Biobank Quality Standard

Collecting, storing and providing human biological material and data for research

Version 1

Contents

i Introduction

The importance of high quality human tissue samples and data for research is well known, and is increasing with the advent of personalised medicine. Researchers, however, continue to cite lack of access to high quality, well annotated samples as a major hindrance to their work. One way in which research funders have tried to address this problem is by setting up a number of biobanks and large research collections, but they continue to receive requests to fund new sample collections. The UK Funders' Vision for Human Tissue Resources[1], published in 2011, includes proposals to develop "a common set of good practice requirements for tissue collection and storage and associated mechanisms for assessing compliance" to increased the quality of the samples and data, and "practical mechanisms for potential users to discover the existence of human tissue collections" to improve access to existing collections.

Since 2011, the National Cancer Research Institute's Confederation of Cancer Biobanks (CCB) has been working with members of the biobanking community to develop and harmonise standards that can be used by biobank staff in the UK to assure the quality of the samples and data that they hold. Although led by CCB, the standards developed are designed to be generic to all biobanks and tissue collections, irrespective of the disease focus. They can be used, also, as the basis of a scheme that will award a "quality mark" to biobanks achieving the required standards.

Broad applicability was achieved by the hard work of more than 50 members of the biobanking stakeholder community, including representatives of funders, researchers, pathologists, patients and pharmaceutical industries as well as cancer and non-cancer biobank Directors and Managers. They have been reviewed by the broader biobanking community and improved as a result of the comments made.

The standards have been created in light of the legal and regulatory environment governing the use of human tissue and data for research in the UK[2]. They standards are designed to be pragmatic and achievable, while at the same time assuring the quality of the samples and data held. They have been consolidated into this quality standard, which covers the quality management of a biobank, and a separate data standard. Both standards consist of "requirements" and "best practices" for the management of quality in a biobank. They do not mandate *how* the standards are to be achieved thus allowing them to be applicable to all disease areas and biobanks of different sizes with different business models.

The data standard was devised to facilitate communication about the samples and data held by biobanks. It has been adopted already by several groups, including the Breast Cancer Campaign Tissue Bank and the STRATUM project; these groups have expanded the data standard to cover, respectively, breast and respiratory disease-specific data. Other groups planning to make use of the standard include the National Cancer Intelligence Network, to aid linkage between cancer registry data and tissue banks, and the Experimental Cancer Medicine Centres (initially through a specific project that involves linking tissue banks in Edinburgh and Dundee).

[1] http://www.ncri.org.uk/wp-content/uploads/2013/08/2011-NCRI-UK-funders-vision-for-human-tissue-resources.pdf
[2] http://www.mrc.ac.uk/Ourresearch/Ethicsresearchguidance/Useofhumantissue/index.htm

ii Explanations

This document gives **requirements**, shown in the main body of the document. Requirements are applicable to all biobanks and tissue collections unless the technical activities of the organisation are limited, causing sections to be irrelevant. An example is a tissue bank that does not collect solid tissue; in this case sections such as those for warm and cold ischaemia do not apply. It is not intended that an organisation will exclude any of the requirements if they carry out the activities to which they relate.

Best practice is differentiated from requirements. It is shown in a smaller font and marked clearly as best practice. Whilst it is acknowledged that best practice may not be achieved currently by all organisations, organisations are expected to work towards achieving best practice.

Explanatory **notes** are shown in boxes. These are used to provide extra information and guidance on how the required standard may be achieved.

In this document the term "**Research Ethics Committee**" (REC) refers to such a committee within the UK Health Departments' Research Ethics Service, i.e. the National Research Ethics Service (in England) and the equivalent Research Ethics Services in Scotland, Wales and Northern Ireland (an NRES REC). It does not include other RECs such as university RECs.

The term "**tissue**" in this standard is used to refer to all human biological samples, including solid tissues, fluids (that do and do not contain cells), cell lines and derivatives such as nucleic acids. This is consistent with definitions in the UK Funders' Vision for Human Tissue Resources, with the addition of cell lines stored for research.

1 Quality management system

1.1 General requirements

The biobank shall establish, document, implement and maintain a quality management system.

The biobank shall comply with the requirements of this standard and strive continually to improve the effectiveness of its quality management system.

1.2 Quality Manual and Quality Policy

The biobank shall have a quality manual that provides an overview of the biobank's quality management system, including:

- the quality policy
- a description of the quality management system
- a description of the organisational structure and governance arrangements
- a description of the roles and responsibilities of laboratory management (including the quality manager)
- a description of the documentation that supports the quality management system

All biobank personnel shall be familiar with the contents of the quality manual and all procedures relevant to their work. These documents shall be readily available to personnel, under document control.

The biobank shall take a systematic approach to the improvement of quality. There shall be evidence of regular review, audit, communication, and corrective and preventive actions.

Best practice:

- The quality policy should set out the biobank's commitment to defining the quality of its products and services and to meeting those quality parameters

> **Note:**
> A biobank's products are diverse and may include samples, their derivatives, donor and sample data, results of testing and analysis, sample collection kits and transport kits.

1.3 Documentation requirements

There shall be documented policies and procedures covering all aspects of activity relating to the biobank, including but not limited to consent, collection, storage, release and transport of tissue and data, the management of the biobank and its adherence to applicable quality and regulatory standards.

The biobank shall maintain records relevant to its activities. These records shall provide evidence that activities are being performed in compliance with the requirements of the quality management system.

2 Document control

The biobank shall establish and maintain a procedure to control all documents that form part of its quality management system (generated internally or from external sources) such as regulations, standards and methods as well as forms, drawings, software, specifications, instructions and manuals.

Note:
Documents may be in hard copy or electronic and may be digital, analogue, photographic or written.

The biobank management shall ensure that:

- A master list, showing all documents currently approved for use and their authorised holder or location, is maintained
- Documents are approved by authorised personnel prior to issue
- Documents and the procedures they describe are reviewed regularly
- Documents contain a unique identifier, the date at which they came into use (also known as the activation date), the date review is due, version number, total number of pages and name of the approver
- Documents are legible, readily identifiable and available at the point of use.

There shall be a documented procedure for document copy control which ensures that the authorised holder or location of each controlled copy is known at all times. Superseded versions of documents shall be archived and copies removed promptly from circulation so that staff members have access only to the latest, active versions of documents. Archived documents shall be marked as obsolete to prevent their accidental use.

Best practice:

- Each biobank document should be identified with its unique identifier, title, author, owner, approver, activation date, date review is due, version number and, for paper-based systems, copy number. Each page should be numbered and the total number of pages in the document shown or the end of the document identified.

2.1 Document review and revision

There shall be a documented procedure for document review and, if necessary, revision of all biobank documents.

The procedure for document revision shall ensure that document revisions are approved by authorised personnel prior to issue. The procedure shall include the requirement to consider the potential need for additional training when implementing document changes.

Staff shall be notified whenever a new version of a document is issued.

Best practice:

- Changes to documents should be approved by the original document approver or their nominated deputy.
- A description of the changes made should be included in the revised document, so that what has changed since the last version was issued is clear to the reader.
- All biobank documents should be managed within a document control database.
- A document control log should be maintained. This log should
    - track the different versions of the document with dates of activation and withdrawal from use
    - briefly describe the reason(s) for the issue of a new version

2.2 Document retention

The biobank management shall determine the appropriate retention times and method of destruction for documents removed from current use.

3 Control of records

There shall be a documented record management system that specifies what data is to be recorded, where it is to be recorded, how long it is to be retained and how it is to be disposed of (if appropriate) in light of relevant data protection law.

All records shall be legible and stored in an environment that maintains their legibility. All records shall be kept secure and confidentiality maintained.

The biobank shall have procedures to protect and, if held electronically, back up records. These procedures shall prevent unauthorised access to or amendment of records.

All paper records shall be signed and dated by the person creating the record at the time it is made. An equivalent system shall be implemented for electronic records, enabling the person creating the record to be traced and the date and time of creation of the record to be recorded.

If changes to records are permitted, any changes shall ensure that the original record remains legible. All changes to paper records shall be dated and signed by the person making the change at the time the change is made. Equivalent measures shall be taken to avoid loss or unauthorised amendment of records stored electronically.

Best practice:

- The biobank's quality manual should list all data types and specify where each data type should be recorded, together with a record retention period and, if appropriate, the disposal route (eg as confidential or non-confidential data).
- Biobank data generated during the sample conservation process and quality assessments should be retained for a period of not less than 10 years from the expiration date of the samples to which the data relate or, if there is no expiration date, from the date of final sample distribution.
- An audit trail showing any changes to electronic records, who made the changes and the date and time of such changes should be maintained.

4 Change control

There shall be a systematic approach to change control, which includes all changes affecting the biobank, for example changes to policies, management, governance arrangements, financing, staff, collaborators, equipment, premises, techniques and procedures. Documented procedure(s) shall exist for assessment, recording and mitigation of the potential and actual impact of these changes.

Documented procedure(s) shall exist for the creation, review, amendment and deletion of techniques and procedures. When new techniques or procedures are to be introduced, or existing ones revised, consideration shall be given to the potential need to provide additional training to all those affected by the changes.

Best practice:

- The change control system should incorporate the requirement to undertake an assessment of the risks associated with change, to validate fully any new techniques and procedures before they are introduced and to monitor the potential cumulative effects of multiple minor changes.

5 Management responsibility and governance

The biobank shall have a documented governance policy that has been agreed by relevant stakeholders, including funders, and outlines the governance of the biobank. This policy shall cover:

- Who has legal responsibility for the biobank
- Who has oversight of the biobank and responsibility for its organisation and policies
- Who is responsible for its day to day operation
- How responsibility is delegated
- How the consent, collection and release of tissue is governed including reference to the biobank's access policy and arrangements for ensuring ethical approval of research
- The standards to which the biobank will adhere
- The requirement for the biobank to maintain Research Tissue Bank ethical approval status (obtained from an NRES REC)
- The requirement for the biobank to hold an appropriate licence to store tissue for research (where relevant)
- The requirement to protect the privacy of donors and maintain their data confidentially
- The requirement to protect any intellectual property rights accrued by the biobank or its stakeholders.

Best practice:

- The governance document should grant ultimate responsibility for the biobank to one group such as a tissue bank Executive Committee. This group should consist of appropriately qualified and experienced individuals.

> **Note:**
> The tissue bank Executive Committee is comparable to the Board of Directors for a company or health board, the Board of Trustees for a charity or the Court for a University, and indeed may be those boards if the biobank exists within the auspices of another legal entity.

