded.
c. Time dependant measures: pH, sperm motility, agglutination and antisperm should all be completed within 60 minutes of specimen production.
d. Sperm concentration and other measures should be completed by the end of the working day.
e. Sperm morphology analysis* and indirect antisperm antibody tests should be examined and reported on within a pre-defined time frame which meets the needs of the clinical users of the service.
f. Sperm motility analyses should always be performed at 37°C using a heated microscope stage.
g. Motility grades should be measured (a = rapid progressive, b = slow progressive, c = non-progressive, d = static). There is clinical evidence supporting sperm velocity being a strong predictor of fertility outcome.**
h. Vitality testing using either Eosin/Nigrosin or the Hypo-osmotic swelling (HOS) test should be available for samples with low motility.
i. Sperm concentration should be assessed using the Haemocytometer method. Any alternative to this should be validated against the Haemocytometer for samples at both high and low concentration.
j. Antisperm antibodies may be assessed using the MAR or Immunobead tests. Clinics not performing this test routinely should have referral arrangements with another laboratory in place, should the test be requested.
k. If diagnostic sperm preparation is performed, the setting of clinical thresholds for post preparation semen parameters should be evidence based and validated against clinical data.

If laboratories propose methods other than those described above or recommended by the WHO (2010) then written justification and full laboratory validation should be provided which measures that alternative against the recommended standard. The ABA does not recommend the use of methods for sperm quality analysis which do not involve the direct microscopic visualisation of the specimen and instead employ mathematical algorithms to calculate semen quality e.g. spectraphotometric methods.

*There is clear evidence that sperm morphology can have an impact on fertility. Due to the variety of different methods used and uncertainty regarding discrimination the precise interpretation and value of the percentage of normal forms in a given sample remains controversial. Individual clinics need to determine how best to apply morphology analysis to identify specific conditions which can cause sterility.

**The ABA acknowledges the WHO 2010 recommendation to report motility of grades a + b combined, but recommends reporting of a and b as separate motility grades.

Uncertainty
There is always a degree of error or uncertainty associated with any laboratory measurement of biological processes. Below is a summary of recommendations which should be considered to reduce the level of uncertainty associated with measurements made in the andrology laboratory.

a. Standardising specimen collection procedures will reduce the inherent biological variation in semen quality
b. Complying with specimen acceptance criteria
c. Ensuring specimens are homogeneous
d. Training and ongoing assessment of competence
e. Following standardised operating procedures
f. Increasing the number of sperm assessed per analysis
g. Multiple sampling of the same specimen
h. Implementing IQC procedures
i. Participating in relevant EQA

Post vasectomy semen analysis

Post vasectomy semen analysis (PVSA) should be carried out as follows:

a. Patients should wait at least 16 weeks before attending for PVSA and should have ejaculated more than once per week. (see Note 1)
b. Clearance should not be granted on the basis of the analysis of a single sample.
c. It is advised that unlabelled specimens be discarded.
d. Centres should obtain written confirmation that the patient has collected the entire sample; otherwise the result should be disregarded.
e. Postal samples should only be permitted if there is significant risk of patient non-compliance with note of appropriate limitations (see k). Specific risk

assessments should be performed in collaboration with service users with regard to postal samples.

f. Postal regulations for pathological specimens must be adhered to. End users must be notified of the limitations of the test in this instance.
g. A wet preparation should be examined using phase-contrast optics.
h. The examination of a single 10 µl drop of the wet preparation is not recommended. The ABA recommends that laboratories adopt one of the following strategies to improve the chance of detection of sperm:

   A. Centrifugation of a portion of the sample
   B. Examination of multiple aliquots
   C. Examination of a larger volume

i. Samples too viscous to form a pellet should be treated by an enzyme digester e.g. alpha-chymotrypsin prior to centrifugation. Centres must ensure that end users are aware that this step renders potentially motile sperm, immotile upon treatment.
j. Evaluation of sperm numbers should be expressed as millions per ml or numbers seen in the volume examined.
k. The initial (wet preparation) testing should be completed within 4 hours of specimen production, however it must be recognised that sperm may have lost motility within this period of time.
l. All end-users should be notified and be in agreement with any centre which performs PVSA to a lesser standard.
m. Samples should not be reported as clear if motile sperm are identified in the analysis of the ejaculate.

