IV CONVEGNO INTER (NATIONAL) GRUPPI

Modena, 5-7 Giugno 2025

FROM EVIDENCE TO PROOF
IN LEGAL MEDICINE AND FORENSIC SCIENCE

ABSTRACT BOOK

Please note that all abstracts are listed in alphabetical order of the Presenting Author in each Congress Room.

***Curated by*: Prof. Cecchi, Dr. Di Mauro, Dr. Marozzi, Dr. Beltrame, Dr. Fassina, Dr. Marisei, Dr. Sablone, Dr. Tettamanti.**

INTER-POST GRADUATE SCHOOLS

COMMUNICATION

THEMED

“THE SCIENTIFIC EVIDENCE”

Leonelli Room

(alphabetical order)

Title: **Effects of Decomposition on the Cardiovascular System: A Systematic Review**

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Abstract:

Introduction. Postmortem decomposition poses significant challenges in forensic pathology, particularly in the evaluation of the heart and coronary arteries. Putrefactive processes may alter or mask cardiac pathology, complicating the interpretation of cause of death. This systematic review aims to evaluate the literature on decomposition-related alterations of the heart and vessels, focusing on their forensic impact.

Materials and Methods. A systematic literature review was performed across PubMed, Scopus, and Web of Science, including studies from 1970 onward. Articles were screened according to predefined criteria, and duplicates were removed using *Rayyan software*. After initial screening and full-text evaluation, seven original research articles and one forensic guideline were included in the final analysis.

Results. The review confirmed a significant lack of focused studies on cardiac decomposition. Calcified atherosclerotic plaques remained detectable in various stages of decomposition, including skeletal remains, and may serve as reliable postmortem indicators. In contrast, myocardial histology was often unreliable due to autolysis and bacterial overgrowth. Postmortem computed tomography angiography (PMCTA) showed some capacity to visualize vascular calcifications but was hindered by postmortem gas and fluid artifacts. Mummification and adipocere cases demonstrated improved preservation of cardiac morphology, particularly of coronary arteries, though valvular structures remained difficult to assess.

Discussion. The current literature provides limited guidance on the forensic evaluation of decomposed cardiac tissues. Despite this, certain features such as vascular calcifications may retain diagnostic value. Further controlled studies are needed to develop standardized protocols for assessing postmortem cardiac pathology.

Title: Considerations on the use of three-dimensional scanning as scientific evidence

Beltrame B.[1], Macorano E.[2], Colucci A.[2], Santelli S.[3], Capucci M.[4], Cortese R.[5], Di Lorenzo P.[5], Cecchi R.[4], Fais P.[3], Santoro V.[2], Introna F.[2], Di Michele P.[6], Ceretti G.[7], Verzeletti A.[1]

Schools of specialisation in Legal Medicine involved: Bari "Aldo Moro", Bologna, Brescia, Modena, Napoli "Federico II".

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2. Institute of Legal Medicine, University of Bari "Aldo Moro", Bari
3. Institute of Legal Medicine, University of Bologna, Bologna
4. Institute of Legal Medicine, University of Modena, Modena
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Abstract:

Three-dimensional scanning represents an emerging technology with significant potential applications in forensic medicine. Acquisition, comparison and visualization of 3D data enable objective and reproducible documentation, improving the quality of forensic analyses and enhancing the effective communication of technical findings in judicial contexts. However, despite its advantages, the adoption of this technology remains fragmented due to the lack of standardized protocols that would ensure uniform procedures for the acquisition and management of 3D data as scientific evidence. This gap leads to a high risk of data alteration and corruption, ultimately rendering it unusable for judicial purposes.

Our collaborative project involves five Institutes of Legal Medicine, aiming to explore practical applications of 3D technology in forensic contexts, assessing potentials and limitations. A review of the existing scientific literature highlighted a significant lack of methodological descriptions: publications often fail to report in detail the procedures for the acquisition, management, storage, transmission, analysis and visualization of 3D data. This methodological insufficiency poses real risks of error, data alteration and loss of evidentiary validity.

In response, we present a shared operational procedure that systematically and briefly defines all phases of 3D data management in forensic settings—from initial acquisition to final

presentation. The procedure will be applied to future studies conducted by the working group, with the non-binding support of Invisalign®, to ensure the quality, reproducibility, and reliability of three-dimensional data as scientific evidence. The Intergruppi Congress will provide an opportunity to evaluate the protocol and propose potential integrations.

Title: "Towards a Standard of Scientific Evidence in On-site Inspection: Compilation of the ECLM On-Site Inspection Form in a Broad Case History"

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Abstract:

Introduction

The ECLM on-site inspection form is a checklist that can be used by the forensic pathologist in the course of on-site investigations. Proposed by the European Council of Legal Medicine (ECLM) in 2022, it allows the collection of data relevant to the identification, collection, sampling and preservation, during the on-site inspection, of all elements that may be useful as forensic evidence. The aim of this study is to assess the completeness of the information collected in a large number of on-site inspections, the records of which were drawn up without the use of the ECLM on-site inspection form, in order to verify the usefulness of the use of this form.

Materials and methods

The authors present a multicentre study involving 20 Italian forensic medicine institutes, led by the Institute of Forensic Medicine of Modena. For each institute, the reports of on-site inspections carried out without the use of the ECLM on-site inspection form were collected and a forensic pathologist was asked to analyse the individual cases and to identify, for each case, the presence/absence of information with regard to all the points examined by the ECLM form (an Excel file was prepared for this analysis).

The Excel files prepared by the participating forensic institutes were then sent to the lead institute.

Results

Data were collected and analysed from a total of 1721 on-site inspection reports. The results obtained document that the items on the ECLM on-site inspection form are not always investigated in the on-site inspection reports written without the use of this tool.

