OSAC 2025-S-0014
Guidelines for a Quality Assurance Program in Forensic Anthropology

Forensic Anthropology Subcommittee
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OSAC Proposed Standard

DRAFT OSAC 2025-S-0014 Guidelines for a Quality Assurance Program in Forensic Anthropology

Prepared by
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Abstract

A Quality Assurance (QA) program is necessary to ensure a consistent, trustworthy, and high-quality work product produced by an analyst. This document was developed to provide forensic anthropology practitioners with fundamental information on the minimal components of a quality assurance system. It is a supplement to the OSAC 2024-S-0001, *Standard for implementing a Quality Assurance Program* in Forensic Anthropology document. The organization of the document follows that of the Standard; however, it provides explanations and examples of how the requirements can be implemented by sole practitioners or practitioners in unaccredited laboratories. The goal of the document is to make basic quality assurance practices available to all forensic anthropologists.

Keywords: *quality assurance, laboratory management, accreditation requirements*

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Guidelines for Implementing a Quality Assurance Program in Forensic Anthropology

Introduction

The Standard for a Quality Assurance Program in Forensic Anthropology document provides the minimal components of a Quality Assurance (QA) program for forensic anthropology laboratories. Implementing these components may be challenging for those who have not worked or trained in an accredited laboratory. This guideline document builds on the Standard requirements by illustrating how the Standard may be implemented. It is written as an example of how a laboratory's policies can address the Standard requirements. The target audience are anthropologists performing forensic casework within a larger entity that provides little to no administrative support for establishing a full quality assurance system compliant with accrediting body's requirements or international standards such as ISO 17020. For example, this would include a forensic anthropologist who works within an academic department that does not recognize forensic casework as a significant aspect of its mission or scope, and which handles a limited number of cases each year. Also, it is intended for a sole practitioner who does not have the necessary infrastructure to meet an accrediting body's requirements or international standards. Laboratories that perform forensic casework on a regular basis, especially those with contracts from medicolegal authorities, are expected to seek formal accreditation through a certified accrediting body.

In addition to developing a QA program that includes the basic components outlined here, a forensic anthropologist should consider human and cognitive factors that impact procedures such as the presence of task relevant and irrelevant information. Assessing what constitutes relevant versus irrelevant context in case analysis is case specific with bias mitigation strategies being (to some extent) restricted when working as a sole forensic anthropologist or in a smaller team. However, considerations of procedures on how to optimize information sequencing and promote transparency in forensic anthropology data collection, analysis, and interpretation should be taken. For example, this could be done by implementing guidelines that document the procedure and sequence of information in terms of assessing what information is available (e.g., case materials, photos from scene and autopsies, investigative summaries, etc.), what information is needed for the forensic anthropologist to conduct their analysis, (task-relevant information vs task-irrelevant information) and what information can be received at a later stage (post analysis) to minimize the risk of cognitive biases. Larger laboratories with multiple practitioners might benefit from assigning different individuals to different tasks to minimize potential contextual biasing information, specifically in complex cases where the risk of bias might be greater. This could be done by ensuring that the person taking part in the recovery does not perform the analysis, allowing the analyst to be blind to contextual information. Although this might be challenging for a sole practitioner, blind peer review can be implemented by sending case photographs prior to sending case information (analytical report, bench notes, diagrams, police reports, etc.) so that a remote reviewer has an opportunity to conduct an independent assessment (see section 4.14).

Forensic anthropologists may use the resources referenced in this document as well as the Standard as a first step to mitigate the influence of human factors to the best of their ability.

Appendix A is a diagram to assist with understanding the relationship between standards, accreditation, and QA programs.

4.1 Scope of Work

Identifying and documenting what analyses and services (i.e., tasks) a forensic anthropology laboratory provides is the first step in developing a QA program. Examples of analyses are generating a biological profile, skeletal trauma analysis, histological examinations, and antemortem/postmortem radiograph comparison. Services may include search and recovery of evidence from a scene. The scope of work is the foundation of the QA program. All standard operating procedures, training modules, and competency and proficiency testing are centered on tasks provided. A laboratory can expand the list of tasks with an appropriate expansion of the QA program. Laboratories do not perform *ad hoc* tasks without appropriate standard operating procedures, training, and competency testing.

