Crime Scene/Death Investigation
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Jason Wiersema, Chair, Disaster Victim Identification, Harris County (Texas) Institute of Forensic Sciences
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SAC Mission

Improve forensic practice by creating and promoting standard guidelines and protocols to ensure that the results of forensic analysis are reliable and reproducible.
Roadmap for Fire and Explosion Investigation for Origin and Cause of a Fire

Overall Process
- Recognize the need
- Define the Problem
- Collect Data (scene and other sources)
- Determine Origin
- Determine Cause

Origin Determination
- Analyze Data
- Develop Origin Hypotheses
- Test Hypotheses
- Origin Determined, if one and only one hypothesis survives testing

Cause Determination
- Analyze Data
- Develop All Possible Cause Hypotheses in Origin Area
- Test Hypotheses
- Cause Determined, if one and only one hypothesis survives testing

Written Report & Verbal Communication of Findings

* NFPA 1033: Qualifications
* NFPA 921: Investigation Process
* NFPA (upcoming): Fire & Explosion Investigation Unit Operations

All Apply to Entire Process
All Areas Bear Further Research (see Strategic Plan)
Fire and Explosion Investigation


**Odontology**

**ADA 1058-2010D Forensic Dental Data Set** (Odontology Subcommittee, February 14, 2019)

**ADA 1088-2017D Human Identification by Comparative Dental Analysis** (Odontology Subcommittee, March 7, 2019)
Anthropology

- Best Practice Recommendations for Facial Approximation in Forensic Anthropology
- Standards for Sex Estimation in Forensic Anthropology
- Standard for Stature Estimation from Human Remains
• Standard for Ancestry Estimation in Forensic Anthropology
• Standard for Age Estimation in Forensic Anthropology
• Standard for Anthropology Scene Detection and Processing
• Standard for Identifying and Describing Pathological Conditions and Anomalies in Forensic Anthropology
• Standard for Qualifications in Forensic Anthropology
• Standard for Determining Medicolegal Significance in Forensic Anthropology
• Standard for Skeletal Sampling and Preparation in Forensic Anthropology
• Standard for Resolving Commingled Remains in Forensic Anthropology
Standards

• Standard for Trauma Analysis in Forensic Anthropology
• Standard for Personal Identification in Forensic Anthropology
• Standard for Taphonomic Observations in Forensic Anthropology
• Standard for Documentation, Reporting, and Testimony
• Standard for Proficiency Testing in Forensic Anthropology
Standards in Process – at SDO

Crime Scene Investigation

• Standard Practice for Crime Scene Investigator Training, Continuing Education, Professional Development, Certification, and Accreditation
Standards in OSAC Registry Approval Process

Crime Scene Investigation (VSC 8)
- E620-11(18) Standard Practice for Reporting Opinions of Scientific or Technical Experts
- E678-07(13) Standard Practice for Evaluation of Scientific or Technical Data
- E860-07(13)e2 Standard Practice for Examining and Preparing Items that Are or May Become Involved in Criminal or Civil Litigation
- E1020-13e1 Standard Practice for Reporting Incidents that May Involve Criminal or Civil Litigation
Standards in Process – Under Development

Crime Scene Investigation
- Standard Practice for Documenting and Processing of Shooting Scenes for Reconstruction
- Standard Practice for the Collection and Preservation of Items That May Contain Biological Material
- Standard Practice for the Collection and Preservation of Seized Drugs
- Standard Practice for Crime Scene Reconstruction
Standards in Process – in Registry Process

**Disaster Victim Identification**


- ANSI/ASB Best Practice Recommendation 010, Forensic Anthropology in Disaster Victim Identification: Best Practice Recommendations for the Medicolegal Authority, First Edition, 2018
Standards in Process – at SDO

- ASB Best Practice Recommendation 005, Mass Fatality Incident Data Management: Best Practice Recommendations for the Medicolegal Authority
- ASB Best Practice Recommendation 008, Mass Fatality Scene Processing: Best Practice Recommendations for the Medicolegal Authority
- ASB Best Practice Recommendation 094, Postmortem Fingerprint Recovery: Guidance and Best Practices for Disaster Victim Identification
- ASB Best Practice Recommendation 108, Forensic Odontology in Disaster Victim Identification: Best Practice Recommendations for the Medicolegal Authority
• Best Practice Recommendations for Building Resiliency for Disaster Victim Identification Responders (new work product)
• Best Practice Recommendations for Quality Assurance in Disaster Victim Identification (new work product)
• Best Practice Recommendations for Managing Disaster Victim Identification Response with Chemical, Biological, Nuclear, and Explosive Trauma (new work product)
• Best Practice Recommendations for Disaster Victim Accounting (new work product)
• Best Practice Recommendations for Comparison of ID Methodologies in Disaster Victim Identification (new work product)
• Best Practice Recommendations for Mass Fatality Management Preparedness (new work product)
Standards in Process – Under Development

- Mass Fatality Incident Data Management: Best Practice Recommendations for the Medicolegal Authority
- Media Communications: Best Practice Recommendations for Medicolegal Authorities in Disaster Victim Identification
- Ethical Considerations in Disaster Victim Identification: Best Practice Recommendations for the Medicolegal Authority
- Legal Considerations in Disaster Victim Identification
- Family Management Following a Mass Fatality Incident: Victim Information Center Best Practice Recommendations for Medicolegal Authorities
- Disaster Victim Identification Process: Best Practice Recommendations for the Medicolegal Authority
- Forensic Odontology in Disaster Victim Identification: Best Practice Recommendations for the Medicolegal Authority
Standards in Process – Under Development