Discussion

The results document the usefulness of the form as a checklist to examine the main elements of forensic interest. The use of the ECLM on-site inspection form proves to be a valid tool to assist the forensic pathologist during the on-site inspection, allowing them to examine all the main aspects to be investigated and facilitating a complete collection of data even in the most complex cases. We therefore hope that the forms developed by the ECLM will be systematically adopted in the forensic practice of the forensic pathologist, so that they become a methodological standard for the collection of information during the inspection, which is crucial for the production of scientific evidence in court.

Title: **Sexual Assaults: Forensic medical examiner and the search for evidence**

Camelo V[1]., Di Cesare C. [1], Nappi M. [2], Cardinale A.N. [2], Turco M. [2], Lombardi L. [3], D'Angiolillo M. [3], Treglia M. [1], Sablone S. [2], Tettamanti C. [3], Ventura F. [3], Introna F. [2], Marsella L.T. [1]

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Abstract:

Introduction

Forensic sciences develop scientific evidence through methods that identify and evaluate crime-related elements, reconstructing medical and circumstantial data. Their rigorous application ensures impartial assessments, critical for justice. This multicenter study analyzes anonymized sexual assault cases to identify potential issues in hospital-based victim care, strengthen medico-legal expertise in court and propose improvements for judicial accuracy and crime prevention.

Materials and methods

The authors examined medical records of sexual assault cases from 2022 to 2024 at the Emergency Departments in Roma Tor Vergata, Bari and Genova, collecting the following data: victims' age and gender, time elapsed between the event and hospital admission, consent to examinations, observed injuries, biological samples, clothing changes, and oral/vaginal/anal hygiene procedures.

Results

The analysis of 83 cases revealed a rising trend in sexual assault consultations, with female victims representing 97.5% of cases and minors accounting for 16.9%. Access to the hospital within 24 hours of the event occurred in 49% of the cases, while 61% consented to all proposed assessments (clinical, photographic, toxicological, and judicial sampling).

Furthermore, 41% of the cases showed a negative physical examination, 43% presented only external injuries, the remaining had only genital injuries, both genital and external injuries, or unknown findings.

Conclusions

The absence of clear objectivity requires a contextualized interpretation, highlighting the critical importance of forensic medical consultation. Results emphasize the necessity of improving specialized training for first responders and implement standardized protocols for sexual assault victim management. These measures would ensure prompt, multidisciplinary interventions with proper focus on scientific evidence collection.

Title: Post-Mortem Microbiology (PMM) as scientific evidence in autopsy cases involving Medical Malpractice: from ancillary technique to forensic cornerstone

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Schools of specialisation in Legal Medicine involved: (1) Università degli studi della Campania "*Luigi Vanvitelli*", (2) Università degli Studi di Napoli "*Federico II*".

Introduction: Post-mortem microbiology (PMM) represents a forensic methodology that, despite its diagnostic value, remains underutilized in routine forensic practice. The implementation of standardized sampling protocols showed the reliability and reproducibility of microbiological findings[1]. In this context, we report and compare two cases of meningoencephalitis, with standardized cerebrospinal fluid sampling for PMM in only one case, leading to the identification of the etiological agent.

Case Reports: 1) An 11-year-old female, diagnosed with otitis media and mastoiditis, showed a rapid neurological decline with cerebral edema and decompressive craniotomy. The cause of death was identified in acute meningo-encephalitis, based on histological findings of mixed inflammatory infiltrates within the cerebral parenchyma and subpial regions. However, no microbiological identification of the pathogen was achieved. The investigation didn't reveal any elements of medical malpractice; **2)** An 8-year-old female died in her bed, after a diagnosis of adenoidal hypertrophy. Autopsy supported by histopathological examination revealed multifocal inflammatory involvement, both acute and chronic, affecting the brain, lungs, heart, thymus and adenoidal tissue. The cause of death was assessed to be meningoencephalitis. PMM, performed through standardized CSF sampling, identified Human Herpesvirus 6 (HHV-6) as the etiological agent. This circumstance allowed to identified medical malpractice profiles.

Discussion: Comparison of two cases show the potential of post-mortem investigations integrated with PMM. This technique requires standardized and shared protocols for the collection of samples in different biological matrices, in order to ensuring the analytical reliability of results, which may serve as pivotal evidence within judicial proceedings.

Title: **Anthropological and Forensic Approach to the Study of the Remains Found in the Mass Grave of Ossero**

Concato M.[1], Di Stefano B.[1], Calvano M.G.[2], Sorçaburu Ciglieri S.[1], Vetrini R.[1], Cuttaia C.[1], Fattorini P.[1], Introna F.[2]

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Abstract:

Introduction. Personal identification is a key aspect of Forensic Medicine. This project aimed to identify 27 Italian soldiers killed by the Titini Militias in April 1945 and buried in a mass grave in Ossero (Cres Island, Croatia). The remains were exhumed in 2019 by Croatian authorities and transferred to the Sacrario d'Oltremare in Bari. Investigations began in 2022 following an agreement between the Ministry of Defence and the Universities of Bari and Trieste.

Materials and Methods. The remains underwent radiographic and anthropological analyses to assess sex, age, stature, minimum number of individuals, and traumatic injuries. A total of 341 samples were collected and designated for genetic comparison (Di Stefano et al., 2025).

Results. Analyses revealed commingled remains of at least 32 individuals, aged 15–45 years and 161–181 cm tall, including at least three females. Forensic analysis confirmed cranial gunshot and blunt force trauma, with multiple peri-mortem fractures. Genetic analyses identified 30 distinct post-mortem profiles, six of which were female, confirming the identity of ten soldiers.