4.2 Organization

The internal organization and chain of command may be highly variable depending on the setting of the laboratory, but includes all individuals (e.g., authorized personnel, students, volunteers) that perform tasks. For example, in an academic setting, the organization of the laboratory may require an undergraduate intern to report to an attending graduate student who, in turn, reports to the faculty laboratory director. A sole practitioner may document that they report facility concerns to the facilities manager and case concerns to the requesting agency, such as a law enforcement agency, medicolegal authority, district attorney, defense counsel, etc.

4.3 Safety

An appropriate health and safety program can be as simple or elaborate as needed, depending on the tasks performed by the forensic anthropology laboratory. The purpose of the program is to reduce and mitigate any potential hazards encountered during casework, whether in-house or at the scene. For example, regarding the use of appropriate personal protective equipment (PPE), a laboratory's safety program may address how to appropriately don and doff the PPE to prevent transmission of bloodborne and airborne pathogens during examinations. This program may also address safety in the use of autopsy/scene tools, handling of biohazard chemicals and biological tissues, and establishing safety procedures.

4.4 Security

The laboratory's security policy typically addresses physical and digital evidence, case files (hard-copies and electronic), and building/facility access. The security of physical evidence is ensured at all stages of the process including receipt, transportation, transfer, analysis, storage, and disposition. Transport of human remains is secured so that only authorized individuals have access to the transporting vehicle. Consider if written permission is needed to transport human remains from a scene to a laboratory; if so, written procedures are developed to address appropriate documentation and necessary signatures.

Laboratory access is limited to authorized personnel, and the laboratory manager maintains documentation of individuals who have authorized access. Access may be restricted by key card, physical key, or other security device. Doors to the laboratory always remain secured. Some laboratories also utilize surveillance cameras in/around the facility. Controlled access may be granted to visitors. A visitor log or similar is used to document who has entered the laboratory, the date and time of the visit, and which authorized person escorted the visitor or provided access. The security policy also addresses photographs taken inside the laboratory and by whom.

Laboratory policies address access to both electronic and paper case files. A secure computer system can be used to control access to electronic case files. Paper case files can be secured using a locking cabinet or a locked room accessible solely to authorized personnel, and all access events are logged.

4.5 Document Control

Documents that dictate how the laboratory performs tasks (e.g., standard operating procedures (SOPs)) as well as standardized forms used to collect information (e.g., bench notes, chain of custody) are controlled. Current versions of a document are clearly marked and readily available to authorized personnel; obsolete versions of a document are clearly marked and may not be available to authorized personnel. The current version of a document is kept in a controlled location (e.g., a properly labeled binder or electronic file). When copies are made of the controlled document (e.g., photocopy of a document held within the controlled binder or printed copy of the document from the controlled electronic file), it is marked as 'uncontrolled'.

There are several ways to create a document-control system through properly labeled and secured files. Commercial software is available as well. Several accredited forensic anthropology laboratories post their SOPs on the internet and have them marked with their effective dates. This allows laboratory personnel to access the documents and easily recognize the most current version. Some examples of offices that post their documents on the internet are included in Appendix C.

4.6 Standard Operating Procedures

An SOP is a document designed to inform practitioners how to perform a specific task in a specific laboratory. The goal of the documents is to ensure consistency among authorized personnel that perform each task. These documents cover the full range of the laboratory's operations including receiving evidence, accessioning evidence, analyzing evidence, writing analytical reports, technical and administrative review, transferring evidence, and disposition of evidence. Tasks are performed in compliance with the SOP to ensure quality assurance. This may include tasks that are performed at locations away from the laboratory.