Note 1: Samples collected less than 16 weeks post-vasectomy have a much higher chance of clearance being incomplete. Ideally patients should have at least 24 ejaculations prior to sample testing. Patients over the age of 45 may well require significantly more ejaculations to establish clearance.

Note 2: Operators should remember that hyperviscid samples may not be homogenous, and require treatment before an initial wet preparation can be examined.

Note 3: It is impossible to definitively report the absence of cells due to the inherent limits of detection. Results should therefore either report a locally derived detection limit or use an appropriate expression such a 'no sperm seen upon examination of precipitate' rather than azoospermia with post-vasectomy samples.

Note 4: If centrifuged pellets contain sufficient detritus to obscure sperm this must be noted in the reported result. In such circumstances the analysis of a larger volume may prove advantageous.

Note 5: Interpretation: appropriate clearance of sperm for effective sterilisation is compatible with low numbers of immotile sperm and does not need azoospermia. However the 'Special Clearance' given in such circumstances is an opinion based prognostic comment and should only be given by appropriate individuals in possession of all the relevant information in terms of the operation and laboratory tests. Thresholds for special clearance should be developed by the lead andrologist and surgical providers of vasectomy.

Aseptic techniques for sperm processing

a. Protective measures should be in place to ensure aseptic conditions for gametes during processing for treatment or cryopreservation.
b. Material from only one patient must occupy the processing area at any one time.
c. Suitable monitoring should be carried out regularly to verify the quality of air in the processing area and of the background laboratory air.
d. Care should be taken when transferring gametes to cryo-straws or other cryo-containers, to minimise the risk of contaminating the outside of the container.

Sperm preparation

Sperm preparation methods are designed to take sperm from the seminal fluid and place them in an artificial media, which will support sperm function. The aim of sperm preparation is to select sperm with improved motility, morphology, DNA integrity which is free from seminal plasma, non-sperm cells and contaminating micro-organisms.

a. All media used for sperm preparation (e.g. density gradient media, sperm buffer) must be validated and batch numbers recorded. 'Homemade' media should not be used.
b. The sperm preparation method, whether density gradient centrifugation or swim-up should be validated in terms of effectiveness. Effectiveness should be measured by post-preparation sperm motility and outcome of ART procedures.
c. All semen parameters pre- and post sperm preparation should be recorded using the methods described above
d. Diagnostic sperm preparation should state starting volume/weight and re-suspension volume of sperm. Sperm concentration should be reported as millions/ml.
e. Diagnostic sperm preparation should be clinically validated in that thresholds for sperm yields should be related to clinical outcomes in ART procedures. Diagnostic thresholds should be agreed upon with clinical colleagues using clinical data and evidence in the literature.
f. Sperm preparation for treatment or cryopreservation must use sterile media and consumables. Operators must be trained in and use suitable aseptic techniques and preparation should take place in an appropriate standard of air quality.

g. Density gradient media used in assisted reproduction procedures must be licensed for used in ART.
h. Prepared sperm should be protected from extreme temperature and/or pH fluctuations
i. There should be suitable decontamination procedures between patients.
j. Laboratory staff should avoid processing more that 1 sample at any one time.
k. Witness confirmation of identifiers should be obtained at every stage where the gametes are transferred from one container to another e.g. from specimen pot to centrifuge tube, to a further centrifuge tube and into either insemination catheter or dish (HFEA, 2010). Electronic systems and protocols for witnessing can be used provided they have been risk assessed according to current laws and statutory codes of practice.