Discussion. The extensive commingling and missing skeletal elements hindered skeletal reconstruction. Consistent with historical data, firearms were confirmed as the cause of death, with peri-mortem fractures likely caused by blunt instruments and heavy vehicle crushing. The study revealed more individuals than expected, including historically undocumented females. The results emphasize how poor scene management can limit genetic identification effectiveness. Proper planning and a multidisciplinary approach with specialized personnel are crucial.

Title: Tradition and Innovation of Post-Mortem Imaging in Forensic Pathology to Support Scientific Evidence

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Abstract:

Introduction: In recent decades, post-mortem imaging techniques have gained increasing importance in forensic pathology. Alongside conventional radiology, advanced methods such as post-mortem computed tomography (PMCT) and post-mortem magnetic resonance imaging (PMMRI) have been developed. PMCT, including high-resolution microCT, is highly effective in detecting trauma, gunshot wounds, mechanical asphyxia, and injuries in charred or decomposed bodies. PMMRI provides detailed visualization of soft tissues, proving useful in advanced forensic diagnostics, particularly in post-mortem brain MRI (PMBMR) for brain injuries and cardiac MRI (PMCMR) in sudden cardiac death.

Materials and Methods: After reviewing the development and validation of these techniques, real cases from the forensic departments of Trieste, Ferrara, Salerno, and Foggia were

analyzed. These cases illustrate the diagnostic value of each technique and how post-mortem imaging can be integrated with traditional forensic methods. This multidisciplinary approach supports both the resolution of judicial cases and the understanding of disease pathophysiology.

Discussion: Post-mortem radiology techniques have become reliable tools, officially recognized as scientific evidence in judicial proceedings and included in clinical protocols for socially relevant conditions, such as sudden cardiac death. A multidisciplinary strategy involving collaboration among institutions, forensic professionals, and prosecutors is essential to enhance diagnostic standards. This network aims to study and prevent fatal events—particularly those related to inherited cardiovascular diseases—starting from thorough autopsy investigations supported by advanced imaging.

Title: Value of fibronectin expression in asphyxial deaths- a pilot study

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Abstract:

Aim: Asphyxia is a pathological condition resulting from hypoxia and/or hypercapnia, potentially leading to unconsciousness and death. It can arise through mechanisms such as airway obstruction, impaired oxygen diffusion, or disruption of cellular oxygen utilization. In forensic pathology, asphyxia is particularly relevant, frequently encountered in cases of hanging, drowning, and other oxygen-deprivation scenarios. The aim of this study is to investigate the immunohistochemical expression of fibronectin in the left ventricular myocardium, in order to assess its potential as an early indicator of hypoxic injury.

Materials and Methods: A total of 35 autopsy cases were retrospectively selected from the archives of the Departments of Legal Medicine at the Universities of Palermo and Genoa, from 2021 to 2025. The cohort included 9 non-asphyxial controls and 26 asphyxial deaths (2 smothering, 3 strangulation, 5 hanging, 8 drowning, and 4 chemical asphyxia cases). Immunohistochemical analysis of fibronectin and quantification analysis were performed on FFPE left ventricular tissue sections.

Results: We observed a significant upregulation of fibronectin expression in all asphyxial deaths compared to controls. Despite variation in group sample sizes, fibronectin expression showed heterogeneity among the asphyxial cases, with the highest intensity observed in drowning deaths.

Conclusions: The upregulation of fibronectin in asphyxial deaths suggests its potential use as an early biomarker of hypoxic injury. These findings may have important forensic implications, aiding in the differentiation between asphyxial and non-asphyxial deaths and improving the diagnostic accuracy of post-mortem examinations. A comprehensive approach — integrating scene investigation, autopsy, and histopathology — remains essential for accurate interpretation.

Title: Validation of Methods in Forensic Histopathology: From Basic Research to Evidentiary Application

De Simone S.[1], Rovito G.[2], Buffon M.[3], Consalvo F.[4]

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Abstract

Introduction: In recent years, histopathology has gained importance in forensic investigations for determining the cause of death and addressing legal questions. Traditional staining techniques (e.g., hematoxylin-eosin, Masson's trichrome) are now complemented by immunohistochemistry (IHC), which enables the detection of markers not visible with conventional methods, especially in poorly preserved tissues. Over the past three decades, advances have led to the development of specific damage markers and improved protocols, allowing IHC to serve as reliable scientific evidence.

Materials and Methods: This study explores the validation processes that have established IHC as an accepted tool in forensic practice. It also examines selected case studies from Foggia, Ferrara, Trieste, and Salerno forensic departments. IHC contributed to legal decisions and was acknowledged as scientifically valid evidence in judicial rulings.

Results and Discussion: The study highlights the critical role of experimental research in refining IHC applications, particularly in complex post-mortem scenarios where traditional microscopy is limited. Markers such as glycophorin-A and HIF-1α have proven valuable for assessing injury vitality, timing, and mechanisms. Integrating IHC with other fields—genetics, toxicology, imaging, and metabolomics—reflects a growing multidisciplinary approach. Collaboration across institutions is essential to standardize methodologies and enhance their probative value. Furthermore, insights gained from forensic histopathology can support clinical medicine by deepening our understanding of disease mechanisms.

Title: **Patient Safety by Design: A New Risk Analysis Tool for the Safe Integration of Artificial Intelligence into Clinical Workflows**

Di Palma G. [1], Congedo E.S. [2], Visci P. [3], Volonnino G. [4], Frati P. [4], Ferorelli D. [5], De Micco F. [6]

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Abstract:

Introduction: Early diagnosis of malignant skin lesions is a priority in dermatological practice. However, standard dermoscopy is limited by cognitive errors, diagnostic variability, and operational constraints. The integration of Artificial Intelligence (AI) into diagnostic workflows introduces new opportunities, yet also new vulnerabilities that must be systematically addressed. This study presents an innovative risk analysis tool based on a Failure Modes, Effects, and Criticality Analysis (FMECA) adapted to AI-assisted workflows, aligned with the "Patient Safety by Design" paradigm. The model is designed to be generalizable to other clinical settings.