- Generic ethical approval and each donor's consent (where relevant – see "Consent and withdrawal" section below) should cover the collection and release of all materials and associated data held by the biobank.
- If the biobank is disease specific, donors or others affected by the disease should be able to influence the operation of the biobank. If the biobank is not disease specific then it should still allow advocates of those on whom the biobank relies for tissue and/or those it aims ultimately to benefit to influence the operation of the biobank. The processes to allow donor involvement and the input expected from the donors should be documented and relevant training provided.

5.1 Organisational structure

There shall be an organisational plan that defines the organisation and management of the biobank, its place in any host organisation and its relationship to any partner organisations, including funders. The organisational plan shall include the responsibilities, authority and interrelationships of all organisations involved.

> **Note:**
> Many biobanks operate within a larger host organisation such as a university or hospital. In these circumstances the biobank will be required to comply with the host organisation's relevant policies and procedures.

There shall be a documented organisational chart detailing the roles and relationships of all biobank personnel (whether employed directly by the biobank or by a host or partner organisation).

The biobank shall check that any host's policies and procedures are sufficient to meet the requirements of this standard and, if they are shown to be insufficient, ensure that supplementary policies and procedures are documented.

Best practice:

- The Quality Manual should have a section describing the organisational structure and interrelationships of the biobank and its host: diagrams and tables should be used to provide clarity

5.2 Management committees

Biobank stakeholders, including researchers and donors or lay representatives, shall provide input to the biobank's steering, management, and access committees.

Best practice:

- At least one donor or lay representative should be a member of the steering, management, and access committees. The role of the donor or lay person should be clearly defined and communicated, with training provided to the individual(s).

6 Licences and legal requirements

The biobank shall operate and provide evidence that they are operating within the legal parameters and regulatory requirements of the country in which they are based[3].

The biobank shall hold all appropriate approvals, permissions and licences, and operate within their terms and conditions.

The biobank shall comply with all relevant regulatory codes of practice.

> **Note:**
> For example, in England, Wales and Northern Ireland, the Human Tissue Authority's (HTA) Codes of Practice "provide guidance and lay down expected standards for each of the sectors [*the HTA*] regulate. The revised codes are designed to support professionals by giving advice and guidance based on real-life experience".

Best practice:

- A Human Tissue Coordinator (however named) should be nominated to oversee adherence to any applicable licence and regulatory requirements. If the biobank holds a licence from the Human Tissue Authority (HTA), this person may be the Designated Individual.
- Current reference codes for all appropriate regulatory permissions and accreditations (e.g. HTA licence, NRES REC approval, the IRAS ID and accreditation by Health Improvement Scotland) should be included in biobank communications (eg within document footers), displayed in the biobank and be easily identifiable on the biobank website.

7 Ethical approvals

The biobank shall maintain appropriate and current ethical approvals for tissue and data storage and/or use for research, encompassing procedures for data and sample collection, storage, release and disposal. The biobank shall operate within the terms of the ethical approval it receives,

[3] In the UK the relevant legislation, regulations and guidance can be found at: http://www.hta.gov.uk/ (England, Wales and Northern Ireland) and http://www.legislation.gov.uk/asp/2006/4/contents (Scotland). Information about the Scottish Accreditation scheme can be found at: http://www.sehd.scot.nhs.uk/cmo/CMO(2011)07.pdf

including provision of reports and notification of amendments. Reports shall be made available to biobank stakeholders.

The biobank shall make researchers aware, if the planned research falls within the scope of its research ethics approval covering release of tissue, that the researcher's project does not need separate NRES REC approval.

The Biobank's access policy, procedures and how access decisions are made shall be outlined in the protocol included with the biobank's research ethics application.

The audit regimen in place for the biobank shall include scrutiny of compliance with the ethical approvals that govern its operations.

8 Access to tissue and data

The biobank shall have documented access policies and procedures, which are communicated to potential applicants.

The access policy shall be stated clearly and referenced in all of the biobank's donor-facing and client-facing media (such as the biobank's donor information sheets and web site). The policy shall ensure that *bona fide* researchers in any sector can be granted access to samples and data.

> **Note:**
> The 'NCRI template for access policy development – Part I' will be useful in creating this policy See:
> http://www.ncri.org.uk/includes/Publications/reports/template_for_access_policy_development_v1_1.doc

The biobank shall ensure that operational policies do not preclude involvement by any individual or group (for example commercial partners, or researchers based outside of the UK), or justify clearly why exclusive policies exist.

Researchers shall be required to apply in writing for access to samples and/or data from the biobank.

Guidelines for researchers and other applicants shall be available, explaining clearly the application submission process, application review process, anticipated time to review, conditions of access, any governance requirements and method of notification of outcome.

The biobank shall require that each request is accompanied by a summary of the proposed research and its sample requirements phrased in language easily understood by lay persons and members of the public.

Applications shall be reviewed by a tissue and/or data access committee for scientific merit and impact of the research in the wider context of research in the relevant field. Guidelines for application reviewers shall be available, clearly explaining the application review process, scoring system and all possible outcomes.

If there is competition for scarce samples, samples shall be provided to the project with greatest scientific merit and closest alignment with the aims and purpose of the biobank, as judged by the access committee.

The review procedure shall take account of any previous reviews, so that access to tissue and data is not delayed unnecessarily. The review process for access to small numbers of samples, for example for use as control materials, shall be proportionate to the amount and proposed use of the samples, in light of the biobank's documented access policy and NRES REC approval.

Feedback shall be provided to all research applicants (whether successful or unsuccessful) who have submitted an application to access samples from the biobank. An appeal procedure shall be available and brought to the attention of unsuccessful applicants.

Best practice:

- Researchers should be required to provide feedback to the biobanks on the progress of their study, sample quality, findings and publications. Such requirements should be defined in the Materials Transfer Agreement.
- Researchers should be required to return their research results to the biobank to enrich the data associated with the samples (see also section 33).
- Researchers should be required to acknowledge the biobank as the source of the samples used in their research.
- Information about the samples and data held, and the procedure when applying for access to them, should be available online without registration.

8.1 Access review

The biobank shall review, at least annually, the number and nature of samples accrued balanced against those released for research. If a collection or sub-collection is determined to be inappropriately under-used, there shall be a mechanism for prompt investigation and decision on the value of continued accrual. The investigation shall include a review of the biobank's access policy. The outcome of the review, including details of sample accrual and release, shall be visible to donors as a component of the biobank's annual report. Donors' representative(s) on the biobank management committee shall have a specific brief to consider this information and be able to engage in dialogue with donors if collection is to be reduced or stopped.

9 Material and data transfer agreements

Material and data transfer agreements (MTAs) shall form a contract governing the rights and obligations of the biobank and the recipient of samples and associated data. MTAs shall be drawn up and signed by the biobank (and/or its host institution) and its clients before any samples or data are released to the client.

Note:
MTAs may also be known as sample, tissue or data transfer agreements.

The 'NCRI template for developing a data or material transfer agreement – Part II' will be useful when creating this document See: http://www.ncri.org.uk/includes/Publications/reports/template_for_access_policy_development_v1_1.doc

The Brunswick Group of universities has an agreed common MTA for non-commercial users. See: https://www.arma.ac.uk/resources/brunswick-agreements/material-transfer

MTAs may be required to define the conditions of sample and data transfer between an NHS Trust with a diagnostic pathology archive (which retains surplus material primarily for medical records purposes) and research biobanks hosted by that or another institution.

Best practice:

- The MTA should specify the client's responsibilities in respect of (note that this list is not exhaustive):
  - obtaining ethical approval for the planned work;
  - complying with any restrictions on the use of the samples;
  - returning surplus sample and/or derived materials to the biobank (if required by the biobank);
  - maintaining the security and traceability of the samples once received;
  - complying with instructions for disposal of the samples;
  - complying with obligations to the biobank in regards to intellectual property, provision of data generated to the biobank, co-authorship and/or acknowledgement of the biobank in publications;
  - providing periodic reports to the biobank. The MTA should specify when and how reports should be submitted to the biobank.
- The biobank should seek legal advice for stating the appropriate rights and obligations in the MTA/contract for biobanks hosted by larger institutions.

10 Health and Safety

The biobank shall comply with all applicable health and safety legislation and good practice.

The biobank shall operate according to documented health & safety policy and procedures. These may be within the policies and procedures of a host or parent organisation.

11 Communication with stakeholders

Policies governing biobanks shall be transparent. Effective lines of communication shall be established among stakeholders.

> **Note:**
> Trust is an essential component among those donating, collecting, processing and storing the samples and data, as well as among the investigators who use the samples and data to pursue a scientific endeavour. Significant efforts should be invested to ensure that mutual understanding and trust are developed and maintained.

Best practice:

- Prior to the initiation of collection, stakeholders, including funders, potential donors, lay representatives, researchers and other potential clients should discuss communication strategies to promote transparency and trust.
- Biobanks should develop clear guidance as to what services are provided, the charges for the provision of those services, and the hours during which services are available.
- Contact information should be readily available to stakeholders. 24-hour contact information should be available if there are time constraints in the biobanking process, for example in the collection of post-mortem tissue.

11.1 Internal communication

Effective procedures for the dissemination of information to staff shall be implemented and their effectiveness reviewed periodically.

There shall be regular meetings for exchange of information between all members of the biobank staff and management. Records of these meetings shall be kept and disseminated to staff and other stakeholders as appropriate.

Best practice:

- Staff and management meetings should take place not less than every three months.

11.2 External communication

The biobank shall promote good communication with external stakeholders, including funders, donors and researchers, ensuring they are informed regularly about its activities, plans and developments, and that all stakeholder groups have the opportunity to shape the biobank's direction and contribute to its development.

Best practice:

- The biobank should provide stakeholders with information about the use of its samples and/or data. This should include numbers of samples used, purpose of their use, numbers of projects supported and outcome of research, including reference to publications arising from use of its samples and/or data. This may form part of the biobank's annual review process.

11.2.1 External staff

The biobank shall engage with staff of partner organisations involved in the collection, transport and processing of tissue for research to ensure mutual understanding of clinical and biobanking matters relating to clinical samples. This shall include medical, nursing, allied professional and administrative staff, including trainees, especially within Surgery and Pathology.

The biobank shall engage with researchers to ensure mutual understanding of the possible uses and limitations to the use of available tissue for research. The biobank shall ensure that it understands researchers' needs with respect to types and formats of tissue and associated data, ensuring that it will be suitable to support research using emerging technologies.

Best practice:

- Pathology staff contributing to biobank activities should have this in their job plans as a core activity. There should be regular pathology input into education and training for biobank staff, and vice versa.
- The biobank should have a regular programme of activities and/or other events/publications aimed specifically at engaging hospital staff, with feedback. There should be input into the design and delivery of this training by hospital staff groups and donor representatives.