Sperm preparation for high risk specimens

As many pathogenic microorganisms are sexually transmitted, all processes which involve the handling of semen or washed sperm carry biohazard risk. In particular specimens produced by individuals who are seropositive for HIV, Hepatitis B and Hepatitis C carry significantly higher risk and should be identified and handled accordingly

a. Vaccination is the most effective method of preventing Hepatitis B transmission prior to unprotected intercourse or ART.
b. Patients should be fully counselled prior to treatment, regarding the risk to a negatively screened female partner and any potential offspring resulting from assisted conception treatment.
c. Negatively screened semen samples can be processed and used for insemination of positively screened female partners with no risk of infection.
d. Patients should be advised that sperm washing for high risk samples is a risk reduction and not risk elimination procedure.
e. Sperm preparation for high risk samples involves additional risk reduction methods. Risk reduction procedures should include:
    i. Changing tubes to reduce viral carry over between process steps
    ii. An additional swim up of the re-suspended post density gradient pellet in a clean test tube
    iii. Viral testing of the sample post preparation*
f. Where cryopreservation of potentially infectious samples takes place, laboratories should implement as many risk reduction measures as are practicable, which may include:
    i. Storage in a closed packaging system which remains robust at ultralow temperatures e.g. high security straws
    ii. Storage in the vapour phase
    iii. Separation of samples in multiple vessels according risk status and viral type e.g. screened, unscreened, positive, processed
g. To reduce the nosocomial risk to staff, additional personal protective equipment, to include visor or goggles, a face-mask, an apron and double-gloving, should be provided to all staff handling high risk biological specimens.
h. To reduce the nosocomial risk to other patients, separate equipment should be used for processing all high risk specimens. All equipment should be thoroughly disinfected following handling of high risk specimens, using a disinfectant that is known to eliminate the virus.
i. Clinical waste bins used for the disposal of all consumables and sample pots from high risk specimens should be labelled and disposed of according to local approved hospital or service protocols after the procedure.

*Viral testing strategies and procedures should be developed and validated locally and in collaboration with a Consultant Virologist. Where either presence of virus or viral load testing is not performed post preparation, clinics should have procedures in place for evaluating the risk of transmission in the absence of such tests and for provision of the appropriate implications counselling to the patient/couple.

Sperm cryopreservation and storage for patients and sperm donors

Centres must be able to demonstrate to service users that methods used for sample processing, freezing and storage are optimised and validated. Laboratories should be able to demonstrate that any significant reduction in post thaw semen quality should not be attributable to technical limitations nor to conditions of freezing and storage.

a. Centres providing sperm cryopreservation and storage must ensure all patients have appropriate consent in place prior to storage.
b. All samples for cryopreservation should have their quality assessed using the methodology outlined above (F1).
c. Methods of sperm processing and freezing must be validated by demonstrating a suitable post thaw recovery of motile sperm and satisfactory outcome in their use in ART procedures.
d. All issues surrounding the processing of patients, the provision of information and consent must be carried out in accordance with current laws and statutory codes of practice.
e. There should be adequate decontamination procedures for controlled rate freezers, nitrogen vapour freezers and liquid nitrogen dewars.*
f. There should be adequate separation between diagnostic and sample processing areas.
g. Laboratory staff should not process more than one patient sample at any one time.
h. Sperm should be frozen in suitable packing material which should be used according to manufacturer's

instruction. The integrity of packaging materials should withstand long-term storage at ultralow (liquid nitrogen) temperatures.