Materials and Methods: An "AI-aware" FMECA was developed for outpatient dermoscopy, examining failure modes in both traditional and AI-assisted workflows. A multidisciplinary panel assigned Risk Priority Numbers (RPNs) through iterative workshops. Simultaneously, a controlled diagnostic comparison was performed using 115 dermoscopic images, assessing

the performance of clinicians with varying levels of experience and deep learning algorithms. Standard metrics (accuracy, macro-precision, macro-recall, F1-score) were used to support scientific validation.

Results: AI integration significantly reduced RPNs in critical subprocesses (e.g., lesion classification and image comparison), while also highlighting new risks, such as misinterpretation of confidence scores. AI algorithms outperformed clinicians across all diagnostic metrics, particularly in reducing false negatives for melanoma.

Discussion and Conclusion: The proposed risk analysis model enables the safe and systematic integration of AI into clinical workflows by anticipating and managing new technological risks. This FMECA-based approach supports proactive risk management and can be adapted to other medical domains, fostering ethically responsible and safer deployment of AI in healthcare.

Title: The role of evidence in reconstructing homicide-suicides in conditions of frailty

Pirani F.[1], **Fiorentini C**. [1], Giovannini E. [1], Cavalli E. [1], D'Onofrio M. [1], Giorgetti A. [1], Pelletti G. [1], Pelotti S. [1], Fais P. [1]

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Abstract:

Homicide-suicide is defined as the killing of one or more persons followed, within 24 hours, by the suicide of the perpetrator. In Italy, recent studies have shown an increase in cases over the last decade, especially in the elderly population.

This study aims to analyse the phenomenon of homicide-suicide in fragile conditions, defined through the demographic, social and clinical characteristics of victims and perpetrators. Twenty-five cases provided by the forensic medicine institutes of Bologna, Padua, Pavia, Modena and Messina were studied and determinants of fragility and circumstantial elements were noted.

The results highlight the peculiar characteristics of homicide-suicide in this population, but the evidence collected does not always include an adequate investigation of risk factors.

The age group most represented was over 64 years, with predominantly female victims. In most cases they were cohabiting, one of whom was a caregiver. Organic pathologies were present in more than half of the victims, while psychiatric disorders affected more than two thirds of the perpetrators. Death occurred mostly at home. The most frequently used means were firearms, acute intoxication by exogenous substances and mechanical asphyxia. In more than half of the cases, no information on the social network and anamnestic information of the perpetrator and/or victim was reported.

These results underline the need for a systematic and standardised collection of evidence across the country to understand and prevent this phenomenon, which is expected to progressively increase in view of the increase in the elderly and frail population.

Title: Forensic Investigation of Work-Related Fatalities: the role of Laser Scanning in Scene Reconstruction.

Francaviglia M.[1], Spadazzi F.[2], Marisei M.[3], Federica Ministeri[1], Niola M.[3]

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Abstract:

Introduction

Work-related deaths represent a major issue in both forensic medicine and law, often involving difficult-to-reconstruct dynamics. The judicial inspection in fundamental in determining the causes and sequence of events, providing essential elements for assessing responsibilities. The use of personal protective equipment is pivotal in investigations, as its improper use may contribute to the injury. In this context, the forensic pathologist is crucial in analyzing injuries and reconstructing the event. The advent of new technologies offers innovative support to traditional scene analysis, allowing accurate three-dimensional documentation.

Objective

This study aims to evaluate the application of the laser scanner in reconstructing a fatal workplace accident aboard a ship, where a worker was crushed between two containers. The objective is to demonstrate the technology's effectiveness in collecting precise data on distances, impact points, and sampling areas for detailed forensic analysis.

Materials and Methods

The inspection was performed using three-dimensional surveying with the BLK Leica 360 laser scanner, enabling complete scene mapping with millimeter precision. The device recorded distances between containers, the body's position and impact marks and the integrated thermal camera provided useful data for estimating the time of death.

Results

Three-dimensional analysis enabled a faithful scene reconstruction, allowing investigators to virtually revisit the accident site for further evaluations.

Discussion and Conclusions

The use of the BLK Leica 360 laser scanner represents a significant advancement in forensic investigations of workplace accidents, increasing inspection accuracy compared to traditional methods, minimizing the risk of losing critical data and improving the quality of forensic reconstructions.

Title: Solving a Cold Case Through Scientific Evidence

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1 Scuola di Specializzazione in Medicina Legale, Università di Verona

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Abstract:

What role can a rigorous methodological approach play in establishing scientific evidence?

This study examines the death of a 36-year-old homeless man in a Northern Italian city in the late 1990s. Found unconscious with signs of assault, he was hospitalized in a coma with facial trauma. A brain CT scan showed multiple contusions and a subarachnoid haemorrhage. Due to his condition, he was transferred to another hospital, where he died shortly after.

The initial forensic autopsy, based on the presence of purulent material and leukocytic infiltration in the brain, identified cardiorespiratory failure due to meningoencephalitis as the cause of death, excluding any link to the assault. However, the case was suspended due to the suspects' absence, and the findings were not examined by the judiciary.

