

B1 The Path Forward Continues: What's Happening in Forensic Standards

Monday, February 21

7:00 a.m. - 8:15 a.m.

Teresa Ambrosius, BA

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Learning Objective: Participants will learn about updates in standards development in the United States and internationally from United States Standards Developing Organizations (SDOs). Participants will also get an update from the Organization of Scientific Area Committees (OSAC) for Forensic Science regarding how they are working with the SDOs and encouraging forensic science service providers to implement standards.

Participants will gain a better understanding of the progress of consensus standards development, including submission, drafting, public and committee commenting and resolutions, and finalization. Participants will also realize the importance of public input into the standards process and will learn how to participate, even if they are not part of an SDO consensus body or committee.

Impact Statement: The 2009 National Research Council (NRC) stressed the lack of standardization in forensics. The advent of OSAC, administered by the National Institute of Standards and Technology (NIST), and the AAFS Standards Board (ASB) has resulted in several years of concerted efforts to identify gaps in needed standards and begin their development using the voluntary consensus standards development process. All forensic professionals need to be aware of new and emerging standards in the various forensic disciplines, their importance, and how they can be implemented.

In 2009, the NRC published the Report, *Strengthening Forensic Science in the United States: A Path Forward*, which summarized the challenges facing the forensics community and the lack of mandatory standardization, certification, and accreditation. From this report, the Department of Justice (DOJ) and the NIST signed a Memorandum of Understanding that led to the establishment of the National Commission on Forensic Science (NCFS) and the NIST-administered OSAC for Forensic Science.

Presenters will provide an overview of the standards currently in development, those soon to be published, and the new standards published by various SDOs. New standards include those related to interdisciplinary topics, such as evidence collection and labeling, interpretation and reporting, and discipline-specific standards in the areas of criminalistics, toxicology, digital evidence, anthropology, facial recognition, photography, biology, pattern evidence, and crime and fire scene investigation, with a focus on terminology, measurement uncertainty, measurement traceability, quality assurance, and calibration.

Presenters will describe the process that a document goes through from inception through drafting, commenting, voting, and publication. This overview will give participants the education they need to participate in the standards development process.

OSAC has been working closely with various SDOs to bring the community together to define requirements for disciplines to submit standards through the development process. OSAC's role in the standards development process and promotion of implementation of these standards will also be covered.

B2 Autopsy of a Crime Lab: The Evolving Approaches Toward Forensic Evidence in Court

Tuesday, February 22

7:00 a.m. - 8:15 a.m.

Brandon Garrett, JD

Duke University School of Law
Durham, NC

Learning Overview: This presentation will survey the current state of litigation and judicial review of admissibility of forensic evidence, as well as providing an overview of a recent book, *Autopsy of a Crime Lab*, that surveys the sources of error in forensic work and approaches designed to improve the process and safeguard reliability.

Impact Statement: This presentation will provide an overview of the book, but particularly focus on legal research and developments in the courts as judges have evolved in their approach toward forensic evidence. Studies examining how lay jurors evaluate forensic testimony in court will be summarized.

“That’s not my fingerprint, your honor,” said the defendant after Federal Bureau of Investigation (FBI) experts reported a “100-percent identification.” They were each wrong, and Brandon Mayfield was later cleared. How does error, even in high-profile cases, occur? Is it the quality of the latent fingerprint, the role of databases, individual examiner error, cognitive bias, or uncertainty inherent in a method that can lead to error? How should lawmakers, labs, and courts approach each of these challenges? The recently published book, *Autopsy of a Crime Lab*, is the first to catalog the sources of error behind a range of well-known forensic evidence, from fingerprints and firearms to forensic algorithms. At the crime scene, the book explores the need for scientific standards regarding evidence collection. Moving to the lab, the book explores quality controls, human factors, and the need for further studies to validate basic premises of widely accepted techniques. Turning to individual experts, the book asks how proficiency tests could be used to better assess individual performance, and the need for standards governing report writing and testimony. Reaching the courtroom, the book examines how concepts of judicial gatekeeping have slowly evolved, regarding discovery, testimony, and expert admissibility.

Taking us into the lives of the wrongfully convicted or nearly convicted, into crime labs rocked by scandal, and onto the front lines of promising reform efforts driven by professionals and researchers alike, *Autopsy of a Crime Lab* describes the forensic landscape and recent efforts to place evidence, from the crime scene to the laboratory to the courtroom, on a sound scientific footing.