i. Packaging materials must be sterile and have an effective sealing method, to prevent contact between liquid nitrogen and the frozen contents.
j. Frozen samples must be labelled with at least 3 identifiers. Witness confirmation of identifiers should be obtained prior to analysis and transfer of processed sample from specimen container to the packaging containers (cryovials or straws) (HFEA, 2010).
k. Long-term sperm storage must take place at temperatures lower than −140°C (below the glass transition of water temperature). Centres should be able to provide documentary evidence that samples are to have been maintained at acceptable storage temperatures for the duration of the storage period.
l. Centres storing in the liquid phase should demonstrate that the risk of exposure of frozen contents to the liquid nitrogen is negligible.
m. Centres storing in the vapour phase of nitrogen should ideally do so in specialised vapour vessels with auto filling. However, adaptation of existing liquid dewars may be used providing that rigorous procedures are implemented to maintain an appropriate liquid level.
n. Centres should perform a regular storage review to demonstrate an effective inventory control system and to reconcile patient records with stored material. A 'bring forward' strategy should be in place to ensure patients have adequate notice if their agreed storage period is due to end.
o. Plastic straws, which have become broken or their sealing plugs expelled during storage in liquid nitrogen or during audit should be recorded and reported.
p. Centres should ensure that all regulatory paperwork is completed for each freezing process and that patients are given copies of all completed forms.

*There has been considerable controversy surrounding decontamination of storage vessels. The ABA suggest centres consult their local infection control team and virologists in order to establish and risk assess procedures for the cleaning of vessels, using the guiding principles that the future viability and replication of virus requires viable human cells/tissues to be present. Risk assessments should include a minimum predefined period between decommissioning and recommissioning to ensure that the risk of the presence of viable human material and/or pathogenic microorganisms is extremely low.

Therapeutic sperm storage

a. Storing centres should have open and continuous dialogue with service users regarding the quality and level of service provided. There should be a formal agreement between the two, setting out contractual obligations of the service providers and of the users and of the level of commitment to the patient.
b. As part of the evaluation cycle, storage providers should provide an annual report to service users, as part of its management review.
c. All centres should provide comprehensive storage information for end-users (patients and clinicians).
d. There should be a strict referral procedure for sperm storage and this should include the 'emergency referral' for oncology patients.
e. Patients must receive the opportunity to read relevant information and ask any questions about storage.
f. Patients should be informed of: the risks associated with storage; the requirement to return for follow-up testing; the extent of funding from the referring institution (particularly in the event of a resumption of spermatogenesis)
g. Information should be re-emphasised in an information counselling session.
h. Clinics should offer access to alternative sample collection methods should the patient fail to produce a specimen e.g. vibrostimulation or in extreme cases electro-ejaculation or surgical sperm retrieval.
i. Clinics should offer routine follow-up once treatment is completed which may include:

    - Semen analysis
    - Counselling
    - Consultation with clinical staff

j. Clinics should plan ahead and ensure that the service has the capacity to cope with user demand.
k. Clinics should work in collaboration with referring centres to ensure proper follow up assessment of patients with regard to their fertility status. Clinics should make it clear that only individuals with continued impairment of fertility qualify for long term storage and should work with colleagues and patients to ensure that appropriate evidence is provided.
l. Clinic staff should be trained to appreciate, empathise with and cater for the additional needs of adolescent patients.

Sperm donors

As a minimum standard, all sperm donors should be screened according to the guidelines laid down by the national legislative body's interpretation of the European Union Tissue and Cells Directives (2004/23/EC, 2006/17/EC and 2006/86/EC) and the guidelines from the combined Fertility Organisations of the ABA, the Association of Clinical Embryologists, the British Andrology Society, the British Fertility Society, and the RCOG (2008).

a. All centres should provide comprehensive information for potential sperm donors.
b. All record keeping, consent for use and storage of donor sperm must adhere to current regulation.

c. Centres should provide risk assessment in the event that any donor seroconverts for HIV or Hepatitis B or C during the quarantine period. Centres should take into account the material stored, the risk of seminal transmission, the type of packaging used and whether the material is stored in the liquid or vapour phase before deciding to dispose of specimens.
d. Sperm donor samples should be processed and packaged in a 'clean air' environment.
e. The processing environment should be thoroughly decontaminated between donors.
f. Cryopreservation should follow the guidance outlined above.
g. Supplying centres should supply post thaw information with every ejaculate.
h. Recruiting/supplying centres must only compensate donors according to current legislation.
i. Centres must have suitable procedures in place for recording pregnancies, and pregnancy outcome from each cycle of treatment with donor sperm. This should be demonstrated through a regular audit cycle. The maximum number of pregnancies achieved by use of the donor sperm should comply with national legislation.
j. Centres should clarify as part of a third party agreement the action required in the event of a dispute between supplying and purchasing centres, in particular with regard to post thaw donor sample quality. This agreement should set out the criteria for post thaw assessment including thaw procedure, time delay in analysis and analysis procedures.