In 2017, after identifying a suspect, the investigation was reopened. The reanalysis of histological samples confirmed subarachnoid and intraparenchymal haemorrhages with leukocytic infiltration in the haemorrhagic areas. A broader macro- and microscopic analysis of the formalin-preserved brain revealed a similar pattern, with minimal leukocytes mixed with red blood cells in the meningeal spaces.

Immunohistochemical analysis using CD15 antibody showed leukocytes only in haemorrhagic areas.

The cause of death was thus redefined as traumatic subarachnoid haemorrhage, excluding meningoencephalitis.

This case demonstrates the importance of a rigorous evidence-based methodological approach in establishing scientific evidence. The integration of advanced techniques such as immunohistochemistry allowed for accurate cause-of-death identification nearly 20 years later, highlighting the value of scientific rigor and multidisciplinary collaboration in legal medicine.

Title: **The autophagic process as a diagnostic and prognostic indicator of traumatic brain injury. Update on the use of protein markers by immunohistochemical technique**

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Schools of specialisation in Legal Medicine involved: University of Trieste, University of Ferrara

Abstract:

Introduction: autophagy is a cellular response to stress and has been shown to activate in neurons following traumatic brain injury (TBI). This study investigates the potential forensic application of four autophagy-related proteins – LC3B, Beclin 1, p62, and LAMP2A – as diagnostic markers of TBI.

Materials and methods: histological samples were obtained from the frontal lobe of 10 subjects who died within 1 hour of a TBI (Group A), 13 who died between 1 hour and 32 days post-TBI (Group B), and a control group of 10 subjects who died without head trauma (Group C). Immunohistochemistry was performed using antibodies against LC3B, Beclin 1, p62, and LAMP2A. Different cytoplasmic staining patterns were assessed in neurons and compared across groups using one-way ANOVA.

Results: LC3B and p62 staining revealed two distinct cytoplasmic patterns. However, only LC3B showed a statistically significant differences between Groups A and B ($p = 0.0055$) and between Groups B and C ($p = 0.0035$), but not between Groups A and C ($p = 0.9845$). In contrast, Beclin 1 staining did not show any discernible pattern differences between groups, and LAMP2A staining was predominantly negative in neurons but positive in glial cells. Therefore, these two markers were excluded from further statistical analysis.

Discussion: LC3B appears to be a promising immunohistochemical marker for detecting TBI in forensic brain samples. While Beclin 1, p62, and LAMP2A did not show diagnostic utility in this study, further research with larger cohorts and complementary techniques is warranted to explore their potential role.

Title: **Recent Advances in Entomotoxicology: Relevance in Forensic Interpretation**

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Abstract

Introduction

Forensic entomotoxicology focuses on detecting drugs and toxins in necrophagous insects to aid in identifying the cause of death and supporting environmental or veterinary investigations. However, its real-world applicability is limited due to the lack of standardized protocols and insufficient knowledge of insect drug pharmacokinetics. This represents the main limitation in translating findings into admissible scientific evidence.

To address this, we conducted a literature review to summarize the strengths and weaknesses of the field.

Materials and methods

Following PRISMA guidelines, in December 2024, a systematic literature search was performed through PubMed and Scopus Database, using the terms “forensic” and “entomotoxicology”. There were neither time nor regional constrictions and all the included papers were written in English language and full text available; conference paper were excluded from Scopus.

Results

The search yielded 61 results from PubMed and 117 from Scopus. After removing duplicates, 123 articles were screened for eligibility. Following exclusion of reviews, book chapters, and non-accessible texts, 87 original research articles and 5 case reports were included in the final review.

Discussion

Our analysis focused on identifying best practices for sampling, storing, and analysing entomotoxicological evidence, the effects of toxicants on insect development and organ

colonisation, and the application of entomotoxicology in determining cause and mode of death and post-mortem interval, considering the influence of drugs on larvae.

Title: **Diagnostic algorithm for gunshot direction reconstruction using OsiriX in living patients and crime scene reproduction by Metashape**

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Schools of specialisation in Legal Medicine involved: Palermo and Bari.

Abstract:

Introduction:

Gunshot wounds in living patients pose significant diagnostic and forensic challenges, particularly when medical-legal examination occurs after clinical interventions such as wound suturing. Accurate reconstruction of projectile trajectories is essential for both clinical decision-making and forensic documentation. This study presents a diagnostic algorithm combining OsiriX, a DICOM viewer with advanced 3D capabilities, and Metashape, a photogrammetric software used for reconstructing the crime scene environment.

Materials and Methods:

Multidetector computed tomography (MDCT) scans of patients with gunshot injuries were analyzed using OsiriX. A seven-step algorithm was developed incorporating multiplanar reconstruction (MPR), 3D volume rendering (VR), and precise tracking of regions of interest (ROI). Simultaneously, photographic documentation of the crime scene was processed in Metashape to generate high-resolution 3D models, enabling spatial correlation with the anatomical findings.

Results:

The algorithm enabled clear identification of entry and exit wounds, accurate modeling of bullet trajectories within the body, and effective 3D visualization for clinical and forensic interpretation. The integration with Metashape allowed reconstruction of the spatial context, linking internal ballistic paths to environmental evidence. The method proved reproducible, clinically informative, and particularly valuable in complex forensic cases.

Conclusions:

The combined use of OsiriX and Metashape enhances the analysis of gunshot injuries in living patients by providing a systematic, reproducible approach for trajectory reconstruction. This protocol offers significant benefits for trauma imaging, forensic assessments, and interdisciplinary collaboration, and its integration into diagnostic workflows for penetrating injuries is recommended.