When the laboratory deviates from its SOPs, the deviation(s), the detailed reasoning for the deviation(s), and the authorization(s) are documented in the case file. When possible (and if appropriate), a planned departure from a procedure or process is pre-approved and documented by laboratory management. Additionally (when possible), the requesting agency is notified of potential deviations prior to their occurrence. The laboratory should foster open discussion with

the requesting agency regarding potential deviations. The laboratory clearly explains the reasoning for the departure from the SOP and the justification for the proposed alternative procedure or process. Prior to conducting the alternative procedure or process, the laboratory obtains consent/authorization from the requesting agency for deviating from laboratory SOPs, and whenever possible other downstream stakeholders (especially if the evidentiary material/remains will be entirely consumed or chemically, thermally, or structurally altered).

Some accredited forensic anthropology laboratories publish their SOPs online (see Appendix C); these serve as helpful resources as a laboratory develops its own SOPs. Standards published by accredited Standard Development Organizations such as the Academy Standards Board (ASB) can serve as a basis or component of an SOP. For example, a SOP for skeletal analysis may reference the American National Standards Institute (ANSI)/ASB standards for age, sex, and stature estimation.

4.7 Method Development and Validation

Most forensic anthropologists use methods that have been validated for use under a wide range of typical operating conditions with a wide range of samples and published in peer reviewed journals. Most of these methods are not sensitive to laboratory conditions and do not need to be internally validated before use unless the operating procedures are outside of those covered in the published validation reports, or the method is used on samples (populations) different from the one used to develop the method. In some situations, methods may need to be modified or developed by the laboratory. In these situations, the method development or modification is done with a documented plan and the experiment/study is carried out with known samples by personnel who are competent to perform the method development. All records associated with method development and validation are retained to show the scientific validity and reliability of the method.

Some elements to be considered, as applicable, when performing method validation include accuracy, uncertainty of measured results, limit of detection, repeatability, reproducibility, bias, precision, and method limitations. Methods need to be validated when they have not been peer-reviewed/published, have been modified, or are being used outside of the intended purpose. If the modification(s) are significant enough to depart from the original validated method and/or the end result, the method should be re-validated. These modifications can include changes to the technical procedures, statistical analyses, and/or representative samples.

4.8 Calibration and Performance Checking

Instruments, equipment, and reference materials may be damaged during routine handling and become unreliable. Calibration and performance checking ensures that instruments, equipment, and reference materials are functioning properly and in good repair.

Typically, instrument calibration is performed by a calibration service provider that is certified to ISO 17025 and a certificate of calibration is received following a calibration test.

Performance checking is done in-house by measuring an item of known dimension and is done at regularly scheduled intervals.

Calibration and maintenance of equipment may require regular service by a certified technician; such is the case with microscopes and medical imaging equipment. More specialized equipment such as a digitizer may require the authorized personnel to work directly with the manufacturer.

Comparative materials, such as pubic symphysis casts, are inspected for damage or wear and tear. One possible way to evaluate wear and tear is to photograph an item when it is received and then compare the item to the original photograph at established intervals (annually, semi-annually, etc.) The initial photograph creates a record of the object's original appearance and allows the authorized personnel to note any physical change in the item.

Calibration and performance checking of instruments, equipment and reference materials are done at established, regular intervals; for example, calibration scheduled annually, and performance checks scheduled quarterly. The calibration certificates and performance checks (i.e., logbook and associated records) are maintained/archived. Individual instruments, equipment, and comparative materials are given a unique identifier so that they can be properly identified in calibration certificates and logbooks.

4.9 Personnel

All individuals (i.e., authorized personnel, students, interns, volunteers) handling evidence and/or performing tasks must be adequately trained before working independently, regardless of the tasks being performed. Furthermore, the required education and training required to perform a task are identified and documented in the laboratory's policies and SOPs. A record of education and training is created and maintained for each individual authorized to perform each task. With each additional education and training activity an individual receives, their record is updated. Some jurisdictions may require laboratories to provide access to these records. Having a list of authorized individuals can help manage records of individuals who have left the laboratory.