Transport of frozen samples

a. Frozen donor or patient samples should be transported using a dry shipper which has been designed specifically for this purpose – see 3 h.
b. Dry shippers should be secured with a tamper evident seal prior to their dispatch to the receiving clinic.
c. Documented procedures must be in place for the carriage of frozen specimens (by patient or courier), ensuring that samples are accompanied by relevant paperwork.
d. When transporting a patient's stored material, centres should inform patients of the risks associated with dry shipper failure and how the risk may be reduced by transferring only a proportion of their samples.
e. Centres should be aware of, and adhere to legislation governing import and export of samples and should inform patients that the process can be expensive and time consuming.
f. The providing centre should have procedures in place to facilitate the recall of any material which may have been compromised during transit.

Cryostorage emergency

a. There should be emergency procedures which respond to:

    - Liquid nitrogen leak or spillage
    - Freezer failure or malfunction
    - Loss of liquid nitrogen supply
    - Failure of power supply
    - Oxygen depletion alarm

b. There must be suitable early warning systems, procedures and staff on-call cover to deal with 'out of hours' emergencies.
c. All centres must have sufficient spare storage capacity in the event of a vessel failure.
d. All vessels should be monitored for either temperature (vapour storage) or nitrogen level (liquid storage) and have alarms linked to an external warning system.
e. There should be contingency plans in place to deal with catastrophic failure such as fire or flood which permits moving the storage facility to another licensed site.
f. Centres storing in automated vessels should be aware of the potential pitfalls of automation, including the failure of liquid nitrogen supply. Procedures should be in place for dealing with these and staff should be trained and competent in their implementation.

6. Post Analytical Process

Reporting results

Most centres will issue a number of report types. Reporting of results must be sympathetic to the category of patient under examination and indeed the needs of the clinical user who will receive the report. For example, a semen analysis result which falls below the accepted normal threshold may be a concern to infertility patients but may be more than satisfactory if the patient has received chemotherapy. Insightful interpretative comment and summary is extremely important in such cases, not withstanding sufficient clinical history being available. Expert fertility clinicians may require a low level of comment, summary and interpretation of the report, yet a much higher level may be required by others (e.g. a general practitioner, an oncologist, a urologist or a patient). Any reporting from licensed procedures must not take place without the written consent (disclosure of information consent) from the patient concerned.

Report types will include:

- Diagnostic Semen Analysis reports – for infertility patients
- Diagnostic Semen Analysis reports – post vasectomy
- Diagnostic Semen Analysis reports – post chemo- or radiotherapy

- Surgical Sperm Retrieval reports – PESA, MESA, TESE patients for infertility treatment
- Sperm storage report – Pre-freeze (summary of sperm quality and quantity frozen and stored)
- Sperm storage report – Post thaw analysis prior to treatment
- Donor sperm report – Post thaw quality

The written report or hospital intranet report

a. All centres must have a standard reporting format for all examinations. The report should include:

   i. Unequivocal identification of the patient
   ii. Identification and contact details for the referring doctor
   iii. Date and time of sample production
   iv. Date and time of the analysis and report
   v. Unique identification of sample
   vi. Summary of the results including reasons if no examination is performed
   vii. Interpretive comment highlighting abnormal results and/or inclusion of critical limits if applicable
   viii. Reference ranges used
   ix. Laboratory name and contact details
   x. Status of report as appropriate e.g. copy, interim or supplementary
   xi. Where possible identification of person(s) verifying results and authorising the release of the report

b. Report format must be clear and concise and contain results on all of the tests performed.
c. A clear and concise comment using appropriate terminology should be used to summarise the findings. All unusual findings should be reported.
d. WHO terminology can be used provided it is appropriate for the recipient of the report.
e. Reference ranges should be provided on the report. Centres should provide validation for any reference range, which is not current and published by the WHO. Centres choosing not to use WHO methodologies should provide appropriate validation of their reference values
f. End users should be made of aware of the current reference ranges, the clinical value of the test and of its limitations. They should be informed of any changes in laboratory methodology and/or output.
g. There should be a written procedure for verifying results and checking prior to despatch.