11.2.2 Patients and donors

The biobank shall promote biobanking to potential donors and their families as part of a wider donor engagement programme.

Donor views shall be sought on biobank activities on a regular basis (see also "stakeholder feedback", below). There shall be active and ongoing involvement of donor/lay representatives to provide input into the promotional and operational activities of the biobank.

> **Note:**
> Some donors will not want to be contacted by the biobank; this standard does not require that every donor's views are sought, but donors must have the opportunity to express their views.

The biobank shall have a mechanism in place to seek the views of donors and potential donors on sensitive issues and feedback to donors the results of these consultations. Donor and/or lay representatives shall be involved in the design and analysis of the biobank's feedback mechanisms.

Note:
Sensitive issues include disposal, import, export, animal research, cell line and stem cell research, commercial use, and sample under-use.

The biobank shall have a mechanism in place to seek donor/lay input into any information produced for donors, including considerations of the target audience with respect to age, language and cultural diversity.

The general results of research undertaken with samples from the biobank shall be communicated to interested donors.

Best practice:

- General results of research undertaken with samples from the biobank should be published, for example on the biobank's website.
- Non-use of samples should be a component of discussion and information sharing with donors associated with the biobank.

11.2.2.1 Return of research results or incidental findings to donors

The biobank shall have a clearly defined, justified policy and, where necessary, process for the management of clinically relevant research results and incidental findings. The policy shall be fully and clearly described to the donor during the consent process (prior to consent being given) in writing and by an appropriate person.

If the biobank's policy permits the return of research results or incidental findings which may be relevant to the donor or their family, the donor's consent to be re-contacted shall be sought and this information logged in accordance with this standard's requirements for sample traceability. Feedback shall only be given to donors and/or donors' families who have consented to be re-contacted for this purpose. Feedback shall be given by trained, qualified personnel who understand the implications of the results for the donor and/or their family.

Note:
At present there is no clear consensus within the biobanking and research communities on how to handle clinically relevant, incidental findings. Work commissioned by the Medical Research Council and Wellcome Trust has produced guidance in this area, see: http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_grants/documents/web_document/wtvm055196.pdf

If samples have been collected without the donor being informed about communication of clinically relevant findings, or if their opinion is not recorded, the biobank shall consult an NRES REC for advice on the best course of action should a clinically relevant finding arise.

Best practice:

- The defined feedback pathway should be resourced and tested if the biobank's policy permits feedback of results.

11.3 Communication with researchers

In order for the biobank to make the samples within it accessible to researchers it shall have a method for publicising the existence of the biobank and the types and numbers of samples held within it.

The biobank shall be readily visible to researchers as a resource for samples, with local, regional and/or national visibility in formats appropriate for the scope of collection(s). As a minimum, the

biobank shall be visible on an on-line directory (such as the NCRI Biosample Directory, see http://biosampledirectory.ncri.org.uk/).

Best practice:

- As well as displaying the biobank via the NCRI's Biosample Directory, the biobank should have an independent presence on the web.
- Holdings should be searchable via web-based sample directory portal(s).

11.4 Stakeholder feedback

The biobank shall have a documented policy describing how it will seek and respond to feedback from all stakeholders regarding its operation, performance and quality.

There shall be a documented procedure for assessing client satisfaction.

Best practice:
The stakeholder feedback policy should:

- outline procedures for actively seeking feedback from each of the stakeholder groups, for example all clients who have received samples within a defined period might be sent a questionnaire requesting their evaluation of a range of service performance parameters, with the results being acted upon and published
- outline procedures for improving the biobank in response to feedback
- ensure that improvements are highlighted to those using the biobank
- ensure that those giving the feedback receive a response outlining what the biobank will do / has done in response to the feedback

12 Complaints, anomalies and non-conformities

12.1 Complaints

A documented procedure shall exist to receive, assess and respond in a timely fashion to complaints from donors, prospective donors and clients of the biobank.

> **Note:**
> **Complaint:** a complaint may be internal, for example between scientific areas and their internal subcontractors, or external from a client or other stakeholder. Complaints may be received verbally, electronically or in writing. Anyone making a verbal complaint should be asked to confirm this in writing, but the verbal complaint should be followed up even if written confirmation is not received. This standard covers all sources of complaints.

The biobank shall record all complaints and acknowledge them as soon as possible by the most appropriate method. Records of responses/solutions shall be maintained.

The biobank shall investigate all complaints so as to identify the root cause and implement any necessary corrective actions.

Best practice:

- The biobank should develop a clear complaints procedure and make this available to all stakeholders. The communication methods available for complaints should be appropriate for the likely complainant (for example, not all donors will have email or internet access; therefore the biobank should avoid only publishing and making a complaints procedure available online).

- On receiving a complaint the biobank should acknowledge it and communicate this by the same means as the complaint was initially made. The complaint procedure should be clearly communicated to the complainant at this stage.
- The complaint should be logged with the results of any investigation and a clearly stated outcome. The complainant should be made aware of the results of any investigation and the ultimate outcome. Consideration should be given to including at least a one-tier appeals process.
- The complaints procedure should be referenced in all of the biobank's donor-facing and client-facing media (such as the biobank's participant information sheets and web site).
- Meetings should be held as required to discuss complaints, to identify trends and suggest broader corrective or preventive measures

12.2 Anomalies and non-conformities

A documented procedure shall exist for recording, investigating, reporting and reviewing anomalies and non-conformities.

> **Note:**
> **Anomaly**: an unexpected event occurring within the quality system, usually detected by staff of the area in which the event occurred, which may result in non-compliance with the quality system or with the requirements of the client.
>
> **Non-conformity:** a non-compliance with the quality system, usually detected at audit. Non-conformities can be classified as Type 1 (major non-conformity where results or products may be compromised), Type 2 (a cluster of minor non-conformities indicating that a particular aspect of the quality system is not under control) and Type 3 (minor non-conformity).
>
> **Adverse event:** the term "adverse event" is used by the HTA and others in relation to the clinical use of tissue for patient treatment. This term is not used in this standard to avoid confusion.

Any breach of protocol shall be logged in such a way that it is flagged whenever an affected sample is requested and the NRES REC shall be informed as required by and in accordance with NRES procedures.

Each event shall be recorded. A decision shall be made promptly as to what action(s) will be taken to prevent inappropriate use of compromised samples and to suggest corrective and preventive action to avoid recurrence.

Best practice:

- The procedure for logging anomalies and non-conformities should include a risk assessment of how that event might influence the integrity of the sample(s) (e.g. likely, possible, unlikely) and the type of analysis this might affect (e.g. RNA analysis, IHC analysis). The category of risk should then be flagged electronically for each sample affected so that it is flagged whenever a sample is requested.
- Meetings should be held as required to discuss anomalies and non-conformities so as to identify trends and suggest broader corrective or preventive measures.

13 Corrective and preventive actions

The biobank shall operate documented procedure(s) for implementing corrective and preventive actions. These shall ensure that such actions are implemented in a timely manner and include the requirement to ensure that the actions taken address the root cause of the problem or potential problem. The procedure(s) shall include an assessment of the effectiveness of corrective and preventive actions.

14 Audit and review of biobank activities

14.1 Internal and external audit

The biobank shall operate a documented procedure for submitting all aspects of its operations to horizontal and vertical, internal and external audits, in accordance with a predetermined schedule, to demonstrate that its operations continue to comply with the requirements of its management system and this standard.

The audit system shall cover all aspects of the biobank's management system. Audits shall be carried out by trained and competent personnel who are independent of the area being audited.

Internal auditors shall be clearly defined in the biobank's organisation chart, showing how they will be assigned tasks so that they are not auditing their own practice.

If the audit findings cast doubt on any aspect of the biobank's operations, the biobank shall take timely corrective actions.

Records shall be maintained of the areas audited, audit findings and any corrective actions arising from them.

The biobank shall assess and record the effectiveness of any corrective actions implemented.

> **Note:**
> In larger biobanks the independence of auditors may be assured by cross-functional auditing. Alternatively, auditors may come from a host organisation, independent biobank or commercial audit provider.

14.2 Management review

The quality management system shall be reviewed by the biobank's top management at least annually. This annual management review shall include a comprehensive review of the quality management system and its continued suitability and effectiveness. Any necessary changes or improvements shall be introduced using the biobank's change control procedure.

Findings from management reviews and the actions that arise from them shall be recorded and the actions evaluated for effectiveness. Biobank management shall ensure that actions are discharged within an appropriate and agreed timescale.

15 Biobank sustainability

The biobank shall have a documented strategy to safeguard its continued financial viability for the expected lifetime of the sample storage and handling activities. The biobank shall maintain a legacy plan for its own holdings, in case the future of the biobank is threatened. Plans shall be reviewed periodically and amended as needed.

> **Note:**
> The STRATUM project surveyed the funding arrangements of different biobanks in the UK and prepared a cost-model report that can be found at:
> http://www.stratumbiobanking.org/docs/STRATUM%20COST%20MODEL%20FINAL%20REPORT%20MAY%202013.pdf

Best practice:

- The biobank should develop a breakdown of the costs associated with the collection, storage and distribution of samples such that the annual headline costs for (a) maintaining and (b) adding to the biobank are known. The biobank should be able to distinguish within their budgets, (1) the costs required to continue collection and distribution of samples and (2) those required for continued maintenance and distribution of the current collection. If the biobank is funded predominantly from one source, a risk assessment and contingency plan should be developed against the loss of that funder.
- The biobank should develop a protocol for the transfer of samples to another biobank should it fail to continue to be financially viable or need to transfer its holdings for any other reason. This protocol should be developed in coordination with appropriate ethics committee and donor/lay input.

16 Risk assessment and contingency planning.

The biobank shall perform a documented assessment of the risks to its business, operations and products. This assessment shall cover:

- Risks to the management and operation of the biobank and the samples and data it holds, including risks to its reputation, key staff, premises, facilities and equipment
- Minimisation and mitigation of those risks
- Contingency plans, including an emergency procedure, business continuity plan and disaster recovery plan.
- Roles and responsibilities of key staff in implementing the contingency plans
- Risk assessment and detailed plans for biobank legacy in short, medium and long term, addressing personnel, premises and technology.

The risk assessment and contingency plans shall be reviewed regularly and amended as needed.

The biobank shall document procedures for assessing the impact of unplanned events on its operations and the samples and data it holds.