B3 Procedures for Breaking the Zodiac Killer's Code

Wednesday, February 23

7:00 a.m. - 8:15 a.m.

Jeanne Anderson

Federal Bureau of Investigation Laboratory
Quantico, VA

David Oranchak

Roanoke, VA

Learning Overview: Attendees will learn about the forensic cryptanalysis of the Zodiac Killer's 50-year old unsolved cipher, how this code was broken, and the procedures used by the Federal Bureau of Investigation (FBI) Laboratory in cases such as this.

Impact Statement: This presentation impacts the forensic science community by bringing awareness of forensic codebreaking capabilities.

The field of forensic cryptanalysis, or codebreaking, is a little-known but well-established forensic discipline that, when applied, can produce reliable and informative results. Cryptanalysis can be applied to records of illicit businesses, such as drug distribution or manufacturing, human smuggling, and commercial sex, as well as coded messages.

The FBI Laboratory houses the Cryptanalysis and Racketeering Records Unit (CRRU) and is staffed with forensic cryptanalyst examiners trained to decipher coded messages and cryptic illicit business records. This forensic analysis relies on standard operating procedures based on steps developed in the early 1900s by a United States Army cryptologist and that remain accepted by forensic and academic cryptologic communities today. These procedures provide a framework for the analysis of codes and records that apply regardless of crime, context, or record type. Despite this framework's historical basis, it remains largely unknown by the forensic community; this presentation will inform attendees about this forensic capability. Further, this presentation will introduce one such codebreaking case, that of the never-caught Zodiac serial killer. This case involved a coded message that remained unsolved for 50 years before it was broken this past December. This development provided the law enforcement community with new material on an unsolved serial killer case and the cryptologic community with a new encipherment technique that confounded professional and amateur cryptanalysts for 50 years.

One of the three-person team who broke this message will provide background on techniques employed for over a decade of work on the Zodiac Killer's code, including those techniques that eventually helped decrypt this coded message as well as how these techniques may apply to remaining unsolved coded messages. An FBI Cryptanalyst Forensic Examiner will present on law enforcement's approach to coded messages, specifically the standard operating procedures used for analysis of records and codes such as this. Several remaining unsolved coded messages will be introduced for those interested in applying any of the presented cryptanalytic techniques to actual unsolved codes.

B4 Pursuing Truth Through Forensic Evidence—But Does the Family Believe?

Wednesday, February 23

7:00 a.m. - 8:15 a.m.

T.L. Williams, MFS

United States Army Criminal Investigation Command
Quantico, VA

Tanya Marlow, MFS

United States Army Criminal Investigation Command
Quantico, VA

Phillip Curran, MFS

United States Army Criminal Investigation Command
Quantico, VA

Learning Overview: Upon completion of this presentation, the attendees will have acquired a better understanding of locating, identifying, and collecting evidence and the documentation of the crime scene associated with a suicide investigation. The attendees will also be aware of the policies and procedures for conducting a crime scene investigation (timeliness, thoroughness, and timely reporting) and casualty liaison briefings provided to the primary and secondary next-of-kin. This presentation will also enable attendees to understand tribulations associated with the media, Congress, and the next-of-kin involvement when all evidence points to suicide and the family does not believe their child could ever commit suicide.

Impact Statement: This presentation will impact the forensic investigative community by demonstrating that all deaths in the United States Army must be conducted as if they were homicides and conducted in a timely and thorough manner in order to provide next-of kin with the best evidence.

On July 19, 2005, Criminal Investigation Command (CID) was notified of the death of a 19-year-old single Private First Class (PFC) female, assigned to Headquarters and Headquarters Detachment (HHD), Logistical Task Force 129, Logistics Support Activity (LSA) Anaconda, Balad, Iraq. Investigation determined the PFC died as a result of a self-inflicted intraoral gunshot wound. The father refused to accept the findings of the investigation and was adamant the PFC was raped and murdered. The CID Report of Investigation (ROI) revealed the PFC committed suicide when she shot herself through the mouth with her assigned M16A2 rifle. The investigation also disclosed no signs of struggle; no contusions, lacerations, or abrasions around her face, neck, or mouth; no evidence her clothing was altered; no valuables were stolen; no one seen leaving the scene; and she was well liked in the unit and described as a good soldier. The stressor indicators were described as a medical diagnosis of a sexually transmitted disease; relationship issues with an ex-boyfriend; changed eating habits; started smoking; gave away some personal items; and made statements about wishing to be dead. A psychiatric evaluation came to the same conclusion as the CID ROI.