Alternative reporting methods

Centres should define a written procedure(s) and perform a risk assessment(s) before reporting results through any other mechanism other than a written report. Such mechanisms could include:

   i. Telephone
   ii. Fax
   iii. E-mail
   iv. SMS

a. Alternative reporting should only be made available to the appropriate Medical Practitioner (usually whoever is responsible for the care of the patient) or his/her delegated staff and only in exceptional circumstances.
b. Exceptional circumstances should be defined and documented by standard operating procedures and should be authorised by the Medical Director of the appropriate referring service.
c. Any reports issued using alternative methods should be documented recording the date, time, name of the person called and the name of the andrologist communicating the report.

Clinical interpretation

a. Clinical interpretation may include the following:

   - Interpretation of the semen analysis should provide advice on the prognosis in terms of chance of conception and where relevant, assisted conception treatment
   - Highlighting individual semen parameters which indicate the need for further diagnostic testing or analysis
   - Interpretation of PVSA reports and advice on clearance to practitioners
   - Assessment of the quality of frozen-thawed sperm and advice on subsequent treatment
   - Assessment (based on semen quality) of the numbers of samples required to be cryopreserved for individual patients
   - Assessment of sperm quality after preparation for treatment
   - Assessment of the suitability of donor samples for storage after a poor post thaw analysis

This advice should be carried out by an appropriately trained consultant scientist/clinician or equivalent. This responsibility may be formally delegated to an appropriately trained scientist. There may be additional responsibilities which need to be taken into consideration in accordance with the HFE Act 1990 (as amended). Prior knowledge of the patient's medical and reproductive history should be gained before offering advice and recommendation for treatment. Centres should distinguish between clinical interpretation to clinical users of the service and patients receiving test results.

b. If such advice is not available, then centres should seek the advice from a consultant scientist/clinician or equivalent at another centre. This should be carried out by formal arrangement and/or contract.
c. If interpretation is required prior to assisted conception treatment, then this should be carried out in conjunction with an experienced HPC registered Clinical Scientist (Table 1).

Table 1. Semen Analysis Reference Ranges.

	Centiles						
	2.5	95% CI	5	95% CI	10	50	90
Volume (ml)	1.2	1.0–1.3	1.5	1.4–1.7	2	3.7	6
Concentration (M/ml)	9	8–11	15	12–16	22	73	169
Progressive Motility (%)	28	25–29	32	31–34	39	55	69
Normal Forms (%)	3	2.0–3.0	4	3.0–4.0	5.5	15	36

World Health Organisation reference ranges derived from the 5th centile from semen parameters from fertile men whose partners had a time-to-pregnancy of 12 months or less. Taken from: Cooper et al, 2009. World Health Organization reference values for human semen characteristics. Hum Reprod Update. 2010 May-Jun;16(3):231–45.

7. Evaluation and Quality Assurance

Evaluation equates to 'measurement and analysis of performance' and is synonymous with quality assurance. In general, the requirements of evaluation are to ensure that centres are able to assess quality and can continue to provide a service, which meets the needs and expectations of service users. Laboratories should define procedures under their quality management system which includes:

- Audit
- Assessment of user satisfaction
- Key Performance Indicators (KPIs)
- Internal Quality Control (IQC)
- External Quality Assurance (EQA)
- Process validation
- Assessment of clinical value of service

Audit

Audit is central to the evaluation process and is defined as the 'systematic, independent and documented process for obtaining and evaluating evidence and objectively evaluating it to determine the extent to which the pre-defined criteria are fulfilled' (ISO 19011:2002). The purpose of audit is to identify non-conformities from the above criteria. An appropriate plan of action should normally be implemented over a defined time period to meet the standards defined within the quality policy.