Best practice:

- The biobank or the organisation of which it is a part should maintain detailed plans and standard operating procedures for implementation in case of an emergency. Staff should be aware of these plans and procedures.
- A document should be generated listing each potential risk, how high or low the risk is, the consequence(s) of that risk occurring, the actions taken to mitigate the risk and the remedy/actions to be taken should that risk occur.
- Plans should include instructions for contacting key personnel out-of-hours.

17 Staff

17.1 Roles and responsibilities

The work of the staff at the biobank shall be subject to a system of governance. Each role within the biobank shall have a job description and person specification documented, so that the required qualifications and competencies are defined and communicated. There shall be clear reporting lines and accountability, documented levels of authority and responsibility associated with each role, a system of staff appraisal, and training and development of staff.

Staff members performing specific roles within the biobank shall be qualified on the basis of appropriate training, experience and/or demonstrated skills, as appropriate.

The biobank shall have a director (however named). The director is the person with overall responsibility for management of the biobank. The director shall be qualified by training and experience to direct and manage the scope of activities conducted by the biobank.

A person responsible for quality assurance (QA) management shall be identified. This individual may have other duties but shall not be involved directly in delivering the services they are quality assuring.

Note:
In the ideal situation a quality manager post will be created within the biobank. In reality, many biobanks will not have the resources to employ a dedicated quality manager. To overcome this, quality management may be:

- divided between biobank employees, as long as individuals do not have responsibility for QA management of the work they deliver
- performed by someone from a host organisation
- shared with another biobank
- sourced commercially

In all of these situations, the biobank will need to identify a senior member of staff, such as the biobank Director, to take overall responsibility for assigning QA roles.

17.2 Training, competence and staff development

The biobank shall maintain a documented training procedure. This shall include:

- A new-starter induction procedure
- Training staff in skills specific to their job according to documented protocols
- Assessment of staff competence against documented criteria
- Recording of staff training and competence, with sign-off
- Assessment of the need for and, if necessary, implementation of staff training and competency assessment before the introduction of new technologies or practices
- A documented procedure for staff appraisal, with annual review of training needs, including a procedure for managers and their staff to review continuing professional development needs and personal development plans.
- Experienced individuals designated to be responsible for delivering training and appraisal.
- Clear line-management of biobank personnel.
- Mechanism in place to promote staff development and progression.

Best practice:

- A bespoke training programme should be created for every member of staff at the time they are appointed: this training programme should serve as a structure for the employee's training throughout their deployment in the biobank.
- Biobank staff members with a clinical and/or scientific role should be encouraged to undertake continuing professional development (CPD). One way of doing this is to join a scheme offered by a professional organisation, such as the Institute of Biomedical Science or Royal College of Pathologists.
- Staff training should be managed in a structured way. Delivery of training should be in the hands of appropriately experienced, authorised individuals.
- A corporate system of staff appraisal linked to personal development plans and continuing professional development should be in place. The appraisal system should be delivered by suitably trained staff. Appraisal meetings should take place annually, with follow-up meetings six months later and regular reviews.

- Job progression should be possible and encouraged. Opportunities should be provided to mentor junior members of staff so they can take on new roles as and when additional (often senior) positions become available. Note that progression is not always the same as promotion.

In the case of a biobank storing samples prior to their analysis as part of a clinical trial, "Guidance on the maintenance of regulatory compliance in laboratories that perform the analysis or evaluation of clinical trial samples" has been produced by the Medicines and Healthcare Regulatory Agency (MHRA) (see: http://www.mhra.gov.uk/home/groups/is-insp/documents/websiteresources/con051910.pdf) .

Staff shall be recruited with certified GCP-L training or the training shall be given before staff members begin work with any clinical trial material. Training shall be repeated at least once every 2 years in order to keep abreast of latest legislation relating to clinical trials. Where a biobank is contracted to provide services to a clinical trial then any staff who will work in the laboratory or storage facility where the trial samples are processed or stored shall be trained in the relevant requirements specific for that trial. Records of both the training and induction are essential and shall be filed in the individual's training record.

Best practice:

- All biobanks, regardless of involvement with clinical trials, should provide basic GCP-L training to highlight the need to protect the interests of the patient at all times. Staff should treat all samples as if they could be used to influence trial outcome measures (i.e. with full audit trails).
- GCP-L training courses should be accredited and online courses should only be used as a temporary measure (face to face training should be carried out as soon as possible even if an online course is completed).

17.3 Professional behaviour

Biobank staff members who have access to donor identities and/or donor identifiable data shall be bound by a professional code of practice that includes standards of ethical behaviour. They shall meet the requirements of their host institution(s) in respect of holding honorary contracts, or equivalent, governing their access to patient-identifiable data.

> **Note:**
> NIHR provides guidance on the use of Honorary Research Contracts or Letters of Agreement when researchers need access to patient-identifiable information. Guidance can be found at: http://www.nihr.ac.uk/files/Research%20Passport%20Current/algorithm_v3.0.pdf
> Interpretation of the guidance varies between different organisations; a biobank will need to comply with the requirements of the organisations they work with.

Best practice:

- Person specifications for roles that involve access to donor identities and/or donor identifiable data should include a requirement that the post-holder is registered with a Council for Healthcare Regulatory Excellence-monitored regulator (such as the General Medical Council or Health & Care Professions Council) or, for staff who are not eligible for registration with a statutory regulator, with the Voluntary Registration Council or an equivalent non-statutory regulatory body.

17.4 Indirectly managed staff

The requirements given in this standard shall apply to staff of other organisations, such as a host organisation or affiliated organisation, if they carry out work on behalf of the biobank. The biobank shall ensure that indirectly managed staff members are clear about their biobank roles as distinct from other NHS or service/research roles they may have. Indirectly managed staff shall be

supervised by appropriate person(s) within the biobank for the part of their work they carry out on behalf of the biobank.

18 Facilities

18.1 Suitability of premises

The biobank shall ensure that its accommodation and environment are adequate and suitable for the procedures it undertakes. Areas used for storage of tissue or data for use in research shall provide an environment that is safe for biobank staff and preserves the integrity of the tissue and data.

The biobank shall be kept clean and tidy with visible evidence of good housekeeping.

Best practice:

- The biobank should perform a documented assessment of its facilities to verify that they are 'fit for purpose' i.e. that staff have adequate space and equipment within an acceptable environment to allow them to receive, log, process, store and release different types of samples safely. The facilities should also allow for the completion and storage of accompanying paperwork and electronic data. Any premises used should be evaluated against these requirements, and continued suitability should be reviewed regularly.

18.2 Access to facilities

The biobank shall implement a documented procedure to restrict access to critical systems, equipment and facilities to authorised personnel only. Visitors shall be accompanied by authorised personnel at all times.

The biobank shall implement appropriate safeguards to prevent unauthorised access to or removal of samples or access to electronic data or paper records. The biobank shall be able to demonstrate that samples and data are held securely in such a way as to prevent unauthorised access both during and outside normal working hours.

Best practice:

- Banked samples and records containing confidential information (such as signed consent forms or any documentation with donor identifiable information) should be housed within restricted areas. In practice this means that samples and records should not be stored in areas open to anyone except biobank staff; access to the restricted area should be limited for example by the use of electronic pass cards or by lock and key.
- Where it is not possible to house banked samples or confidential data in an area that is only accessible by biobank staff members, then such material should be held under two separate locking systems (e.g. a permanently locked cupboard or locked freezer located inside a room or laboratory that is itself locked when no authorised personnel are present).
- Data generated during the tissue conservation process and the location coordinates of samples within the biobank's electronic inventory system should be held within password protected databases.
- Electronic records containing confidential information should be encrypted or held behind an NHS firewall.

19 Equipment

19.1 Selection and qualification

Equipment shall be fit for purpose. The biobank shall implement a systematic procedure for identifying critical equipment and shall ensure that documentary and/or practical evidence is in place to verify that equipment adequately meets the needs of the biobank and, where appropriate, is maintained and validated.

Best practice:

- Equipment should be validated before it is first used.

19.2 Calibration, maintenance and servicing

The biobank shall document procedures and schedules for the appropriate cleaning, maintenance, repair, quality assurance, validation, calibration and monitoring of equipment. Records of all these activities shall be maintained.

The biobank shall undertake an assessment of the control measures necessary to reduce the likelihood of failures in critical equipment. The control measures identified as necessary shall be implemented and their effectiveness reviewed periodically.

Procedures for dealing with equipment faults and breakdowns shall be documented. Such procedures shall include an assessment of the impact of the breakdown on the samples held by the biobank.

Defective equipment shall be removed from use until it has been repaired or replaced and, if necessary, re-validated.

Records shall be maintained of all equipment faults and breakdowns and how they are resolved.

B**est practice:**

- There should be an integrated capital asset register or equipment database which is used to record the cleaning, maintenance, repair, quality assurance, validation, calibration and monitoring events for all critical equipment.

19.3 Temperature-controlled equipment

The biobank shall locate refrigerators and freezers in air conditioned room(s) with controlled room temperature.

The biobank shall ensure that all refrigerators, freezers and liquid nitrogen (LN2) storage units with automatic filling systems are connected to the “essential” power supply circuit and/or back-up generator.

The biobank shall test the effectiveness of all monitoring and back-up systems, such as the operation of alarms and back-up generators, to a defined schedule. Records shall be maintained of the outcome of this testing.

All monitoring and alarm systems shall be connected to an uninterruptible power supply (UPS) so that data are maintained should the usual power supply fail.

The biobank shall maintain documented procedures for safe handling of LN2, including procedures for monitoring and recording LN2 levels and, if necessary, manual filling of units.

The biobank shall ensure that oxygen depletion alarms are installed and maintained in every area where LN2 units are housed. The effective operation of these alarms shall be tested to a defined schedule and records maintained of the outcome of this testing.

The biobank shall provide LN2-specific health and safety training to all staff working with or in proximity to LN2.

The biobank shall have access to spare refrigerator, freezer and LN2 storage capacity so that samples can be moved in an emergency.

Best practice:

- Mechanical freezers should have dual compressors.
- Back-up refrigerators, freezers and LN2 units should be fully validated and maintained as operational, and labelled appropriately.
- Back-up systems for mechanical refrigerators and freezers should include the use of dry ice to maintain temperature temporarily.
- Biobanks should implement a contract or service level agreement for off-site storage with an approved supplier in case of disaster. This may be achieved by local collaborations to provide mutual hosting and back-up facilities.

19.4 Room temperature storage

The biobank shall ensure that samples stored at room temperature are held at temperatures within defined and monitored parameters.

Best practice:

- There should be regular monitoring of these parameters with long term records of any excessive variations.