The father has conveyed through the media and other sources that the PFC was raped and murdered and the United States Army was covering her death by reporting it was a suicide. The father had an additional autopsy performed by Cook County, IL, that showed the same conclusions as the CID investigation. The PFC had a broken nose, black eye, and loose teeth. The entrance wound was intraoral (inside the mouth). Soot was present within and immediately around the entrance wound. There was searing of the upper lip and tongue in a radiating pattern consistent with the flash suppressor inside the month. With the flash suppressor inside or partially inside the mouth at the time the trigger was pulled, the weapon gases were absorbed by the head, causing the broken nose, black eye, and loose teeth. There was no evidence of a sexual assault.

Briefings were conducted by CID as follows: the parents of the PFC; the Senate Armed Services Committee; the House Armed Services Committee; Congresswoman Sue Myrick and other distinguished members; Mr. Larry Stubblefield, Deputy Assistant Secretary of the Army for Diversity and Leadership; and several media inquiries. The Executive Producer of PBS's *Frontline* sent a letter to the Secretary of the Army requesting assistance for a PBS program on the death of the PFC. Upon receipt of the letter, the CID Public Affairs Office reached out to PBS and had dialogue with PBS for approximately two months while PBS conducted research on the case. PBS still had some remaining questions that CID agreed to answer on background during a proposed meeting at CID Headquarters. CID representatives met with the reporters on January 10, 2011, at CID Headquarters for approximately three hours. During the interview, the PBS reporters revealed to CID that they had three independent forensic experts look at the CID investigation and found the CID case was professionally done, there were no significant issues with the case, and the independent experts had not come to any different conclusions than the CID investigation. The PBS representatives said they would brief their findings to the family and would try to make the point that the death of the PFC was most likely not a homicide, but a suicide. PBS *Frontline* never aired the episode.

As of June 2021, the father maintains his daughter was murdered and CID Public Affairs Office continues to answer media inquiries.

B5 Helping the Marines Correct the Historical Record: Identifying the Iwo Jima Flag Raisers Using Photographic Comparison and Facial Recognition

Thursday, February 24

7:00 a.m. - 8:15 a.m.

Richard Vorder Bruegge, PhD

Federal Bureau of Investigation

Quantico, VA

Learning Overview: Attendees will learn how Digital and Multimedia Sciences techniques, including photographic comparison, facial recognition, and 3D face modeling, were used to help the United States Marine Corps correct the historical record in regard to the individuals depicted in the iconic “Iwo Jima Flag Raising” photograph by Joe Rosenthal. This case provides an example of how new techniques may be tested against unusual types of evidence in a matter of historical significance.

Impact Statement: The forensic science community will see an example of how established and innovative forensic science techniques can be “stress tested” in unusual circumstances to help further define the limits of these techniques.

On February 23, 1945, United States Marines raised an American flag on Mount Suribachi, Iwo Jima. A photograph depicting that event taken by Associated Press photographer Joseph Rosenthal immediately became iconic in Marine Corps and United States lore, with the image serving as the basis for the United States Marine Corps War Memorial in Washington, DC, and the National Museum of the Marine Corps in Quantico, VA. While most Marines will tell you that the individual names of those in the photograph do not matter, historians, and many in the public, want to be able to put names to the faces.

Previous Marine Corps reviews led to updates of the record in 1947 and 2016, but after the 2016 Huly Board findings were released, historians Dustin Spence, Stephen Foley, and Brent Westemeyer brought forth additional evidence indicating that further changes were needed. As a result, a third Board was convened in 2018. This “Bowers Board” requested the assistance of the Federal Bureau of Investigation (FBI) Digital Evidence Laboratory (DEL) in analyzing photographs and film footage from that day to help establish, once and for all, which Marines are depicted and in which positions around the flag.

The flag raised in the Rosenthal photograph was the second raised on the summit that day, replacing a smaller one. Several photographers, including one with a 16-mm movie camera, were also present and captured multiple photographs and film recordings of events on the summit that day, culminating in a series of celebratory photos known as the “Gung Ho!” photos. The combination of these photographs and film recordings make it possible to track the movements of various individuals during this sequence and establish their presence through image analysis (photographic comparison), primarily based on their faces and details of their helmets, clothing, and gear.