Documented procedures should be established for conducting internal audit of all applicable laboratory processes according to a pre-defined schedule and should be scheduled in advance to include 3 categories of analysis:

i. Vertical Audit – Examination of all elements associated with a testing or treatment procedure to check that these elements conform to the pre-exam, exam and post exam procedures. As a minimum, these should be carried out for:
   - Diagnostic semen analysis (infertility or PVSA)
   - Sperm storage for patients (licensed centres)
   - Sperm donor processing and storage through to DI treatment (if relevant)
   - Preparation of sperm for clinical use

ii. Examination Audit – Examination/witnessing of an individual performing a test/treatment procedure e.g. semen analysis. To ensure that the procedure is followed correctly and that the individual appears to understand the requirements of that procedure. This could be used as part of a training exercise for new members of staff or for those learning a modified procedure. This can also be used as a regular measure of staff competence.

iii. Horizontal Audit – Examinations across processes. To determine whether the elements are actually in place or indeed comply with pre-determined standards at any specified moment in time (i.e. snapshot). For example, take a part of the vertical audit one step further and determine whether on a given day, all pieces of equipment and materials used have been through the appropriate procurement, checking and batch testing procedures.

For each audit there should be:

- A description of each step of the audit process
- A record of compliance where identified
- A record of any deficiencies identified
- A description of proposed corrective action

The results of audits should be discussed within an appropriate forum and summarised within the Management Review to complete the quality cycle.

Assessment of user satisfaction and complaints

The purpose of assessing user satisfaction and monitoring complaints is to establish that the service provided by the laboratory meets the needs and requirements of users (clinicians and patients). This may include the use of patient and referring clinician questionnaires as part of the evaluation process (user satisfaction surveys). Centres should ensure that any review is fully inclusive and involves General Practitioners, Obstetrician/ Gynaecologists, and those referring for sperm storage such as Oncologists, Haematologists, Urologists and General Surgeons. The number of complaints received could be used as a KPI if required.

Key performance indicators

Centres must have procedures in place for the continuous evaluation of service quality. Key performance or quality indicators should be identified, regularly monitored and reviewed and any deficiencies acted upon as

part of the improvement cycle. Service users should be kept informed of performance via the Annual Management Review. Chosen KPIs should be easily measurable and give an overall view of the quality of both the laboratory management and the laboratory product. The Quality Manager would be responsible for collating KPIs on a regular basis and presenting them to management of the parent organisation.

a. Management indicators could include:

- Staff absences
- Staff satisfaction/turnover
- Training and appraisal targets
- Waiting times
- Turnaround of reports
- Referral rates
- Activity

b. Laboratory performance indicators

- Review of data logs from laboratory equipment
- Internal Quality Control
- External Quality Assessment

c. Clinical performance indicators (if applicable)

- Quality of donor sperm supplied by the centre
- Quality of donor sperm purchased from other centres
- Quality of sperm prepared for insemination
- Success of insemination procedures
- Multiple Pregnancy Rate

Internal Quality Control

Internal Quality Control (IQC) is a set of procedures undertaken by laboratory staff for the continuous monitoring of operation and the results of measurements in order to decide whether results are reliable enough to be released within a short interval of time. In andrology this period of time would generally be a working day but could be an analytical session. The methods in place should be appropriate to monitor the analytical output of the laboratory.

In andrology, IQC should also include the assessment between operators unless a particular method has been demonstrated to be operator-independent. The between operator assessments may need to be performed continuously or at regular intervals.

Comparison between runs and between operators is integral to diagnostic andrology quality testing. IQC should be conducted by inserting one or more control materials into every run or batch of analysis. The control materials or processes are treated in an identical or as close as possible to that performed on the test materials. The results examined to satisfy the operator that the system is in control and diagnostic andrology is no different in principle to any other analytical procedure. As live biological samples there are additional challenges and sometimes surrogate measures may be needed, nonetheless understanding measurement uncertainty is critical if the information is to be used in any decision making process.