19.5 Temperature monitoring

The biobank shall operate a systematic temperature monitoring procedure for all temperature-controlled equipment. Such a procedure will include:

- the definition of "alert" and "action" upper and, if appropriate, lower temperature limits
- a defined schedule of temperature monitoring
- recording of temperatures (including the ability to demonstrate the temperature recorded on a given date, at a given time)
- an indication of the maximum time equipment doors can be open
- a requirement to monitor temperatures closely following any alarm
- regular alarm checks
- the circumstances under which samples shall be relocated to alternative storage units.

The biobank shall implement a local and remote alarm system that notifies appropriate individuals when temperatures go outside required limits. This system shall operate at all times of the day and night.

Best practice:

- The biobank should implement:
    - Continuous automated temperature monitoring.
    - Remote alarms to the mobile phone of designated staff.
    - The ability to monitor freezer status via web.

20 Procurement

20.1 Purchasing

The biobank or the organisation within which the biobank is hosted shall implement a documented procedure for purchasing equipment, goods and services.

The biobank shall implement a systematic procedure for identifying critical facilities, equipment, goods and services. A list of approved suppliers of critical items shall be maintained.

The biobank shall ensure that all equipment, goods and services are suitable for their intended purpose before they are used. Whenever equipment, goods or services can influence the quality of the final product the biobank shall implement systems to ensure that these items are assessed and approved or rejected prior to their use. Records of these assessments shall be maintained and used as part of a regular review of suppliers.

Systems implemented shall be proportional to the degree of risk to the quality of the biobank's products.

> **Note:**
> In most cases of procurement of standard laboratory consumables and equipment, raising an institutional purchase order with associated terms and conditions of service is sufficient. A formal service level agreement will normally only be required when the goods or services being supplied are bespoke. In these circumstances, a service level agreement must specify in detail exactly what the provider is required to supply, including specifications of the mode and conditions of transport of the supplied items (such as the requirement for a cold-chain record).

Best practice:

- The biobank should have a procedure which ensures that the impact of any equipment, product or service on the quality of the tissue or data supplied to researchers is assessed and documented.
- Records of the validation of the suitability of the containers should be maintained.

20.2 Subcontracting

The biobank shall assess the suitability of a subcontractor to provide services to the biobank before any work is subcontracted. Records of assessments shall be maintained.

Service level agreements shall be established between the biobank or its host organisation and any organisation that provides services to the biobank. These shall be reviewed at intervals and modifications negotiated if needed.

Biobanks that contract out their laboratory services shall retain records of the name and address of the contracted facility, the name and contact information for key personnel at the location where the services are being provided, documentation of the inclusive dates of the contract period and copies of the contract as well as any accompanying documentation. The scope of work, roles, responsibilities, timelines and quality requirements for all contracted services shall be clearly articulated and recorded.

A risk assessment shall be produced and a record held that specifically addresses the nature of the samples under test. In particular, consideration shall be given to the amount of sample that will remain in the biobank and whether it would be possible to repeat the test using the same contractor, another contractor or in-house.

Best practice:

- A consideration of other contractors and in-house analysis should be made each time subcontracting is undertaken. There should be an onus to prove that risks to samples are less if the specific subcontractor is used than would be the case with alternatives and that the gain to the value of the samples will outweigh any risk to the sample.
- The subcontractor should be audited by or on behalf of the biobank before any contract is placed.

21 Consent and withdrawal

The biobank shall seek generic consent for the prospective collection, storage and research use of donated samples and data or shall document clearly the reasons why generic consent is inappropriate.

The biobank shall implement processes to ensure that consent is obtained in line with legal requirements, with appropriate information and due process. Records shall be maintained of donors' consent, including identification of the person(s) seeking consent. The biobank shall ensure that, where legally required, a record of informed consent is in place prior to accepting a sample collected after 01 September 2006 into the biobank; such consent shall be recorded in the biobank.

> **Note**:
> It may not be possible or necessary to transfer a physical consent document to the biobank, in which case suitable confirmation/assurances of consent may be sent instead. These assurances should detail the samples to which they relate and the extent of the consent received.

Where samples from the living remain following completion of an ethically approved research project, and consent has been sought only for that project, these samples can be used in further research provided:

- Their use in further research has been approved by an appropriate research ethics committee, and
- The samples and any accompanying data are anonymised before transfer to a researcher

Where samples held within a diagnostic archive are made available for research, the diagnostic archive shall hold any appropriate licences to store tissue for research purposes. In the UK (except Scotland) samples from the living that are surplus to diagnostic requirements may be held in the diagnostic archive and used in ethically approved research without specific consent provided:

- the samples and any accompanying data are anonymised before transfer out of the diagnostic archive, and
- the samples and any accompanying data are transferred only for use in research that has appropriate ethical approval.

> **Note:**
> Consent is always required to store, for research, samples of relevant material from the deceased collected after 1 September 2006, the date on which the relevant sections of the Human Tissue Act 2004 (England, Wales and Northern Ireland) and the Human Tissue (Scotland) Act 2006 (Scotland) came into force.

Best practice:

- While informed consent is not a legal requirement for the use of anonymised samples from the living (see above), it should be sought for every sample, where practical and appropriate.
- A copy of the informed consent record should accompany the sample to the biobank.
- The biobank should endeavour to integrate generic consent for research biobanking into procedural consent processes in the biobank's partner hospital(s).

- Biobank staff members should be involved in training all staff (biobank, NHS or other) who seek consent for biobanking.

There shall be a clear, justifiable and documented policy for seeking renewal of consent should it be required. If this policy permits donors to be re-contacted, it shall be made clear to donors at the time consent is sought and specific consent to re-contact the donor shall be sought.

The biobank shall maintain a procedure for dealing with unsolicited requests to donate tissue and data.

Best practice:

- If there are reasons why the biobank cannot accept unsolicited donations, they should provide the potential donor with details of other biobanks that may do so.

The biobank's consent process shall make it clear to donors that they have the right to withdraw their samples and data from the biobank at any time. The limitations on withdrawal, in terms of samples and data that have already been used in research or have been irreversibly anonymised, shall be made clear to donors.

Best practice:

- The biobank should make information about withdrawal available in a number of formats and visible to donors at a number of points in time.
- A formally operated management committee, including lay/donor representatives, should oversee appropriate consent and withdrawal information and procedures in light of any REC approvals.
- Withdrawal should be possible by a number of different routes to make it easy for the donor to withdraw. Requests for withdrawal should be acknowledged promptly and handled as a matter of urgency. Donors should be notified when their samples and data have been withdrawn.

22 Types of samples

The biobank shall document its policy with respect to collection of samples. Options include:

- All samples are specifically collected for the biobank to distribute to researchers. The biobank includes surplus tissue collected specifically for research at the time of diagnostic sampling/surgery.
- The biobank includes samples from clinical trials or specific research projects, which may be held on behalf of the researcher or obtained after the original, planned research is complete.
- The biobank includes tissue samples retrieved from diagnostic archive(s) after diagnosis is complete.
- A combination of the above.

Whenever research or diagnostic samples are included in the biobank, there shall be appropriate governance of tissue transfers between the relevant researchers and/or NHS Trust(s) and the biobank. Samples transferred from researchers or pathology departments to the biobank shall be accompanied by all available information on how the samples were collected, processed and stored prior to transfer.

Best practice:

- Practical and strategic relationships should be developed between biobank and NHS pathology staff for mutually beneficial continuous improvement in tissue and data handling for diagnostic and research purposes.

- There should be strategic planning for sustainability and maintaining donor confidence in the face of increasing private sector involvement in providing NHS diagnostic services.
- The biobank should have access to procedures used in research or NHS pathology departments from which they receive samples, and be notified when changes are made to these procedures.

22.1 Selection of samples for biobanking

The welfare of the donor shall always have precedence over the needs of the biobank. The biobank's procedures shall ensure that collection of samples for research does not interfere with donor diagnosis, treatment or monitoring, or otherwise compromise donor welfare.

Samples shall be assessed by a pathologist or other suitably qualified member of staff to determine their adequacy for both clinical and research requirements and to approve the selection of surplus material to be used in research.

> **Note:**
> Locally, a designated pathologist may agree criteria under which tissue may be used for research without being seen or sampled directly by themselves or another pathologist. These criteria should be documented and reviewed regularly. The designated pathologist remains responsible for ensuring specimen adequacy for clinical care of the donor in these circumstances.

22.2 Legacy samples

The biobank shall have a documented plan for the adoption or rejection of investigator-led and orphan collections of tissue and data. The biobank shall provide guidance to external holders of such collections.

When bringing samples in from external collections, the samples shall be held in quarantine until their quality has been assessed. The biobank shall consider how the samples were obtained (including the consent for their use in research). The records associated with such adopted samples shall allow a recipient to be confident that all samples have been collected legally and ethically for the use intended. These details shall be logged in accordance with the standard on 'Sample Traceability'. The recipient biobank shall obtain copies of all available records associated with the adopted samples, including copies of the protocols/SOPs used by the external collector, and any deviations from them relevant to the legacy samples.

Best practice:

- A risk assessment should be made on the likelihood that the protocol was followed as described (e.g. likely, unlikely). If there is any reason to suspect that the protocols were not followed, the samples should be marked accordingly. Where no protocols are available the biobank should make an assessment as to the usefulness of banking the samples.
- Where there is a lack of information, worst case assumptions should be made about the extent of consent if evidence is not available to the contrary (e.g. if the original consent form gave an option for genetic testing of samples and there is no proof a recipient consented to this aspect then it should be assumed they did not consent for this).
- Samples collected prior to 2006 may not have adequate evidence of consent. While the Human Tissue Acts in the UK do not require consent to be in place for storage and research use of such "existing holdings", best practice requires that consent be sought when practical[4]. Where it is impractical or inappropriate to seek consent for such samples, biobanks should seek appropriate

[4] HTA: http://www.hta.gov.uk/legislationpoliciesandcodesofpractice/codesofpractice.cfm/663-Consent-requirements---Part-1--General-provisions.html

NRES REC approval for their use without consent (although there is no legal requirement to do so). The samples and associated data must be anonymised before release to a researcher.

- The biobank should undertake appropriate quality control (QC) on representative samples from the collection prior to release from quarantine. The nature of the QC and the results obtained should be flagged for all samples from that collection (not just the ones tested).

> **Note:**
> A possible approach would be escalation e.g. from QC of 1% of samples and then increase to 5% if there are QC failures. The nature of the QC will depend on the nature of the samples and their possible uses in research.