Through this examination process, the identities of four of the six individuals around the flagpole in the Rosenthal photo can be established with either “Strong Support” or “Extremely Strong Support,” while there is “Some Support” or “Limited Support” for the other two. Facial recognition technology and 3D-facial modeling software were also utilized in support of these analyses. When combined with further information from historical records, these findings offered a compelling case for the Bowers Board to declare in 2019 that the record is now complete.¹

Requests like this—which do not involve criminal or civil litigation—allow multimedia evidence labs to not only stress test their existing standard procedures on different materials and content, but also allow them to experiment with new techniques and procedures under more “realistic” conditions than may otherwise be available. In this case, facial recognition technology and 3D-modeling software were utilized in support of traditional image analysis techniques for photographic comparison. Through this process, potential limitations of these technologies were identified. This presentation will provide attendees with a better understanding of the process involved in this image analysis examination, as well as how the facial recognition and 3D-modeling software were leveraged in this case, along with the potential limitations.

Reference(s):

- ¹ *Investigating Iwo: The Flag Raisings in Myth, Memory, & Esprit de Corps*. Contributing editor: Breanne Robertson, PhD., Marine Corps History Division, Quantico, Virginia, 2019, LCCN 2019035917 | ISBN 9781732003071 (Also Available at: https://www.usmcu.edu/Portals/218/Investigating%20Iwo_WEB2.pdf)

B6 Electrical Torture, Electrocutation, and Homicide—The Istanbul Protocol

Thursday, February 24

7:00 a.m. - 8:15 a.m.

Helmut Brosz, BASc

Forensic Sciences International Group
Markham, ON, Canada

Renee Knight, BSFS

Forensic Sciences International Group
Markham, ON, Canada

Learning Overview: This presentation will provide an overview in identifying electrical torture injuries through a foundational background in body resistance to electricity and electrocution scenarios. After attending this presentation attendees will: (1) have an understanding of what is Electrical Shock Torture as defined by the Istanbul Protocol; (2) Mechanisms of Electrocutation; and, (3) the variables to be applied in the identification of electrical torture, injury, and homicide.

Impact Statement: This presentation will impact the forensic science community by improving the ability of Authorities Having Jurisdiction (AHJ), including investigators, medical examiners, lawyers, prosecutors, and engineers, to identify when an electrical torture or other electrical incident has taken place. Attendee knowledge of electrical shock injuries, torture, and homicide will be increased.

AHJ attending to a suspected electrical torture scene or homicide scene involving electrocution sometimes have difficulty discerning between natural death and death due to electricity. On average in North America, between 500 and 1,100 electrocutions occur annually, including suicide, auto-erotic, accidental, homicide, etc. The statistics for electrical torture are hard to come by; however, this form of torture “Parilla” appears to be practiced in certain South American and far Eastern Countries. There are also approximately ten times as many arc flash burn injuries and more than ten times as many non-fatal electric shocks. Some minor shock situations result in fall reactions that can lead to death and injury. These low-voltage shocks/electrocutions frequently leave no visible marks on the person. High-voltage electrocutions mostly leave distinctive marks and catastrophic injuries.

In scenarios involving electrical torture, readily identifiable marks may not always be available. Scenarios involving an individual being shocked in the presence of water may sometimes obscure contact entry and exit marks. Scene photos, hospital admission notes and sketches, autopsy photos, and reports are important data to be created, then assembled, studied, and analyzed as set out in the Istanbul Protocol.

The review and study of applicable standards and codes can assist the AHJ or investigator. For example, the Istanbul Protocol provides a definition on what is deemed as electrical shock torture, the device mechanisms utilized, and the various pathological outcomes of the torture relating to independent and dependent variables. For electrocution situations, the National Electrical Safety Code (NESC), Occupational Safety and Health Administration (OSHA) 26CFR1910, 26CFR1926, National Fire Protection Association (NFPA) 70E, and California General Order 95 may apply.

Variables in identifying electrical shock include voltage, body resistance, time, and the paths the current takes through the body. Through these factors, reconstruction and forensic analysis can be conducted in identifying and interpreting the method and potential motive for electrical torture through case presentations, examples, and artifacts.

B7 Forensic Nursing Science: A New Section for a New Scientific Era

Friday, February 25
7:00 a.m. - 8:15 a.m.

Nancy Cabelus, NDP
University of New Haven
New Haven, CT

Joyce Williams, DNP
Stevenson University
Owings Mills, MD

Virginia Lynch, MSN
Forensic Nurse Consultants, International
Divide, CO

Amy Carney, PhD
California State University
San Marcos, CA

Learning Overview: After attending this presentation, attendees will have a better understanding of the history of this dynamic discipline, the inception of forensic nursing worldwide, and how forensic nurses contribute to clinical practice, research, and policy.