Dogs and Sensors
• General Guidelines (ready for comment)
• Terms and Definitions (ready for comment)

Leading towards
• Selection of handlers/career field progression
• Selection of dogs/kenneling
• Court evidence
• Application of dogs in specific circumstances (e.g. accelerants, explosives, human rescue, illicit drugs, etc.)
Standards in Process – at SDO

• NFPA Standard for the Organization and Operation of Fire Investigation Units (FIU)

The Quality Triangle in Forensic Science

- Certification
  - NFPA 1033

- Accreditation
  - Forthcoming NFPA FIU Standard

- Proficiency Testing

- Standardization
  - NFPA 921
Work in Process – Under Development

- Strategic Plan for Fire and Explosion Investigation
- Template Quality Manual for FIU’s in development to facilitate individual FIU’s development of their own Quality Manual and eventually seeking accreditation to the forthcoming NFPA standard
Medicolegal Death Investigation

- Organizational and Foundational Standard for Medicolegal Death Investigation (ASB)

Under development
- Standard for capturing common data elements in medicolegal death investigations (working title)
Proposed American Dental Association Standard No. 1077 Human Age Assessment by Dental Analysis

SCOPE

This document specifies the methodologies and best practices for estimating the chronologic age of a living or deceased individual by analysis of the human dentition and associated maxillofacial structures.
SCOPE

This international standard provides dentists and forensic dental experts with an organized system of concepts to describe the distinctive characteristics of an individual’s mouth. The chosen system is based on a forensic approach of a mouth’s characteristics, with many concepts specifics to the identification domain that are not defined elsewhere in ISO dentistry vocabularies (e.g. “present tooth”).

The hierarchical structure of the standard is designed to describe attributes of a tooth, the mouth and a prosthesis /orthosis with increasing levels of discriminative characteristics (e.g. material characteristics, restored tooth surface…) and the possibility to connect any level of description of an attribute with the most comprehensive concept.

This standard is intended to be used for data exchange between antemortem and postmortem files, without any ambiguity on the terms used to describe an individual’s mouth.
Standards in Process – Under Development

Odontology

Bitemark Analysis, Comparison and Reporting: Standards and Best Practices for the Forensic Dentist and Investigator

Scope

This standard provides definitions, terminology and procedures for the development of evidence identified as a pattern created by teeth. The purpose is to promote consistent methodology and reporting among investigators across jurisdictions.
Proposed Guidelines and Best Practices for Human Abuse Recognition by Dental Professionals

Scope

This proposed guidelines and best practices report provides guidance to dental professionals to recognize abuse and neglect, and document and report those findings.
Anthropology

• Controlled Experimental Bone Trauma Studies
• Healing Rates of Skeletal Injury, Especially in Children
• Stable Isotope Analysis as a Geospatial Tool for Identification
• Validation Studies of Technologies (ex. ground penetrating radar, remote sensing, and) Recovery Techniques in Forensic Anthropology
• Population Frequency Data for Radiologic Identification
Crime Scene Investigation

- Assessing the Culture of Contextual Bias in Forensic Scene Evidence Collection, Handling, and Processing
- Assessment of Level of Personal Protective Equipment (PPE) Required at Crime Scenes
- Crime Scene Research: Creation of a Centralized Searchable Database
- Decontamination of Crime Scene Equipment
- Laboratory Techniques and Technologies at the Crime Scene
- Use of Technology for Crime Scene Documentation
Disaster Victim Identification

- Composite Quantification of Contextual Decedent ID Criteria
- Modeling of MFI Missing Person and Victim Data
- Understanding Cognitive Bias in DVI Operations

Dogs and Sensors

- Development of Methods for Monitoring Levels of Contamination of Aids
- Development of Reliable Surrogate Aids
- Evaluation of Dissipation of Odorant
- Identification of Odorant Chemicals Present In and Above Targets
- Integration of Canine and Instrumental Detectors
Fire and Explosion

• Developing Tools for Evaluation of Fuel Characteristics
• Dissemination of ATF Fire Research Laboratory Data
• Documentation of Post Fire Conditions in Public Research
• Extracting Event-relevant Data from Electronic Sources
• Fire Investigation Component of Publicly Funded Compartment Fire Research - I
• Fire Investigation Component of Publicly Funded Compartment Fire Research - II
• Material Property Impacts on Fire Patterns
• Measurement and Quantification of Fire Patterns
• Potential for Reducing Bias in Fire and Explosion Investigations
• Public Distribution of Recall Data
• Repository of Fire Investigation Research
• Room Size Impacts on Fire Patterns
• Validation of Origin and Cause Determination Protocols
• Ventilation Impacts on Fire Patterns
• Witness Information for Fire & Explosion Scenes
Research Needs

Medicolegal Death Investigation

• Assessing the Utility of Autopsy in Contentious Medicolegal Categories of Death
• Geographic and Seasonal Variation of Postmortem Changes
• Medicolegal Death Investigator Workload Analysis
• Pediatric Forensic Pathology to Improve the Accuracy of Cause and Manner of Death Certification
Odontology

- 3D Imaging of Patterned Injuries on Human Skin
- Critical Comparison of Dental Age Assessment Methods
- Development of 3D Databases of Human Dentitions
- Phenotyping of Tooth Shape and Tooth Color
- Quality & Quantity of Concordant Features Required for Human Identification
- Reliability of Bitemark Analysis Methodology
- Specific Population Studies in Dental Age Assessment
Thank you

https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science