- Where consent forms and donor information sheets are not available for samples then the samples should not be banked unless they are genuinely anonymised. This will include a case by case analysis extracting all relevant data for each donor that may have been logged by the original recipient, evaluating its potential relevance and ensuring only data that cannot be tracked back to the donor is stored by the biobank. A sample should not be considered for use by a third party until this process is completed.
- Where consent forms are available, copies of each completed consent form should be made and transferred to the care of the receiving biobank along with donor information sheets, any ethics application and copies of any ethics committee approval letters.
- It will never be best practice to incorporate such samples into the main biobank collection: they should always be considered and clearly identified as a sub-collection.

23 Traceability

The biobank shall ensure that there is complete traceability of tissue and data, from donor to researcher and/or destruction. This means that:

- Each sample and aliquot shall have a unique identifier.
- Samples shall be labelled appropriately so that identification of the samples and traceability to donors/parent samples are maintained.
- Each sample shall be associated with a consent procedure (where relevant) that records the detail of permissions or restrictions associated with the use of that sample.
- Each sample shall be associated with the relevant version of a collection SOP and, where relevant, processing and storage SOPs.
- Each sample shall be associated with any significant event (such as a freezer thaw) that might impact on the characteristics of that sample.
- It shall be possible to identify the location of any sample at all times, including identifying those that have been distributed to researchers or disposed of. This includes aliquots and derivatives of samples such as sections of tissue, components of tissue microarrays (TMAs) and extracts of nucleic acids.
- The biobank shall be able to track shipments from dispatch to receipt, whether or not a courier is used.

Best practice:

- Records of validation of the suitability of the labels should be maintained, including evaluation of their adherence/ readability in adverse conditions
- Use of barcodes and automated management systems are encouraged.

The biobank shall maintain a chain of custody for the samples it holds, maintaining records of:

- The name and role of any person who receives or handles the samples,
- the dates and times the samples were in each individual's custody
- the dates and times of key events such as collection from the donor, placing into temporary storage, dispatch to and/or receipt from pathology/biobank/researcher.

Note:
The chain of custody begins at the time the samples and data come under the influence of the biobank. It will not be possible, for example, for the biobank to hold full records for samples transferred to the biobank from a diagnostic archive or from a researcher following completion of an ethically approved project. The biobank should obtain as much relevant traceability data as possible from the source of the samples.

24 Collection of samples

The biobank shall collect samples under conditions and using containers appropriate for each sample type.

The biobank shall document its collection protocols and keep records of any deviations from the protocols. Protocols shall be subject to regular review.

The biobank shall ensure that records of factors related to collection, which are of relevance to the quality of the sample, are maintained.

Best practice:

- Whenever evidence is available, the biobank shall use protocols based on authoritative best practice or published research findings.

Note:
Items to record for solid tissue include[5]:
Collection procedure (autopsy, biopsy, fine needle aspirate, surgical excision, other)
Warm ischaemic time
Cold ischaemic time
pH (for brain tissue)
Fixative or preservative used
Fixation time
Processing procedure (reference to processing SOP, including version number)
Storage container used
Storage temperature
Clock time that sample was collected (in case of circadian variation)

Items to record for fluids include:
Type of primary container, manufacturer and preservative (if any) used
Clotting time (serum samples)
Pre-centrifugation interval (time and temperature)
Centrifugation parameters (time, speed (g), temperature)
Number of spin cycles
Post-centrifugation interval (time and temperature)
Storage container
Number of aliquots stored
Volume stored
Date of entry to storage
Storage temperature
Freeze/thaw history and conditions.

Some of these items may be documented in the relevant SOP, rather than being recorded individually for each sample processed. In these cases the biobank shall be able to demonstrate which version of an SOP was in use at the time the sample was processed and shall record any deviations from the SOP, showing the samples affected by the deviation.

[5] See http://www.isber.org/?page=SPREC

25 Transport of samples

The biobank shall document procedures for the transport of samples. These procedures shall cover transport from theatre or clinic to laboratory or biobank and from biobank to researcher. These procedures shall require prompt, direct transport of samples so that the times during which samples are in transit are kept to a minimum.

The biobank shall evaluate risks to the stability of samples and document the need for control of temperature, humidity and light during transport. Temperature, humidity and/or light shall be controlled if this evaluation has shown that such control is needed.

Records of temperature, humidity and/or light during transport shall be maintained if they have been shown to affect the stability of the human biological material.

Staff undertaking picking, checking, packing, transporting and/or receiving samples shall be trained according to a documented procedure. Specialist training is required for international shipments.

The biobank's chain of custody record shall show who picked, checked, packed, transported and/or received samples.

The biobank shall comply with all regulatory requirements relevant to the transport of human biological material, for example those relating to containers, packaging, labelling and shipping.

> **Note:**
> Packaging should meet the UN3373 standard. IATA rules must be followed when applicable.

All shipments shall be accompanied by appropriate documentation showing the origin, contents and destination of the shipment. This documentation shall include sender and recipient contact details.

The biobank shall confirm or require confirmation that the samples received match those detailed on the dispatch note or shipping manifest. Any discrepancy shall be considered a non-conformity and dealt with using the non-conformity procedure.

> **Note:**
> If clinical trial samples are involved the non-conformity may require reporting to the appropriate competent authority (e.g. MHRA).

If the biobank uses external couriers, the biobank shall assess the ability of any such courier to meet its transport requirements. The evaluation shall cover:

- Contingency plan in place by courier in case of problems - especially with frozen tissue.
- Ability of courier to renew liquid nitrogen, dry ice or ice packs if there are unexpected delays in transport.
- Compliance with national and international shipping regulations
- The courier's quality management system (e.g. certification to ISO 9001)

Best practice:

- Time in transit should be recorded
- Samples should be checked against a dispatch note or shipping manifest by a second person prior to dispatch
- Data loggers should be used

- Shipments of cold or frozen material should have sufficient and appropriate refrigerant to maintain temperature throughout the shipping cycle with allowance for at least a 24-hour delay in arrival time.
- The notification of receipt should take place by e-mail, fax or telephone as soon as the shipment has been checked. Any problems should be notified at this time and noted in the sender's records.

26 Processing of samples

There shall be clear lines of communication between the biobank and any pathology department, mortuary or other subcontractor processing samples on its behalf. In particular, the pathology department, mortuary or other subcontractor shall be required to provide details of its sample processing procedures and to notify the biobank of any changes to these procedures.

The number and size of all samples and aliquots banked shall be documented, either in each sample record or in the processing procedure. If the number and size to be collected is stated in a documented procedure, all exceptions to the documented requirement shall be recorded in the record for each affected sample.

Best practice:

- All tissue should be dissected under the supervision of, or by documented agreement with, a Consultant Histopathologist or equivalent. Competence should be assessed periodically.
- Staff carrying out dissecting, freezing, fixing, embedding or otherwise processing tissue for banking should be trained, as a minimum, to a level equivalent to a Biomedical Scientist.

261 Warm ischaemia

Warm ischaemic time (the time between arterial clamping and tissue removal from the donor) shall be recorded whenever this information is required for a specific research project.

Best practice:

- The biobank should maintain records of relevant warm ischaemic time for all tissue samples that it holds.

> **Note:**
> 1 It is recognised that recording warm ischaemic time is difficult in a clinical setting as it requires co-operation from surgical and other theatre staff. Nevertheless, warm ischaemia is known to affect the quality of the tissue and documenting this time period is best practice. It will be essential to record warm ischaemic time for some research projects; the biobank should communicate to researchers its ability (or inability) to collect these data.
>
> 2 It is not practical to record warm ischaemic time for all tissues, for example biopsies or tissues and organs with multiple sources of blood supply.

26.2 Cold ischaemia

The biobank shall have procedures in place to minimise the cold ischaemic time of samples.

The biobank shall set targets for and maintain records of the time(s) of each of the steps between removal of tissue from the donor and subsequent events such as receipt in pathology, placing on ice, snap-freezing, placing in fixative, centrifugation or other processing steps.

Best practice:

- The biobank should reduce the sample temperature, for example by placing the sample, in its container, on ice as soon as possible after removal from the donor and prior to further processing.

26.3 Frozen samples

Procedures for freezing samples shall be documented. Records of the procedure used shall be kept.

> **Note:**
> $0.5cm^3$ is a good size for adequate snap-freezing of solid tissue. Too large a piece of tissue will not freeze adequately in the middle.
>
> Use vials that are suitable for freezing at low temperature with a ring seal in the lid.
>
> Samples can experience freezer burn if not adequately stored. Containers of fluid samples should be filled to reduce tissue contact with air. Tissue may be foil wrapped to reduce exposure to air and facilitate handling.
>
> Morphological validation of core biopsy specimens and other small pieces of tissue is not feasible because of the tissue loss and thawing artefacts that occur when cryostat sections are taken.
>
> Consider freezing tissue in optimum cutting temperature compound or similar embedding media.

26.4 Fixed samples

The procedure used for sample fixation shall be documented. The fixative used and the time that the sample spent in fixative shall be recorded.

> **Note:**
> It can be difficult to obtain this information from some external collaborators. In such circumstances an assessment of the value of banking the tissues without the information shall be made. If samples are to be banked without details of fixation, the reasons for this decision should be documented and sample records annotated, however alternative collaborators should be used whenever possible.

27 Storage of samples

The biobank shall implement a systematic procedure to store samples in a manner providing protection against risk of loss or degradation due to power failure or damage to premises (e.g. fire, flood, and explosion). Documented procedures shall exist for all aspects of storage and its protection.

Where sample numbers are sufficiently high, aliquots of samples shall be stored at two separate sites, or, if refrigerated or frozen, at least in two separate refrigerators or freezers.

> **Note:**
> If samples are refrigerated or frozen, the two locations should have independent power supplies. Where this is not possible, for example due to low numbers of samples per case, adequate back-up capacity for low temperature units should be maintained in anticipation of possible equipment failure. If this is not possible, biobank staff should identify back-up space in a nearby facility to allow for transfer of samples in case of an emergency.

The biobank shall record the storage location of all samples and aliquots in a database and with back-up. It is not acceptable to use a spreadsheet as data can be corrupted too easily. The position of samples and aliquots in refrigerators or freezers shall be recorded to the exact location in the storage box to ensure their timely retrieval and minimise warming.

Records shall be maintained of date and time of removal from storage and, if appropriate, return to storage of samples and aliquots.

Best practice:

- Storage areas and processes should be designed to minimise contact with chemical or biological contamination, and to ensure maintenance of sample integrity is maximised to permit repeat or equivalent examination. Such controls are extended to areas of packaging and transport.
- A LIMS system should be used.

28 Selection and release of samples to a researcher or other client

The researcher/client shall be involved in the identification and selection of samples according to a documented procedure.

There shall be clearly defined pathways and timelines, mutually agreed by the biobank and researcher/client.