Control materials: Material used for the purposes of IQC should be subject to the same measurement procedure as that used for patient samples. These include:

- Prepared 'pools' derived from clinical material (stored in formalin or cryopreserved)
- Artificial substitutes such a 'commercially available beads similar in size to sperm'
- Commercial control slides
- Longitudinal comparisons of data or analytical run sets.
- EQA materials can be used for IQC provided the limitations; such as awareness of the 'target' value and possible degradation are taken into account.
- Duplicate or repeat measures on the same clinical samples both within and between operators may be used.

For monitoring IQC performance the ABA recommends that laboratories follow the latest WHO guidance.

External Quality Assurance

External Quality Assurance (EQA) is a system of objectively checking laboratory results by an external agency. The main objective of this is to bring about lab-to-lab comparability. If EQA results are not consistent with targets a retrospective investigation should be carried out.

a. The laboratory should be a member of an accredited EQA scheme for sperm concentration, motility and morphology.
b. The EQA scheme must be relevant and report target values for the particular methods used within the laboratory
c. The laboratory should make regular returns, all of which should be available for assessment.
d. The laboratory should have a procedure for the review of EQA with both staff and management. Any decisions taken for corrective action should be recorded, monitored and acted upon. Evidence of EQA review should be available for inspection.
e. EQA records should be kept according to current RCPath guidelines (1999).

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Relevant Associations & Companies

61. Asymptote Ltd (2001) http://www.asymptote.co.uk.
62. Cryoservices data sheets www.cryoservice.co.uk
63. Medical Medicines and Healthcare products Regulatory Agency (MHRA) www.mhra.gov.uk

Relevant Laws & Directives

- EC Medical Devices Directives 1998.
- Electricity at Work Regulations 1989.
- EU Tissue & Cells Directive 2004/23/EC.
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- EU Tissue & Cells Directive 2006/86/EC.
- Human Fertilisation and Embryology Act 1990 (as amended).
- *In Vitro* Diagnostic Medical Devices (IVD) Directive (2003): In House Manufacture.
- Sexual Offences Act 2003
- The Confined Spaces Regulations 1997.
- The Control of Substances Hazardous to Health Regulations 2002 (as amended).
- The Management of Health and Safety at Work Regulations 1999.
- The Medical Devices (Amendment) Regulations 2008.
- The Personal Protective Equipment at Work Regulations 1992 (as amended).
- The Provision and Use of Work Equipment Regulations 1998.
- Workplace (Health, Safety and Welfare) Regulations 1992.

Appendix I: Guidelines for the retention of specimens and records of specimens

Permanent storage is without limit but refers to no longer than 30 years. In general stored records and specimens should be appropriately organised and so that retrieval is straightforward.

a. *Stained morphology slides* should be kept until the signed report has been despatched.
b. *Fresh semen samples* should be kept until a full record of the test has been recorded
c. *Request forms* should be kept for at least as long as it takes for the user to receive the authorised report. Ordinarily this period does not need to be longer than 1 month after the final checked report has been sent.
d. *Log books (Day books) and other specimen records*: at least 2 calendar years.
e. *Protocols (of Standard Operating Procedures)*: Current and outdated protocols should be dated and kept permanently on file.
f. *Worksheets*: Should be kept for the same length of time as the related permanent (or semi permanent) specimens or preparations.
g. *Records of telephoned reports*: should be logged on the patient's file or other working records.
h. *Report copies*: at least 6 months for operational purposes.
i. *Treatment related reports* for at least 30 years.
j. *Internal Quality Control records*: At least 10 years.
k. *External Quality Assurance records*: 5 calendar years for subscribing laboratories.
l. *Accreditation* documentation/Records of inspection: Ten years or until superseded.
m. *Equipment maintenance logs* Lifetime of the instrument (minimum of 10 years).