Title: **Anatomical variants of the skull: potential use for identification purposes**

Palermo P. (1), Caccia G. (2), Alemanno S. (1), Palamenghi A. (2), Fracassi I. (1), Cappabianca S. (1), Reginelli A. (1), Caranci F. (1), De Angelis D. (2), Cattaneo C. (2), Gibelli D. (2), Campobasso C.P. (1)

1. Università degli Studi della Campania "*Luigi Vanvitelli*"
2. Università degli Studi di Milano

Abstract:

Anatomical variants of the skull are cranial non-metric traits, often investigated in bio-archaeological studies for interpopulation variability and kinship analyses. Recent studies highlight their potential for personal identification. On this topic, a research project has been designed and carried out by the University of Milan and University of Campania.

Aim of this study is to assess the potential use of cranial non-metric traits for identification purposes and explore their frequencies and detectability both in skeletal collections and in computed tomography (CT) images.

This presentation focuses on the preliminary results coming from the analysis of 37 ancient adult skulls, dating from the 1st century BC to 1800s, housed at the Anatomical Museum of the University of Campania. The biological profile and the frequencies of 39 non-metric traits (30 bilateral, 9 unpaired) were assessed. Craniometric sex estimation identified 19 females (51.4%) and 18 males (48.6%): 20 White (54.1%) and 6 Black (16.2%). The most frequent anatomical variants were the mastoid foramen (92.0%), pharyngeal tubercle (81.0%), and supranasal suture (70.3%). The maxillary torus and supraorbital foramen were the least frequent (both 5.0%).

CT scans from 453 individuals (185 females, 268 males), aged from 18 to 100, without traumatic or congenital cranial diseases, were also analyzed. The frequencies of 24 non-metric traits (16 bilateral, 8 unpaired) were assessed. The minor palatine foramen (95.8%), frontal sinus scallops (94.9%), and pharyngeal tubercle (93.3%) were most frequent, whereas metopism (5.5%) and maxillary torus (9.9%) were the least common.

This research was funded by European Union – Next Generation EU and provides preliminary data on cranial non-metric traits frequencies in ancient and modern contexts, offering insights into their potential for personal identification

Title: **Quantitative Assessment of Asbestos Fibers on Autopsy Samples: Scientific Evidence for the attribution of Mesothelioma to Asbestos Exposure?**

Porzio A.[1,2], Beltrame B.[3], Verzeletti A.[3], Feola A.[1], Campobasso C.P.[1]

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Abstract:

Introduction:

Globally, asbestos-related diseases account for approximately 230,000 cases and 90,000 deaths annually. In Italy, the National Mesothelioma Registry (ReNaM) recorded 37,003 mesothelioma cases from 1993 to 2021: 8,086 cases in Lombardy and 1,562 in Campania. The Royal College of Pathologists recommends confirming asbestos exposure through the identification of asbestos fibers or bodies in lung tissue via mineral analysis or electron microscopy. However, this method is affected by the fibers' half-life and natural clearance mechanisms. In some legal cases, fiber analysis by autopsy has been considered essential to assess asbestos exposure.

Materials and method:

A retrospective observational study analyzed 110 mesothelioma-related deaths examined by two Universities from 2001 to 2019. Data collected included demographics, smoking history, exposure details (professional sector, duration, latency), tumor site and histological type, and fiber analysis via scanning electron microscopy (SEM).

Results:

The sample consisted of 94 males and 16 females, with a mean age of 68.5 years. 38 were smokers or former smokers. Most cases (62%) involved pleural mesothelioma; 6 were peritoneal. Occupational exposure was reported in 105 cases, with an average exposure duration of 20.9 years and latency of 47.9 years. Fiber analysis was conducted in 28 cases, confirming asbestos exposure in all but 5. In other 77 cases, occupational origin was assessed from documental evidence.

Discussion:

While autopsy-based fiber detection is a key scientific tool for confirming exposure, it must be complemented by thorough occupational history. A standardized autopsy protocol is recommended to aid forensic evaluations and explore asbestos's role in other cancers.

Title: **Influence of preanalytical factors in the determination of alcohol and Ethyl Glucuronide concentration from ante-mortem whole blood samples in forensic cases**

Severino S.A.,[1] Fracassi I[1]., Tamburrino C.[1], Petrella[1] R., Campobasso[1]. C.P., Zuccarello P.[2], Carnazza G.[3], Barbera N. [3]., Carfora A.[1]

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Abstract: Blood Alcohol Concentration (BAC) and Ethyl Glucuronide (EtG) are part of the standard toxicological analysis performed in Alcohol-related crimes like driving under the influence (DUI). Different storage conditions like the type of preservative chosen, temperature and the storage interval can influence BAC concentration from samples re-analyzed after long time periods. Aim of the study is to investigate BAC and EtG quali-quantitative variations to define the role of preanalytical contributing factors on the reproducibility of the results. 22 blood samples from DUIs stored at -20°C from 16 to 21 months were selected. Inclusion criteria were the following: samples stored in BD-Vactuainer® gray-top tubes (NaF-$K_2C_2O_4$), available volume of 2,5 mL, 3 samples used as BAC blank. Samples were reanalyzed to quantify BAC (T0;Control group), divided in 6 aliquots, stored at different temperatures (4°C;25°C) and retested at time intervals of 24h;72h;10dd. 100µL of blood sample was fortified with 100µL of Isobutanol (0.25g/L) as internal standard (IS). Analysis was performed with Headspace-Gas-Chromatography Flame-Ionization-Detention (HS-GC-FID). Statistical analysis was evaluated through the non-parametric Kruskal-Wallis test.

Most of the samples analyzed showed similar results obtained at the first determination, ensuring data reproducibility. Positive samples showed a slightly loss of BAC, highlighted when BAC was particularly high. BAC blank were confirmed as negative (BAC= <LLOD) for all the tested conditions. Partial results obtained for BAC (ETG: data not shown), according to literature findings, do not highlight any significantly statistical difference for all

the tested conditions ($\chi 2$= 2.1501) (df=6) (p=0.9054), for short-time storage periods, without refrigeration and NaF-$K_2C_2O_4$ preservative.