Impact Statement: This presentation will impact the forensic science community by presenting exemplars of the application of care of victims, survivors, and perpetrators of violence of trauma.

In 1991, the American Academy Forensic Sciences (AAFS) distinguished forensic nursing as a scientific discipline.¹ This pronouncement launched a movement now recognized worldwide. The following year, the International Association of Forensic Nurses (IAFN) was founded.² In 1995, the American Nurses Association (ANA) Congress of Nursing Practice bestowed the official status of a nursing specialty upon the science of forensic nursing.³ The forensic aspects of nursing have long existed. Nurses have historically cared for victims of violence—both the living and the dead. In the 17th century, nursing had not yet become a science and midwives filled this role.⁴ Two centuries later, Florence Nightingale established the first aspects forensic nursing when caring for the war wounded and dead.

Forensic nursing is a dynamic discipline that recognizes human violence and trauma through a contemporary domain of scientific knowledge, health care, human rights, social justice, public health, and evidence-based practice. Broadly defined, forensic nursing science is nursing applied to the law, following the long-established exemplar of forensic medical science. Forensic nurses are health care providers qualified in the examination and evaluation of patients presenting with forensic biomarkers of crime-related trauma and the clinical investigation of questioned deaths. Global violence and problematic social and cultural situations reinforce the need to define the dynamics, processes, and guidelines for forensic nursing practice as it evolves and endures change.

Educational requirements to practice in forensic nursing vary. The nurse must have, at a minimum, an Associate's degree in nursing but a Bachelor's degree is preferred. After completing the degree, the nurse must successfully pass the board exam in the state in which they intend to practice. After practicing clinical nursing for a year or more, s/he may desire to specialize in forensic nursing as a Forensic Nurse Examiner (FNE) generalist or select a subspecialty of this discipline. Opportunities for role development include the Sexual Assault Forensic Examiner (SANE) course or pursuing the forensic aspects of training as a legal nurse consultant, accident investigator, mental health nurse practitioner, or nurse death investigator. Educational opportunities may be offered in risk management agencies, law firms, correctional settings, or domestic violence shelters. Regardless of the specialized role, forensic nurses work with victims of all ages who have suffered abuse, neglect, sexual assault, trauma, or any other crime-related injuries. Forensic nurses may practice in hospitals and community settings, typically interfacing with the legal system and treating victims, suspects, or perpetrators of crime.

Policy development in forensic nursing has evolved as the professional role grows and changes. Across the United States, individual Boards of Nursing have evaluated the forensic nursing response and the gaps that are filled when forensic nurses work with law enforcement, attorneys, and fellow medical professionals. As individual states evaluate their Nurse Practice Acts and the impact they have on forensic applications, forensic nurses are examining the effect that state, national, and federal rules and policies have on their interactions with both individuals and institutions. Forensic nurses also shape policy, bringing change through advocacy and research.

Graduate forensic nursing programs are available, often online, and require a number of clinical hours (typically 500) in addition to the didactic requirement of 30–40 credits. Forensic nurses with a graduate degree may opt to teach, conduct research, or in a clinical practice. Advanced practice forensic nurses may pursue a doctorate degree in forensic nursing research (PhD) or a doctorate with a clinical forensic focus, the Doctor of Nursing Practice (DNP).

Reference(s):

1. Lynch, V.A. Proposal for a new scientific discipline: Forensic nursing. *Proceedings of the American Academy of Forensic Sciences, 43rd Annual Scientific Meeting*, Anaheim, CA. 1991.
2. Aiken, M. Forensic nursing record. In: IAFN. Summary reports of presentations: *Proceedings of the Founding Meeting of the IAFN*. 13–14 August 1992. Minneapolis: IAFN; 1992.
3. ANA & IAFN. *Forensic Nursing: Scope and Standards of Practice*. 2nd ed. Silver Spring, Maryland: Nursesbooks.org; 2017.
4. Camp, F. *Gradwold's Legal Medicine*. 3rd ed. Chicago: Yearbook Medical Publication; 1976.
5. Lynch, V.A., Standing Bear, Z.G. A global perspective in forensic nursing: Challenges for the 21st century. In: Robinson D, Kettles A. (eds.) *Forensic nursing and multidisciplinary care of the mentally disordered offender*. London: Jessica Kingsley; 2000. p.249–266. (6) Presenti C. Membership Manager, IAFN, Personal communication. 11 July 2021.