

Ethical Considerations in Clinical Chemistry and Laboratory Medicine

Christine B. Sekadde-Kigonde BSc Biochemistry, PhD, FAPath ECSA,
Department of Human Pathology, Thematic Unit of Clinical Chemistry, School of
Medicine, College of Health Sciences, University of Nairobi, P.O. Box 19676, Nairobi
00202, Kenya.

Trefor Higgins, M Sc. FCACB.

Director of Clinical Chemistry

DynaLFEDx

Canada

David E. Bruns, M.D.

Department of Pathology,

University of Virginia School of Medicine,

Charlottesville, VA, USA

Ann M. Gronowski, PhD

Washington University School of Medicine

St Louis, MO USA

For the IFCC Task Force on Ethics (TF-E)

Table of Contents

1. Aim of the Report.....	3
2. Introduction.....	3
3. Ethical Issues in the Pre-analytical Phase.....	6
4. Ethical Issues in the Analytical Phase.....	9
5. Ethical Issues in the Post Analytical Phase.....	11
6. References.....	14
7. Further Reading.....	16

1. Aim of the Report

The objective of this chapter is to consider ethical issues encountered during the daily work of laboratory medicine specialists. It is not intended to be comprehensive but aims to complement guidelines and documents that are available in many institutions and to offer a framework for addressing ethical issues encountered in the practice of laboratory medicine.

2. Introduction

The evolution of medical and bio-ethics over the years is well documented and includes the Nuremberg Code from 1947 (1), the Declaration of Geneva from 1948 (2), the Declaration of Helsinki from 1964 (3), and the Belmont report from 1978 (4). While many of these documents focus on medical research, concepts in the Declaration of Geneva and the Belmont report are also applicable to the practice of clinical medicine.

The “Belmont Report” is one of the key works concerning ethics and healthcare research (4). Created in 1978 by the U.S. “National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research”, it outlines ethical principles and guidelines for the protection of human subjects. The report identifies three core principles.

- a) **Respect for persons:** Acknowledgement of autonomy and protection of those with diminished autonomy.
- b) **Beneficence:** The duty to act in the best interests of patients or research subjects. The goal of maximizing benefits and minimizing harm. Also called non-maleficence.

- c) Justice:** The duty or obligation to treat patients equally and to distribute, by allocating fairly, what is rightly due in terms of benefits, risks and cost.

These principles can be applied to both research and clinical settings. In this chapter these three principles will be cited to clarify the ethical issues in laboratory medicine.

Laboratory medicine, just as other areas of medicine, is obliged to adhere to high ethical standards. Many countries and professional societies have developed policies and guidance materials on ethical issues related to laboratory medicine. For instance, the International Organization for Standardization (ISO) has created ISO 15189:2012 "Medical laboratories – Requirements for quality and competence" (5). Section 4.1.1.3 of the document summarizes the ethical conduct expected in laboratories. The document states that laboratories should have in place means to ensure that:

- a) *“there is no involvement in any activities that would diminish confidence in the laboratory’s competence, impartiality, judgment or operational integrity;*
- b) *management and personnel are free from any undue commercial, financial, or other pressure and influences that may adversely affect the quality of work;*
- c) *where potential conflicts in competing interests exist, they shall be openly and appropriately declared;*
- d) *there are appropriate procedures to ensure that staff treat human samples, tissues or remains according to relevant legal requirements;*
- e) *confidentiality of information is maintained.”*

Numerous professional organizations have outlined codes of ethics for clinical laboratory professionals (6-11). In general they are similar and outline the duty laboratory professionals have to the patient, the profession and society. As one example, the American Association for Clinical Chemistry (AACC) has ten principles of ethical conduct that it endorses. They are as follows:

1. *“Uphold standards of professionalism, be honest in all professional endeavors, and maintain a high level of personal integrity.*
2. *Avoid scientific and professional misconduct including, but not limited to fraud, fabrication, plagiarism, concealment, inappropriate omission of information, and making false or deceptive statements.*
3. *Report any health care professional who engages in fraud or deception or whose deficiency in character or competence jeopardizes patient care or other personnel.*
4. *Maintain a high level of quality in the product(s) of my professional endeavors, including validity and reliability of test results, interpretive opinions, publications, and scientific research.*
5. *Respect the privacy and confidentiality of protected health information encountered during the course of my professional activities in accordance with legal and ethical obligations.*
6. *Continuously strive to augment my professional qualifications, knowledge, and skills, and present them accurately.*
7. *Promote the safety and welfare of patients, employees, co-workers, colleagues, the public, and the environment.*

8. *Avoid, or promptly disclose and work to resolve, actual or potential conflicts of interest.*
9. *Encourage open and honest discussion among physicians, other healthcare providers and/or facility managers regarding disclosure to patients of information about medical errors, if such information is material to any patient's well-being.*
10. *Comply with relevant laws and seek to change them when they are contrary to the best interests of the patient.” (6)*

Despite the importance of ethics in laboratory medicine, there is variability in education that is focused on ethics in the laboratory. A recent report by the IFCC Task Force on Ethics indicates that formal teaching of ethics is absent from many clinical chemistry and laboratory medicine training programs and that there is a perceived need for training tools, with a particular desire of directors of training programs to have online tools (12).

This chapter will focus on the ethical issues encountered during the daily routine work of laboratory medicine specialists and will consider the pre-analytical, analytical and post-analytical phases.

3. Ethical Issues in the Pre-analytical Phase

The ethical obligation of a clinician ordering laboratory tests is not the prime mandate of this document. It is assumed that the referring clinician has: ordered the appropriate tests, not ordered tests for financial gain, discussed the risks and benefits of the tests to patients, referred testing to an appropriate laboratory (one

that is that is properly certified and in which the referring individual has no financial interest) and practiced the three ethical principles to the best of his/her ability.

Nevertheless, a laboratory professional has an obligation to act if there is reason to suspect that these ethical obligations are not being met by any person requesting laboratory tests.

The maintenance of ethical standards in the pre-analytical phase is the collaborative responsibility of the laboratory, the health care provider, researcher, phlebotomist, nurse, or whoever collects the specimen. Their roles include:

- Proper identification of the patient or subject.
- Collection of the appropriate sample using the appropriate technique.
- Appropriate identification and labeling of the sample so that the right tests are performed.
- Appropriate handling of the specimen until testing is performed.

(The reasons for the specimen collection may be outside the purview of the collectors since the collectors may not be familiar with the medical background of the patient and may not have had medical training. In such circumstances, individuals involved in collecting a test specimen must nonetheless be open and honest in explaining to the patient why they are unable to discuss the reasons for and the potential impacts of the testing.)

In particular, the application of the three principles is as follows:

a) Respect for persons: Consent should be obtained prior to sample collection.

Consent should be informed (the patient knows what testing is being performed and why) and may be either expressed or implied. Consent is expressed if the subject is asked for written or verbal agreement. Consent may be implied when a patient provides a requisition and willingly sits in a collection chair and allows a sample to be

taken. Implied consent is nuanced as a patient who is sitting to have blood collected may have been told what to do and may not actually understand that they had a choice.

Informed consent may pose an ethical problem if the patient is incompetent to make a decision due to age, mental status, or critical illness. Who may be allowed to give consent on behalf of the patient may vary among regions, may be influenced by different cultural practices, and may depend on the policies of the institution.

The patient's right to refuse to be tested should be respected. However, there are certain situations in which patient autonomy is not absolute. For instance, a patient may be deemed incompetent to make a decision about their health, as when the patient is unconscious, mentally ill, or under the influence of drugs. Children are generally deemed not competent to make decisions for themselves unless they are legally emancipated from their parents, but the status of children and adolescents under 18 years of age remains an area of controversy and is viewed differently in different parts of the world. There are cases of compulsory testing in certain groups such as intravenous drug users and prisoners. In these exceptional cases, healthcare professionals have an obligation to consult the guidelines provided by the institution in which they practice, and they must weigh the risks of loss of a patient's autonomy versus the benefits of the testing.