Title: Falls from height: injury patterns in jumpers and fallers

Seveso G.*[1], **Secco L.*[2]**, Argentiero G.[1], Callegari E.[2], Padalino P.[2], Giovannini E.[3], Santelli S.[3], Baldino G.[4], Burrascano G.[4], Fiorani M.[5], Camellini A.[5], Lavenia A.[5]

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Schools of specialisation in Legal Medicine involved: Padua, Pavia, Bologna, Messina, Modena-Reggio Emilia.

Abstract:

Introduction. Falls from height are a common source of injury, resulting from occupational, recreational, or intentional causes. This study aims to identify injury patterns associated with accidental and suicidal falls, and to assess how fall height influences these patterns.

Materials and methods. A multicenter, retrospective study was conducted using autopsy records from 1999 to 2024, collected in five Italian Institutes of Legal Medicine and in the Canton of Ticino. 300 cases were included (exclusion criteria: homicides; unknown fall height or manner of death) and classified as accidental (n = 162) or suicidal (n = 138) falls, and by fall height (< 10 or ≥ 10 meters). Epidemiological, forensic and toxicological data were collected for each group.

Results. Jumpers were 60.86% men and 39.13% women, while fallers were predominantly men (90.74%). Psychiatric disorders were present in 55.07% of suicides and 1.85% of

accidents. Falls from ≥ 10 meters occurred in 48.55% of jumpers and 33.33% of fallers, while falls < 10 meters were more common in fallers (66.66%). Immediate death occurred in 76.81% of jumpers vs. 50.61% of fallers. Head and neck involvement showed no significant difference between jumpers and fallers, while trunk and limbs were significantly more involved in jumpers. As fall height increases, injury patterns tend to overlap, reducing their utility in reconstructing fall dynamics.

Discussion. Our findings confirm distinct injury patterns in fallers and jumpers, consistent with the literature. Fall height plays a crucial role in injury distribution. These patterns may support forensic pathologists in reconstructing fall dynamics during autopsy and death scene investigation.

Title: Putting *post mortem* interval estimation in the dock: juridical and forensic considerations

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Abstract:

Introduction

The estimation of the post-mortem interval has always played a key role in criminal proceedings. Several scientific methods have been proposed and validated in order to define with the highest possible accuracy the time span elapsed between the death of the individual and the discovery of the body. Currently, the most widely employed diagnostic strategies are the Henssge nomogram for early PMI and the analysis of potassium levels in the vitreous humour for late PMI.

The aim of the study was to assess whether the analysis of cadaveric temperature by means of Henssge's nomogram could overcome the critical filter outlined by the Cozzini judgment, which transposed into the Italian legal system the criteria of scientific evidence reliability developed in the US context of the Daubert case.

Material and methods*:* The study was conducted by means of a literature review focusing on the aspects of verifiability, falsifiability, knowledge of the error rate and submission to scrutiny and general acceptance in the scientific community.

Results: The literature review showed that Henssge's nomogram has its inherent limitations, which may compromise the level of reliability of the scientific data at trial.

Conclusion: tanatochronological evaluations exhibit wide margins of error that may influence the judicial assessment of scientific data. It therefore appears necessary to clarify the degree of reliability of scientific data, indicating the limits of fallibility and the margin of error associated with the methodologies employed.

Title: **Multicentric Study on Forensic Investigation of Charred Bodies: Interdisciplinary Strategies Unveiled through Flowchart Mapping**

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Abstract:

Introduction: Direct exposure to the action of fire can cause extensive tissue damage, depending on the duration, the anatomical regions involved and the temperature reached. Heat-induced injuries can exhibit a wide range of severity, ranging from localized burns to complete carbonization, complicating the determination of the cause and manner of death. **Materials and Methods:** A retrospective multicentric study was conducted across five Italian Institutes of Legal Medicine, analyzing 67 fully or partially charred bodies. The objective was to assess the role of forensic investigations in determining the cause and manner of death and establishing personal identification. For each case, circumstantial data, post-mortem CT (PMCT) findings, external examinations, autopsies, and histological and toxicological analyses were collected. **Results:** The study confirmed the importance of a multidisciplinary approach (radiology, autopsy, histopathology, toxicology and odontology) in the investigation of charred bodies. The integration of forensic techniques proved effective in identifying the

cause and manner of death and in contributing to victim identification, even in cases with severe soft tissue destruction. **Discussion:** The results underscore the necessity of a structured, multidisciplinary forensic strategy in cases involving charring. Based on the findings and experience gained, an operational flowchart was developed to guide the management of charred remains. This tool defines the role of each forensic discipline and aims to enhance the accuracy and efficiency of investigations in these complex scenarios.

PARALLEL SESSION IN THE PANINI ROOM: FREE COMMUNICATION

(alphabetical order)

Title: Overkill Behind Closed Doors: A Medico-Legal Case Series and Review of Literature of Domestic Homicides

Abramo D.[1], Biondo T.[1], Calabrese S.[1], Nicolosi A[1], Spadaro B.[1], Raffino C.[1], Rotter G.[1], Baldino G.[1], Asmundo A.[1], Ventura Spagnolo E[1].

Section of Forensic Medicine - BIOMORF Department - University of Messina

Introduction. Overkill is a criminological modality marked by extreme violence, involving the infliction of injuries far exceeding those required to cause death. Although statistically rare, it has gained forensic relevance in recent years due to the rise in homicides characterized by destructive, symbolic, and relational dynamics. In domestic and familial settings, overkill presents distinctive features, often involving highly personalized violence and the presence of pathological relational factors such as emotional dependence, resentment, revenge, or perceived betrayal. The brutality and the relational context of these crimes generate significant media and social impact, influencing both public risk perception and the labelling of the offender.