The biobank shall assess the known needs of the researcher/client against the known quality of the samples held and ensure that samples are allocated only when the stated quality requirements are met. A list of suitable samples shall be generated, agreed and signed by the researcher/ client and a biobank representative. These samples shall be specified in the Material Transfer Agreement.

Relevant sample handling data and any QC test results shall be available to the researcher/client. The researcher/client shall be notified if the sample has been released from and returned to the biobank previously.

The researcher/client shall submit interim progress reports during their use of biobank-supplied materials if required by the Materials Transfer Agreement. A mutually agreed process shall be in place to report the sample status at intervals, including numbers, location and usage of tissue supplied, or allocated for supply, by the biobank.

There shall be a notification process to inform the biobank promptly at study closure, or in the event of extension of tissue-based research such as may be associated with clinical trials.

A record of final study closure shall be signed by the researcher/client and a biobank representative.

The biobank shall have a documented policy and procedure(s) for return of unused samples from the researcher. If this policy permits return of samples, returned samples shall be held in quarantine until their quality has been assessed according to documented procedures. The biobank's audit procedure shall evaluate researchers' compliance with these procedures and establish whether or not tissue has been returned when appropriate.

Best practice:

- Requests received, samples identified, samples issued and project interim and final reports should be reported at management committee meetings.

29 Quality control of samples

The biobank shall have a documented policy, programme and procedures for the quality assessment of all samples that it holds. These shall include regular audits of sample quality.

The biobank shall implement a systematic procedure for identifying and documenting the critical quality attributes of released samples and data. These shall be communicated to the researcher/ client receiving the samples.

Note:
Sample quality is an essential component of quality in biobanking but quality criteria cannot be stipulated because of the wide range of sample types and different potential end uses. The key for biobanks is to "know your samples" and provide this information to the users of samples; this allows researchers to judge the samples' suitability for use in their research.

Note:
1. Options for QC testing of samples include:
   - Testing on receipt to allow samples of unsuitable quality to be discarded and save storage costs. This also allows the biobank to know "up front" that it is able to supply suitable material to a researcher and will expedite sample access. However it is expensive and time consuming, especially as some samples may never be used and results may change during storage.
   - Testing prior to release will allow current quality to be assessed, but will delay release to the researcher.
   - Re-testing of a percentage of samples by another lab will increase confidence in the biobank's testing but will increase costs.
2. The procedure for determining critical quality attributes may include examples relevant to the different sample types and potential end-uses that the biobank expects to encounter.
3. An audit of sample quality may not include practical tests. The audit may cover collection and storage parameters, acceptability of samples to researchers and results from use of samples in research.
4. QC testing of only a sub-set of samples is not acceptable.
5. Examples of QC tests include:
   - morphological validation of tissue by H+E, including % inflammatory, tumour, necrotic, haemorrhagic, and/or normal tissue (to include stroma and normal cells) if present
   - A260/280 ratio, concentration and yield for DNA
   - A260/280 ratio, A260/230 ratio, concentration, yield and RIN number for RNA
   - identity and viability for cell lines

Other testing may be appropriate depending upon the researcher's intended use.

Internal quality control records and external quality assurance/proficiency testing records shall be reviewed and used to identify changes that will maximise the preservation of sample quality.

Best practice:

- The biobank should work closely with applicant researchers to identify the key sample quality criteria for the intended research. QC testing should be performed in light of the anticipated end use of the samples. This requires close collaboration with end-users.
- Morphological assessment should be performed on every solid tissue sample prior to dispatch. The biobank should assess and record, as a minimum, the % diseased/normal/necrotic tissue in each of the samples that it holds before providing it to a researcher.
- The biobank should perform quality assessment (quantity and quality) of both DNA and RNA samples.

30 Proficiency testing

The biobank shall participate in relevant external quality assurance/proficiency testing schemes such as those provided by UK NEQAS or equivalent.

The biobank shall document its participation in any external quality assurance/proficiency testing schemes, including the procedures for review and communication of results arising from such participation. The procedure shall include the requirement to investigate all anomalous results and undertake corrective and preventive actions when necessary.

If another laboratory performs relevant procedures on behalf of the biobank, these requirements shall apply fully to that laboratory.

31 Tissue and data disposal

The biobank shall have a documented disposal policy which sets out when and how tissue and data will be disposed of.

> **Note:**
> Tissue should not be stored unless there is a reasonable chance of it being used in research. Periodic review of collections and disposal of samples unlikely to be used is encouraged.

Tissue disposal shall be carried out in accordance with HTA requirements[6] and in light of donors' wishes.

32 Governance of donor and sample data

32.1 Confidentiality

There shall be a documented procedure for maintaining donor confidentiality which includes a robust process for sample anonymisation, data protection and data security.

> **Note:**
> In this context "anonymisation" can mean coding so that the identity of the donors is held by the biobank but is unknown to the recipients of the samples. This is also known as "linked anonymisation" or "pseudonymisation".

Appropriate security arrangements shall be in place whenever data is transferred between systems or individuals.

Best practice:

- Any electronic linkage between donor identities and donor pseudonyms in linked anonymisation systems should be maintained in a secure database held on a server behind the NHS, host institution or other firewall. Paper records should be held in a secure, locked cabinet and access limited to named individuals

> **Note:**
> Section 60 of the Health and Social Care Act 2001 as re-enacted by Section 251 of the NHS Act 2006 allows the Secretary of State for Health to make regulations to set aside the common law duty of confidentiality for defined medical purposes. The Regulations that enable this power are called the Health Service (Control of Patient Information) Regulations 2002. Any references to 'section 251 support or approval' actually refers to approval given under the authority of the Regulations.
>
> This exemption can be sought to enable biobanks to access donor information in circumstances where seeking donor consent to such access is not possible.

[6] http://www.hta.gov.uk/legislationpoliciesandcodesofpractice/codesofpractice/code5disposal.cfm

32.2 Data

The biobank shall ensure that the design and operation of its database(s) comply with Caldicott principles and recommendations. Identifiable data shall be held only if the donor has given their informed consent for the biobank to hold this data. The biobank shall have section 251 approval from the Health Research Authority's Confidentiality Advisory Group (http://www.hra.nhs.uk/hra-confidentiality-advisory-group), if appropriate, to cover its access to patient-identifiable data and data-handling activities.

The biobank shall have access to a copy of any diagnostic pathology report for all of the solid and cytology tissue samples that it holds. Whenever possible, these reports shall be anonymised. If anonymisation is not possible, for technical or scientific reasons, the donor consent process shall ensure that the donor is aware of this requirement and gives permission for the biobank to hold identifiable data.

The biobank shall hold all of the data required by the CCB's data standard (See: http://www2.ncri.org.uk/ccb/documents/data_standard.pdf). No entry shall be left empty; those parameters that are unknown, unavailable or not applicable shall be marked as such.

Best practice:

- The biobank should collect the data shown in the best practice tables of the CCB's data standard. This will allow greater information to be made available to the researcher.

32.3 Data protection

The biobank shall implement a documented procedure for assessing documents for compliance with the UK Data Protection Acts before they are issued. All biobank documents relating to data protection shall be reviewed for compliance with the UK Data Protection Acts by a suitably qualified person. Records of all assessments and reviews shall be maintained.

Best practice:

- All legally binding documents should be referred to a corporate legal compliance team for review before issue.

32.4 Data security

The biobank shall implement a documented procedure for data management that includes controlling access to biobank data so that data are restricted to approved personnel.

> **Note:**
> Data includes any photographic images, drawings, reports and other documents that may be stored in association with samples and patient information.

The biobank shall manage data in such a way that it is secure from loss or corruption at all times, including during transfer into or out of the biobank. The data management system shall specify a robust process for backing-up live electronic data.

Electronic data shall not be transferred using portable devices such as discs or memory sticks unless it has been encrypted prior to writing to the portable device.

Best practice:

- The data management system should incorporate daily backing-up of the live data array in such a way as to allow the entire data array to be recreated elsewhere in the event of a catastrophic failure resulting in loss or corruption of the live data array.
- Fail-safe systems should be implemented
- Off-site or otherwise remote secure servers and data storage should be used for back-up.
- Adequate electronic security measures should be implemented to mitigate risk of hackers gaining access to servers (e.g. encryption of data)
- Paper documents should be stored in fire-proof cabinets and/or rooms equipped with sprinkler systems or an inert gas system.

32.5 Data quality

The biobank shall document its procedure(s) for assuring the quality of the data it holds.

Note:
Validity - All data items held on biobank systems must be valid. Where codes are used, these will comply with national standards or will map to local values.
Completeness - All mandatory data items within a data set should be completed. Procedures must exist to ensure the completeness and validity of data sets used both internally and externally, including the requirement to validate information routinely with the appropriate source.
Consistency - Data items must be internally consistent by following a set of standard definitions where appropriate.
Coverage - Data will reflect complete data capture for all the activity undertaken by the biobank. Every aspect of information should be recorded. Comprehensive and up to date procedures are essential to ensure complete data capture.
Accuracy- Data recorded in paper or electronic form must be accurate, factual, timely, legible and consistent.
Timeliness - Timely recording of data is essential. Data should be recorded as close to the time of its generation as is possible.
Communications – The biobanks will have documented procedures in place to ensure the timely dissemination of information, both internally and externally, and for the prompt resolution of queries.

Best practice:

- An industry-standard database package should be used (i.e SQL Server, Oracle or Access).
- Spreadsheets should be avoided as they are cumbersome for data retrieval, offer little or no data validation and little or no protection against data corruption.
- Default codes should only be used where appropriate, and not as a substitute for real data.
- If it is necessary to bypass a data item, the missing data should be flagged for immediate follow-up.
- Wherever possible, systems should be programmed to only accept valid entries.
- Regular spot-checks, audits and comparisons between systems should be used to identify missing data.
- Every opportunity should be taken to check data at source.
- All tables should be updated regularly.
- All data should be recorded and processed in accordance with set deadlines.
- Errors should be identified and corrected as close to point of entry as possible.

33 Return of research data to the biobank

The biobank shall have a justified policy on the return of research data to the biobank and this policy shall be clearly communicated to any researcher. As a minimum, the biobank shall require notification of, and citation details for, all publications arising from use of samples and data that it has provided. If the research is funded from public money, then the policy shall indicate the

requirement for research data, whether findings are positive or negative, to be returned for future public benefit.

The biobank shall ensure it has the systems, resources and expertise in place to manage, quality check and make available data that is returned to it from studies.

> **Note:**
> Some biobanks do not have the resources to store and then make available all of the data generated from samples they supply. In these cases, the policy for return of data should specify what data is to be returned and this should be consistent with the resources of the biobank or its host institution.