Confidential information about patient demographics, the visit of a patient to a testing facility, which tests were ordered, and the reasons for those tests, should be given only to appropriate personnel. Confidentiality must be maintained at every step of the process including specimen transportation and data entry.

b) Beneficence: All tests should benefit the patient based on the best medical

evidence. In addition, sample collection should not cause harm. Examples of harm in the preanalytical phase include infection or pain from the collection process (notably pain from inadvertent puncture of an artery) and adverse events associated with stimulatory testing. Therefore standard operating procedures and trained personnel should be in place to prevent or mitigate any adverse events in the collection procedure. The collection procedure should be carried out using universal precautions to protect the patient and the healthcare worker, and should be performed with the least amount of patient discomfort possible by properly trained personnel. Additional specimens shall not be collected for research procedures without informed consent from the patient and approval from the appropriate ethics board. Specimens should be labeled with at least 2 unique identifiers, and all aliquot tubes should be similarly identified. Samples should be transported in a manner to preserve the integrity of the sample.

c) Justice: The clinical laboratory should, as far as it is able, provide access to a wide variety of laboratory tests at reasonable cost. The laboratory should evaluate the need to introduce new tests and the opportunities to discontinue older tests when better tests are available. There should be no preference given to individuals to facilitate or expedite the collection process at the expense of other patients.

4. Ethical Issues in the Analytical Phase

Confidentiality, quality and competence are vital for all laboratories and settings. The difficulty of achieving each of these goals may vary among laboratories and among parts of the laboratory. Confidentiality during the analytical phase may be almost a by-product of automation in a laboratory that uses automated bar code readers, automated analysis, and auto-verification and where the patient names for most

samples are usually unseen by those in the laboratory. Challenges of maintaining confidentiality during the analytical phase are often greater in small laboratories that perform manual testing and in operations that conduct near-patient (point-of-care) testing. It is important that any site conducting patient testing strive to maintain ethical standards.

a) Respect for persons: Patients have the right to decline to have their specimens analyzed even after the specimens have been collected and processed. Confidentiality should be respected and maintained. In point-of-care testing, special care should be taken to maintain confidentiality as much as possible. Point-of-care settings can be difficult because testing is often conducted in a common room with access by trained and non-trained personnel.

b) Beneficence: The aim of the laboratory in the analytical phase is to provide the best possible analytical result. This is achieved through good laboratory practice and maintenance of professional standards. Good laboratory practice should involve the establishment of a rigorous quality assurance program encompassing quality control testing, proficiency testing and laboratory accreditation.

The maxim “a wrong result is worse than no result” is a guiding principle in this regard. Good laboratory practice includes refusal to analyze or report a result when there is evidence of poor sample integrity, incorrect or poor labeling or other deficiencies that may compromise the test result. Acceptability of samples that are classified as “difficult to obtain” (such as cerebrospinal fluid) may be considered a special case, and individual facilities should develop an appropriate policy on analysis and documentation of these specimens when specimen integrity or identification is compromised. Laboratories should maintain proper certification as required by their country or region. Only qualified, properly trained and regularly re-

accredited personnel should perform point-of-care testing.

c) Justice: Discrimination in the analysis of patient samples based on gender, age or racial origin is an injustice. All patient samples are to be treated equally. It is recognized, however, that specimens designated as STAT or priority must be analyzed promptly to meet the medical need as well as possible. Laboratories should develop appropriate operating procedures for this type of testing, and state which tests are included and the expected turnaround times. It is expected that all specimens are analyzed accurately and in a timely manner.

5. Ethical Issues in the Post Analytical Phase

The post analytical phase includes reporting and interpretation of results, residual specimen storage, and data access. Laboratories should have a policy for specimen storage that is analyte dependent. Archiving of results in either electronic or hard copy format is an important aspect of good laboratory practice. Archived documents may include: (1) request forms, (2) raw analytical and quality control data, (3) results and (4) reports. Policies on retention and destruction of medical records and specimen retention and discard should be put in place. Identification of authorized personnel allowed to access medical records such as doctors, patients, and laboratory staff should be documented in the policy manual. In addition, the patient should be allowed to give consent for access by others (such as family members) as required. Applying the three principles:

a) Respect for persons: There are substantial differences in the world regarding the confidentiality of results. In some areas, the patient and the referring clinician are the sole legitimate recipients of laboratory data. Exceptions are made if the patient is a juvenile or is incapable of receiving or understanding laboratory

results. In other areas, the patient's family is regarded as legitimate recipients of a patient's laboratory results. Respect for local customs as to legitimate recipients of laboratory data should be taken into account as laboratories develop a policy on dissemination of results. In some areas, there may be exceptions regarding who may access results; access is affected by legal requirements, insurance rules, and government regulations. Reliable transmission methods should be used, and security in relaying the results should be protected regardless of the channel of communications, e.g., internet, courier, public post, electronic means (including hospital information systems), and hand deliveries by messengers.

Patients have a reasonable expectation that their samples will be used solely for the laboratory testing requested by the clinician. Individuals have the right to decide when and if their records or specimens shall be used outside the normal medical care to which they have consented. Any further testing of residual samples (except for method validation or in cases where samples are completely anonymized) should be approved by a local ethics committee or board, and patient consent may be required.

b) **Beneficence:** Misinterpretation of results can lead to patient harm; to minimize this harm, only qualified personnel should interpret reports.

The reporting of results should be performed in a manner such that the patient's clinician receives the right result within an appropriate time with information that allows for the correct interpretation of the results. It is expected that results should include an appropriate name for the test performed, an appropriate reference interval, which may be age and gender specific, the unit of measurement and, when possible, a designation that the test is within or above the reference interval.

Turnaround time (TAT) should be as short as possible based on laboratory

conditions for that test, and achieving this TAT should not compromise validity of the results. Timely access to results is important, and withholding of results because of non-payment might lead to harming the patient especially in emergency situations. The data included on a report, including patient demographics and the above-mentioned test information, should be formatted on each report so that the clinician can make clinical decisions based on information that is clearly provided. Delays in reporting, for whatever reason, should be avoided. Incorrect results can lead to mismanagement. Ordering clinicians should be notified of errors as soon as they are identified, and test results should be corrected as soon as possible. The change should be marked on the report, and the incorrect result or results should remain accessible and be clearly identified as erroneous.

c) **Justice:** The reporting of results should be consistent for all patients. Rapid reporting may be required for some results, such as for "critical" and "significant-risk" results, but the rules for rapid reporting must apply regardless of the source of the sample and the patient's ability to pay. Withholding of laboratory results because the patient has not paid should be avoided.

A policy on the use of residual samples should be developed. Residual samples are often used without the patient's knowledge. There is much discussion in the literature about who owns patient specimens and whether patients should share in profits if financial gains are derived from leftover samples. Rules and practices vary by region and institution. Bio-banking of leftover specimens and the ethical issues associated with it are beyond the scope of this chapter (13-16).

6. References

1. Nuremburg Code <http://www.cirp.org/library/ethics/nuremberg/> Accessed 9 January 2016.
2. Declaration of Geneva http://www.wma.net/en/30publications/10policies/g1/WMA_DECLARATION-OF-GENEVA_A4_EN.pdf Accessed 9 January 2016.
3. Declaration of Helsinki <http://www.wma.net/en/30publications/10policies/b3/17c.pdf> Accessed 9 January 2016.
4. Belmont Report <http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html> Accessed 9 January 2016.
5. ISO 15189:2012 Medical Laboratories – Requirements for quality and competence. <https://www.iso.org/obp/ui/#iso:std:iso:15189:ed-3:v2:en> Accessed 9 January 2016.
6. AACC Ethics guidelines. American Association of Clinical Chemistry. <https://www.aacc.org/about-aacc/governance/ethic-guidelines>. Accessed 9 January 2016.
7. American Society for Clinical Laboratory Science; Code of Ethics www.ascls.org/about-us/code-of-ethics Accessed 9 January 2016.
8. College of American Pathologists Principles of Ethical and Professional Conduct http://www.cap.org/web/oracle/webcenter/portalapp/pages/search-results.jsp?searchTerms=cap%20principles%20ethical%20professional&_afLoop=1212918502052812#%40%3FsearchTerms%3Dcap%2Bprinciples%2Bethical%2Bprofessional%26_afLoop%3D1212918502052812%26_adf.ctrl-state%3Dcq515pog_4 Accessed 4 January 2016.
9. Pathology Australia Code of Ethics and Practice Guidelines- http://www.pathologyaustralia.com.au/wp-content/uploads/2010/07/02_Pathology-Australia-Code-of-Ethics-and-Practice-Guidelines-November-2012.pdf Accessed 9 January 2016.
10. Canadian Society for Medical Laboratory Science (SCMLS) – <http://www.csmls.org/About-Us/Who-We-Serve/Code-of-Conduct.aspx> Accessed 9 January 2016.
11. College of Pathologists Pakistan. Ethics for Pathologists. <http://www.healthwayslabs.net/docs/ethics.pdf>. Accessed 9 January 2016.
12. Bruns, DE, Burtis CA, Gronowski AM, McQueen MJ, Newman A, Jonsson JJ. Variability of ethics education in laboratory medicine training programs: results of an international survey. Clin Chim Acta 2015;442:115-118.