4.10 Training

A training program for authorized personnel ensures that a laboratory meets its own QA program requirements. It allows the laboratory to demonstrate competency and proficiency of authorized personnel/analyst-level through a training and testing program. The training program provides authorized personnel the knowledge, skills, and abilities tied to laboratory security and safety, evidence handling, cognitive bias and human factors (see Appendix B and C for resources to facilitate human factors training), in addition to the core scientific practices (e.g., determine non-human from human bone, sort commingled remains, estimate the biological profile from a skeleton).

4.11 Competency and Proficiency Testing

Competency tests provide a means to gauge an individual's ability to function independently in a laboratory. Ideally, new laboratory personnel who have the potential to handle casework or perform analyses are competency tested prior to beginning casework. Using the laboratory's defined list of areas that require testing (e.g., sex estimation, age estimation, population affinity estimation, human/non-human differentiation), all new personnel are administered tests related to their duties prior to working on casework.

Proficiency testing occurs at regular intervals to ensure that analysts are familiar with the SOPs and equipment as well as maintaining their skill level for routine analyses. Proficiency tests are analyses that mimic casework, but there is ground truth to the evidence and the expected result is known. An example is a DNA mixture created from three contributors. In anthropology, ground truth may be known (pubic symphysis of a White, 45-year-old male), but the expected result may not be clear due to human variation. Often anthropologists must work together to form the expected results through consensus. Once a test is created it can be shared among laboratories to test the proficiency of the analysts as well as measure interlaboratory results.

To be most effective, proficiency tests are conducted in the blind, if possible. During blind proficiency testing the analyst does not know they are being tested, allowing the test environment to closely mirror typical casework. If non-blind proficiency testing is used, the laboratory provides an explanation as to why blind proficiency testing was not used. Blind proficiency testing is difficult in anthropology due to the nature of the evidence. However, if a laboratory performs human/non-human comparisons based on photographs submitted electronically, the laboratory could have a law enforcement agent submit a proficiency test that consists of a photograph of a bone. The analyst would be unaware that they are taking a proficiency test and would complete the analysis in a true analytical environment.

See Appendix C for resources on proficiency test implementation strategies. External vendors are available to provide proficiency testing for forensic anthropology laboratories for a fee. Each proficiency test typically addresses one examination area (e.g., sex estimation) per test. A laboratory can choose how many proficiency tests it requires in one year. A documented plan/schedule of what tasks are proficiency-tested and when is strongly recommended to reduce chances of missing proficiency-testing of specific tasks. When the result of a proficiency test does not match the expected result and is not scientifically justifiable, an analysis of the source of the error is done and documented. When necessary, the analyst is retrained and retested before returning to performing independent analysis.

Results of the competency and proficiency tests and any follow-up action such as retraining are archived.

4.12 Evidence Handling

Evidence-handling procedures include how evidence is received and accessioned. All human remains are treated as evidentiary material. Accessioning includes assigning a unique identifier (i.e., case number) to each case. At times, additional remains may be received for a case already

accessioned into the laboratory. When this occurs, the original unique identifier can be assigned to the additional remains, but the secondary accessioning is documented in the case file.

The written procedure addresses steps to protect against commingling and contamination. These steps can be as simple as allowing only one case to be placed on a table or tray at a time. A laboratory may choose to write the unique identifier on each bone of a case or may choose to label the container holding the remains with the unique identifier. The system that a laboratory employs to label a case with a unique identifier is included in the written procedure.

The written procedure includes documentation of evidence transfers (i.e., appropriately signed chain of custody). The documentation is initiated when evidence is first received–whether as a recovery from the scene or through transfer from the requesting agency–and continues until final disposition of the evidence. Evidence transfer is typically documented on a form and the form (or copy of it) is stored in the case file.

The written procedure includes the final disposition of the evidence. Final disposition may be to return the evidence to the requesting agency, to archive evidence for a specific period then destroy it, or to archive evidence indefinitely. Regardless of the final disposition chosen, it is communicated to the requesting agency and documented.