If the policy includes a requirement to return research results to the biobank, it shall include details of circumstances in which this might be waived.

If the return of research results is required, this requirement shall be included in the MTA. Researchers shall be provided with:

- details of the data to be returned,
- the acceptable format(s) of the returned data
- a defined timescale for return of data, and
- the procedure for such return of data.

Best practice:

- The biobank should require all data to be returned for future use and ensure compliance with this requirement.
- The biobank should issue reminders annually to recipients, requesting an update on their use of the tissue and/or data, any publications derived and a copy of any derived data.
- The biobank should hold these data in confidence for a period agreed with the researcher prior to making them available for use in further research.

Glossary

Aliquot – A process wherein a specimen is divided into separate parts which are typically stored in separate containers as individual samples. The term aliquot may also be used as a *noun* to denote a single sample.
Anomaly - An unexpected event occurring within the quality system, usually detected by staff of the area in which the event occurred, which may result in non-compliance with the quality system or with the requirements of the client.
Anonymisation – Removal of identifiable personal information from samples and data. Anonymisation can be complete or refer to coding so that the identity of the donor is held by the biobank but is unknown to the recipient of the samples. See Complete anonymisation, Linked anonymisation and Pseudonymisation.
Audit – A documented review of the organisation, its procedures, records, personnel functions, equipment, materials, facilities, and/or vendors in order to evaluate adherence to standards, written SOPs or government laws and regulations (see External audit; Internal audit; Horizontal audit; Vertical audit;).
Autopsy – Post-mortem examination of the organs and tissues of a body to determine cause of death or pathological conditions.
Biobank An entity that receives, stores, processes and/or distributes human biological specimens and associated annotating data, as needed. It may be a legal entity in its own right or form part of a

larger organisation. It encompasses the physical location as well as the full range of activities associated with its operation.
Biobanking - The process of storing material or specimens for future research use.
Calibration –The process of adjusting the output or indication on a measurement instrument to agree with the value of the applied standard, within a specified accuracy and precision.
Cold ischaemic time – In biobanking, cold ischaemic time is the time between removal of a specimen from the body and its preservation through chemical fixation, chilling or freezing.
Collection – May refer to the practice or technique of collecting a specimen or to a specific sample or group of samples that has been isolated for future research purposes.
Complete anonymisation – This requires that identifiable personal information is not collected or, if collected, is not maintained and cannot be retrieved, such that there is no way to trace the identity of the donor from whom the specimens were obtained. Complete anonymisation removes the donor's right to withdraw and makes it impossible for the biobank (and hence the researcher) to obtain any further data about the donor.
Consent - To agree, as to a proposal; concur, permit.
Custodian – The individual or organisation responsible for the management of a biospecimen resource.
Database – A structured collection of records or data that is stored in a computer system so that a computer program or person using a query language can consult it to answer queries.
Deviation – An intentional or unintentional event that is a departure from a procedure or a normal practice.
Distribution – A process that includes receipt of request for specimens, selection of appropriate specimens, and final inspection, in conjunction with subsequent shipment and delivery of specimens to another biobank, specimen collection centre, laboratory or researcher/client.
Donor – Living or deceased individual who is the source of the specimen in accordance with established medical criteria, procedures and privacy regulations.
Identifier/Identifying information – Information (e.g., name, address, social security number, medical record or pathology accession number) that would, alone or in combination with other available data, enable the donor of samples or data to be identified.
External audit – An audit performed, usually for certification or accreditation purposes, by an organisation independent of the biobank, or an audit of an external supplier by or on behalf of the biobank.
Horizontal audit – An audit of one aspect of the organisation, across all areas of the organisation. Examples include audits of training, method validation or communication with donors.
Incidental finding – A finding that is not related to what the main research study is looking at, e.g. if a study scanning the liver to look at fat levels on the liver detects a possibly harmful lump, or if genetic testing detects a previously unknown disorder.
Informed consent – A decision to participate in research, taken by a competent individual who has received the necessary information; who has adequately understood the information; and who, after considering the information, has arrived at a decision without having been subjected to coercion, undue influence, inducement, or intimidation.
Internal audit – audit performed by or on behalf of the biobank
Label – Any written, printed or graphic material on or affixed to a specimen container or package.
Linked anonymisation – Coding of samples and data so that the identity of donors is known to the biobank but is unknown to the recipients of its samples and data.
Liquid nitrogen – Coolant used to cool and store samples. Nitrogen becomes liquid at - 196 °C. Samples stored in the vapour phase of liquid nitrogen are - 190°C and warmer, depending on the distance from the liquid phase.
Material transfer agreement (MTA) – An agreement that governs the transfer of tangible research materials and/or data between two organizations, when the recipient intends to use it for his or her own research purposes. It defines the rights and obligations of the provider and the recipient with respect to the use of the materials.

Procedure – A series of steps designed to result in a specific outcome when followed in order. It is usually documented in a standard operating procedure.
Processing – Any procedure employed after specimen collection but prior to its distribution, including preparation, testing, and releasing the specimen to inventory and labelling.
Prospective – A specimen or collection maintained for expected or likely use in the future.
Pseudonymisation – see Linked anonymisation.
Quality – Conformance of a specimen or process with pre-established specifications or standards.
Quality assurance (QA) – An integrated system of management activities involving planning, implementation, documentation, assessment, and improvement to ensure that a process or item is of the type and quality needed for the project. Also known as a Quality Management System (QMS).
Quality control (QC) – Specific tests defined by the QA or QMS programme to be performed to monitor collection, processing, preservation, transport and storage; specimen and/or data quality; and test accuracy. These may include but are not limited to: performance evaluations, testing, and controls used to determine accuracy and reliability of the biobank's equipment and operational procedures as well as monitoring of the supplies, reagents, equipment, facilities and records.
Quality manual – description of the organisation, its policies and procedures showing how the organisation complies with the requirements of standards, laws and ethical requirements. The quality manual will either reference or include Standard operating procedures.
Research ethics committee (REC) – Any board, committee, or other group formally designated by an institution to review biomedical research involving humans as subjects, to approve the initiation of the research and conduct periodic review of such research. In this document the term "Research Ethics Committee' means a REC within the UK Health Departments' Research Ethics Service, i.e. the National Research Ethics Service (in England) and the equivalent Research Ethics Services in Scotland, Wales and Northern Ireland. It does not include other RECs such as university RECs.
Sample – A single unit containing material derived from one specimen.
Shipping manifest – A written description of the contents of the shipped package.
Specimen – A specific tissue, blood sample, etc. taken from a single subject or donor at a specific time.
Standard operating procedures - Approved documentation (paper or electronic) of the materials and methods required to perform a required procedure and achieve a consistent outcome of the required quality.
Storage – Maintenance of specimens under specified conditions for future use.
Validation – *of methods*: The process of demonstrating that specific equipment, reagents and/or procedures will consistently produce expected results within predetermined specifications
- *of data*: the process of confirming that data has been collected, transferred and/or recorded completely and accurately.
Vertical audit - An audit touching on all aspects of a process, within one or more areas of the organisation. One example is an audit that tracks a sample and covers consent, collection, receipt, processing, storage, associated data, staff (including training), equipment used and results of QC tests for that sample.
Warm ischaemic time – In biobanking, warm ischaemic time is the time between interruption of the blood supply to a tissue and removal of that tissue from the body.

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Note that the dates of ISO references have been omitted. The latest edition of the referenced document (including any amendments) applies.

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ISO 5725 - Accuracy and precision of results and measurement methods.

ISO 15189 - Medical laboratories —Requirements for quality and competence

ISO/IEC 17000, Conformity assessment —Vocabulary and general principles

ISO/IEC 17025 – General Requirements for the competence of testing and calibration laboratories.

ISO/IEC Guide 2, Standardization and related activities — General vocabulary

ISO Guide 34 - General Requirements for the Competence of Reference Material Producers

ISO/IEC Guide 99, International vocabulary of metrology — Basic and general concepts and associated terms (VIM)

Relevant national standards

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Useful Links

Australasian Biospecimen Network http://www.abrn.net/

BBMRI http://bbmri.eu/

BBMRI-ERIC http://bbmri-eric.eu/

Biospecimen Research Network, Biorepositories and Biospecimens Research Branch, National Cancer Institute http://biospecimens.cancer.gov/researchnetwork/default.asp

Canadian Tumour Repository Network https://www.ctrnet.ca/

European, Middle Eastern and African Society for Biopreservation and Biobanking and http://www.esbb.org/

Health Research Authority http://www.hra.nhs.uk/

Human Tissue Authority http://www.hta.gov.uk/

International Society for Biological and Environmental Repositories http://www.isber.org/

Medical Research Council, Regulatory Support Centre http://www.mrc.ac.uk/Ourresearch/Ethicsresearchguidance/RegulatorySupportCentre/index.htm

National Institute for Health Research http://www.nihr.ac.uk/Pages/default.aspx

Public Population Project in Genomics and Society (P^3G) http://www.p3g.org/about-p3g

STRATUM http://stratumbiobanking.org/

UK Clinical Research Collaboration http://www.ukcrc.org/

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Acknowledgments.

Thanks are given to all of the organisations and individuals who responded to the public consultation on the draft standard:

Organisations:

3C-R, France (88 biobanks are members of the Club 3C-R)
Arden Tissue Bank
Areteva
Breast Cancer Campaign
Cancer Research UK
Health Research Authority
Human Tissue Authority
Medical Schools Council
MesobanK (on behalf of the British Lung Foundation)
MRC UK Brain Bank Network
MRC Human Tissue Research
NIHR Exeter Clinical Research Facility
Pathology Diagnostics Ltd, Cambridge
Royal Brompton and Harefield NHS Foundation Trust
The Wellcome Trust
The Wellcome Trust Sanger Institute
University College London
University College London Hospitals

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Will Steward	University of Leicester
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Heather Coupar	MRC Regulatory Support Centre
EW Odell	King's College London; Guy's and St Thomas' Hosp. NHS Foundation Trust
Tim Painter	NCIN UGI SSCRG
Anne Dawnay	University College London Hospitals
Michael Davies	Liverpool Lung Project Biobank
John Field	Liverpool Lung Project Biobank
Robin Crawford	Cambridge University Hospitals NHS Foundation Trust
Anthony V Moorman	Northern Institute for Cancer Research, Newcastle University
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Cheryl Gillett	Kings College London
E Joanna Baker	Cambridge Blood and Stem Cell Biobank (CBSB)
Deborah Clarke	reSEARCH specimen store, Pre-cancer Genetics, Wellcome Trust
Jeanne-Hélène di Donato	3C-R, France
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