13. Allen MJ, Powers MLE, Gronowski KS, Gronowski AM. Human tissue ownership and use in research: What laboratories and researchers should know. *Clin Chem* 2010;56:1675-1682.
14. Charo RA. Body of research--ownership and use of human tissue. *N Eng J Med* 2006;355:1517-19.
15. vanDiest PJ. No consent should be needed for using leftover body material for scientific purposes. *BMJ* 2002;325:648-651.
16. Bathe OF, McGuire AL. The ethical use of existing samples for genome research. *Genetics in Medicine* 2009;11:712-715.

7. Further Reading

Barlow-Stewartand K, Burnett L. Ethical considerations in the use of DNA for the diagnosis of diseases. Clin Biochem Review 2006;27:53-61.

Beauchamp TL, Childress JF. Principles of biomedical ethics. 7th Ed. New York: Oxford University Press;2012:480 p.

Burnett L, McQueen MJ, Jonsson JJ, Torricelli F. IFCC Taskforce on Ethics [13.7]. IFCC position paper: report of the IFCC taskforce on ethics: introduction and framework. Clin Chem Lab Med 2007;45:1098-1104.

Bruns DE, Ashwood ER, Burtis CA. Clinical Chemistry, Molecular Diagnostics and Laboratory Medicine. In: Burtis CA, Ashwood ER, Bruns DE, editors. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 5th Edition. St. Louis (MO): Elsevier Saunders;2013. p 4-6.

Council of International Organizations of Medical Sciences (CIOMS) in collaboration with the World Health Organization (WHO). International ethical guidelines for biomedical research involving human subjects. Geneva 1993.
http://www.cioms.ch/publications/layout_guide2002.pdf (Accessed 9 January 2016)

El-Nageh MM, Linehan B, Corder S, Wells D, McKelvie H. World Health Organization Regional Office for Eastern Mediterranean. Ethical practice in Laboratory Medicine and Forensic Pathology. 1999.
<http://applications.emro.who.int/dsaf/dsa38.pdf> (Accessed 9 January 2016)

Grady C. Enduring and emerging challenges of informed consent. N Eng J Med 2015;372:855-862.

Linehan, BJ, El-Nagen, MN, Corder S, Richter A. Ethics in Laboratory Medicine. In: McClatchey KD, editor. Clinical Laboratory Medicine. 2nd Ed. Philadelphia (PA): Lippincott Williams and Wilkins; 2002. p. 134-142.

McQueen MJ. Ethics and Laboratory Medicine. Clin Chem 1990;36:1404-1407.

Nyrhinen T, Leino-Kilpi H. Ethics in the laboratory examination of patients, J Med Ethics 2000;26:54-60.

Warner EA, Walker RM, Friedmann PD. Should informed consent be required for laboratory testing for drugs of abuse in medical settings? Am J Med 2003;115:54-57

Wijeratne N, Benatar SR. Ethical issues in laboratory medicine, J Clin Pathol 2010;63:97-98;