4.13 Case File

The composition of the case file (i.e., case report, photographs, and other documents) is retained per the laboratory's written police or SOP for document retention. The case file and all documents held within it are labeled with the unique identifier assigned to the evidence. The case file includes all forms used to track evidence (receipt, transfer, release, or final disposition), documents pertaining to the task (e.g., police report, medical examiner report), documents created during the task (e.g., site map, bench notes, analysis printouts, final report), and all communications regarding the case (e.g., copy of emails, written documentation of phone calls, expert witness testimony documents). Items such as radiographs and photographs may be kept in a separate location (e.g., designated server), but must be associated with the case file (typically accomplished by labeling each item with the unique identifier) and retrievable. If items are stored separately from the case file, their alternate storage location(s) is documented in the policy or SOP.

4.14 Technical and Administrative Review (Peer Review)

Technical review is an independent evaluation by a qualified forensic anthropologist. The goal of the technical review is to ensure that:

a) The methods used during the analysis are appropriate and followed correctly,
b) The evidence is adequately documented (e.g., photographs, radiographs),
c) All items are properly marked with the unique case identifier,
d) The bench notes are clear and complete,
e) The reported results/findings are accurate, reasonable, clearly stated, and supported by the technical records,
f) The final report is clearly written, and

g) That proper technical procedures were followed, and that the laboratory's policies and procedures were adhered to.

Technical reviews may not be performed by individuals involved in the examination or reporting of the case and may be done internally or externally. Technical review is not required for 100% of cases produced by a laboratory, but a laboratory defines parameters for cases that require technical review if 100% is not met. The technical review is documented (typically on a form) and that documentation is retained in the case file. A formal agreement between agencies may be required prior to providing technical review. The agreement may include an expected turnaround time for a review and how to handle discordance. When a discordance occurs and cannot be settled between the analyst and reviewer, another expert is consulted. Note that a reviewer may be subpoenaed to discuss their role in the case and their opinion of the analysis.

Administrative review is usually conducted by an individual familiar with the laboratory's reporting format. During the administrative review, the final report is checked for the laboratory's standard report format and accuracy of basic case information such as case number, spelling of decedent's name, dates, initials, page number, presence of signature, etc. The technical and administrative reviews may be conducted by the same individual.

4.15 Preventative and Corrective Actions

Preventive actions are actions taken to reduce the opportunities for nonconforming work or unexpected/undesirable events from occurring. Risk assessments are evaluations of potential issues that could create undesirable events. Risk assessments can result in preventive actions being taken to reduce the risk and/or prevent an event from occurring. These are typically documented using the following: identified risk, evaluation of risk, preventive actions to address risk, and monitoring of effectiveness of actions taken. Together, these processes allow for improvement in the quality of work in a laboratory while reducing any negative impacts.

For example, the laboratory manager notices that only the lids of specimen jars are labeled with the case number. The manager is concerned that if the lids are switched (which is easy to do), then the cases would be incorrectly labeled (identification of risk). The manager performs a risk assessment by reviewing the Evidence Management SOP. The SOP states to "label the jar" and is not specific as to what part of the jar should be labeled (evaluation of risk). The manager revises the SOP to state that the jar itself should be labeled, regardless of whether the lid is labeled. The manager distributes the updated SOP to all authorized personnel and provides training (preventive action to address risk). The manager monitors the labeling of the specimen jars for a period to ensure that all authorized personnel are following the revised procedure (monitoring of effectiveness).

Nonconforming work is work performed which does not follow the laboratory's own policies/procedures, good laboratory practices, or published standards. When nonconforming work is discovered, corrective action is taken. The procedures for handling nonconforming work should include the following:

a) identify affected case(s) and sample(s),

b) identify potential impact on the case(s) and sample(s),

d) perform a cause analysis,

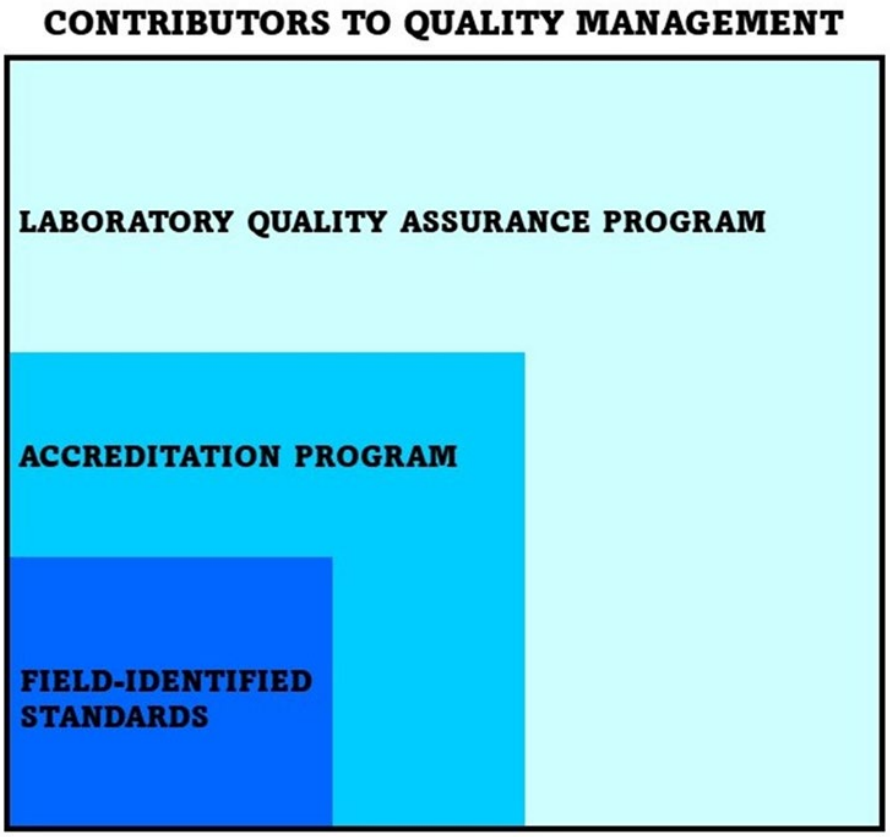
e) investigate to determine if incident is systemic,
f) create a corrective action plan,
g) monitor for effectiveness of the corrective action,
h) notify relevant stakeholders, if applicable.

Building on the previous example, an analyst at the laboratory has labeled the lids of specimen jars and not the jars themselves. A colleague notices this and notifies the laboratory manager about the nonconformance as this is in violation of the newly revised Evidence Management SOP. The laboratory manager performs a cause analysis by interviewing the analyst, reviewing the analyst's training record, re-reviewing the SOP to see if there are any deficiencies, examining other specimen jars handled by the analyst as well as specimen jars handled by other analysts. The manager determines that the analyst received the original training, the SOP is clearly written, and other analysts are properly labeling specimen jars. The manager determines that this is a problem affecting one analyst and not a systemic problem. The manager also determines that the analyst has not been following the revised SOP, but it is unlikely that they have switched labeled lids, and no casework has been negatively affected. The manager creates a corrective action plan for the analyst which involves re-reading the SOP and taking a short quiz. Then, the analyst's specimen jars are monitored for a specific period of time to ensure that the SOP is followed correctly.

All events of the nonconformance and corrective action are documented to include a description of the nonconformity, list of specimens/cases affected, outcome of the cause analysis, necessary corrective actions, and monitoring period and results. A laboratory may consider adding this documentation to the case files of affected cases. This record is retained for a defined period based on the documented retention schedule. Some corrective actions may be minor like the above example; some may be major, requiring work to be suspended, retracted, or re-done as necessary.

Some accredited laboratories post their corrective action SOP on their website, and these can serve as resources (See Appendix C).

Appendix A



This diagram demonstrates the relationship between discipline-identified standards (i.e., OSAC and ANSI/ASB), accreditation program requirements (e.g., ISO 17020), and the laboratory Quality Assurance program. Discipline-identified standards are narrowly focused, typically on a single task (e.g., estimating sex from skeletal remains; determination of medicolegal significance). They tend to be very general and provide the most basic consensus-based requirements. Practitioners are able to follow them with current resources. Accreditation program requirements are broader in scope and provide guidance on what elements are needed for a laboratory to create an efficient and rigorous Quality Assurance program. Being accredited encourages public trust in the quality of products produced by a laboratory. The laboratory Quality Assurance program is the broadest component and dictates how a laboratory operates. This includes everything from types of analyses performed, evidence handling, case record management, and so on. These procedures are typically guided by the standards and accreditation requirements. Although these three levels are not contingent on each other, they can help inform the other levels.

Appendix B

Table of Relevant References with Recommendations for Bias Mitigation

Reference	Application to QA	Recommendations
Cooper & Meterko (2019)	Training, SOPs	Reduce access to task irrelevant information, multiple comparison samples, blind analysis
Davidson, Nakhaeizadeh & Rando (2023)	Training, SOPs	Adapt SOPs to reflect possible biases due to the order of examination
Dror & Kukucka (2021)	Training, SOPs	Linear Sequential Unmasking - Expanded (LSU-E)
Goots, Hefner, & Start (2023)	Training SOPs	Peer review, SOPs, synthesizing data from multiple elements
Hartley, Winburn, & Dror (2022)	Training, SOPs	Use of statistical frameworks to synthesize data from multiple elements, blind analysis, LSU-E, documenting decision making process,
Kassin, Dror, & Kukucka (2013)	Training, SOPs, Technical and Administrative Reviews	Sequence of examination: document evidence findings prior to comparison with target, blind testing, peer review, bias training.
Kunkler & Roy (2023)	Training, Method Development and Validation, SOPs	Use validated, standardized methods, transparency in documenting analysis, document evidence findings prior to comparison with target, masking biasing information, blind testing.
Meija, Cuellar, & Salyards (2020)	Competency and Proficiency Training	Blind proficiency testing
Nakhaeizadeh, Dror, & Morgan (2020)	Method Development and Applications	Assessing what information is task relevant for specific methods.
Nakhaeizadeh, Dror & Morgan (2014)	Training, SOPs	Blind testing, case management
Nakhaeizadeh, Hanson & Dozzi (2014)	Training, Method Development and Validation	Training, blind testing, method assessment
Nakhaeizadeh, et al (2018)	Training, SOPs	Blind testing, separate individuals for evidence recovery and analysis
Quigley-McBride et al (2022)	Training, SOPs	Linear Sequential Unmasking – Expanded (LSU-E)
Sauerwein (2018)	Training, SOPs, Method Development and Validation	Use of method appropriate to sample and context, separate individuals for donor placement and data collection, development of more objective methods for decomposition analysis
Spellman, Eldridge & Bieber (2022)	Training, SOPs, Technical and Administrative Reviews	Separate individuals for evidence recovery and analysis, document evidence findings prior to comparison with target, blind testing, peer review.
Warren, Friend, & Stock (2018)	Training, method development and validation	Method assessment, blind peer review, sequential unmasking of information.
Winburn (2018)	Training and quality control	Understand and constrain errors with strong methods and quality control

Appendix C

Informative References

1] The New York City Office of the Chief Medical Anthropology Unit's Technical Manuals can be accessed at https://www.nyc.gov/site/ocme/services/forensic-anthropology-unit-technical-manuals.page.

2] The New York City Office of the Chief Medical Anthropology Unit's Laboratory Analysis Manual can be accessed at https://www.nyc.gov/site/ocme/services/fau-anthropological-laboratory-analysis-manual.page.

3] Arkansas State Crime Laboratory Quality Manual can be accessed at https://www.dps.arkansas.gov/wp-content/uploads/2020/07/ASCL-DOC-01-Quality-Manual-1709-22.pdf.

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