Case series. A retrospective analysis was conducted on judicial cases reviewed between 2021 and 2025, identifying 11 cases that met the criteria for overkill based on the method of execution. In female victims (7 cases), injuries primarily affected the head, neck, and chest; in male victims, they were mostly concentrated on the head. All victims showed signs of active and passive defense injuries, with post-mortem wounds documented in one case.

Discussion. Analysis of crime scene findings, autopsy results, laboratory data, and imaging revealed recurring injury patterns, weapon types, and victim-offender relationships. In all cases, overkill occurred within a familial context, displaying heterogeneous conduct united by a symbolic and destructive excess of violence. A thorough and multidisciplinary forensic evaluation is essential (not only for reconstructing injury dynamics but also for understanding the criminodynamic, relational, and psychiatric elements underlying the act) thus supporting the development of scientific evidence in court.

Title: Histopathological Alterations and In Situ Hybridization Studies in Placentas from COVID-19 Positive Pregnancies: Morphological Evidence and Pathogenetic Insights

Belmonte B.[1], D'Anna T.[1, 2], Malta G.[3], Formisano E.[2], Morello G.[1], Contorno S.[3], Florena A.M.[3], Orlando E.[3], E. Maresi E.[3].

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3: Department of Health Promotion Sciences, Maternal and Infant Care, Internal Medicine and Medical Specialties, University of Palermo, Palermo, Italy

Abstract:

Aim: Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the causative agent of COVID-19, has raised significant concerns regarding maternal-fetal outcomes, particularly when infection occurs during pregnancy. The impact of the virus on placental structure and function, and its potential role in preterm birth, remains an area of active investigation. This study analyzed histopathological patterns of placental lesions in SARS-CoV-2-infected women during the third trimester, to detect alterations due to direct viral infection or indirect mechanisms, and their correlation with delivery type, vertical transmission, and neonatal outcomes.

Materials and Methods: 21 placentas from SARS-CoV-2-positive women in the third trimester were collected from the Institute of Pathology archives. A control group consisted of 21 gestational age-matched placentas from SARS-CoV-2-negative women admitted for delivery between January 1 and August 30, 2021. Histopathological analysis and in situ hybridization mRNA assay for SARS-CoV-2.

Results: Histomorphological examination of placentas from SARS-CoV-2-positive did not reveal any specific lesions. In the study group, 17 cases showed maternal and/or fetal vascular malperfusion (MVM/FVM); 2 cases exhibited FVM with associated maternal and/or fetal inflammatory response (MIR/FIR), 1 case showed both MVM/FVM and MIR, and 1 case showed MVM only. RNA-Scope assay revealed no expression in syncytiotrophoblasts, endothelial cells, and fibroblasts. In control group placentas showed FVM and MVM, in 8 and 13 cases respectly, without IR.

Conclusions: No specific histological features in placentas from SARS-CoV-2-positive are detected Therefore, in situ mRNA hybridization is essential for confirming viral presence and supporting tailored diagnostic and therapeutic approaches in affected pregnancies.

Title: Fatal butane inhalation: the contribution of cardiac and brain immunohistochemical markers.

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Abstract:

Introduction: Butane (C4-H10) is a highly flammable and explosive aliphatic hydrocarbon. However, thanks to its easy accessibility, it can become a narcotic substance, causing a psychoactive effect. It is usually inhaled directly (sniffing), especially from lighters, camping stoves, and spray cans. Of all inhalants, butane is the one with the highest mortality rate, as it exerts its toxicity mainly at the level of the central nervous system and the cardiovascular system. The rationale for this study is to compare eight cases of fatal butane poisoning with control cases of subjects deceased following head or thoracic trauma to identify antigens that can act, respectively, as cardiac and cerebral markers to support the medico-legal diagnosis of butane poisoning.

Materials and methods: We identified eight cases of fatal butane poisoning, six men and two women aged between 18 and 52 years. For all the selected instances, hematoxylin and eosin (H&E) staining and immunohistochemical investigations were performed using a panel of antibodies against the antigens Connexin 43, Myoglobin, Troponin T and Troponin I on the heart samples (left ventricle, anterior wall) and MAP2 and Calbindin on the brain samples (parietal lobe).

Results: The positivity to the Antigen-Antibody reaction for both brain and cardiac markers was standardized with semiquantitative interpretation.

Discussion: The brain markers are more expressed in the cases than in controls, and vice versa. The cardiac markers, in particular connexin 43 and myoglobin, are more expressed in the controls than in the cases, which, on the contrary, are characterized by their depletion.

Title:Injury as a silent witness: the role of forensic medicine in the legal qualification of a case involving explosives

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2 Dipartimento di Giurisprudenza, Università di Bergamo, Via Moroni 255.

Abstract:

Introduction: In forensic practice, the reconstruction of criminal behavior and charge determination are often entrusted solely to law enforcement, with forensic medicine playing a marginal, confirmatory role. This approach undermines the scientific contribution of forensic pathology, frequently limiting access to instrumental investigations or excluding expert involvement altogether—as reflected in the ongoing decline of autopsies performed nationally. Nonetheless, accurate injury analysis remains fundamental and, in specific contexts, may be decisive.

Case Description: on the shutter of a bookstore a ticking object wrapped in white cloth was discovered. A bomb disposal technician intervened to neutralize the device. During the operation, the device exploded, causing the amputation of the left hand, loss of the right eye, and bilateral thigh lacerations with retained foreign bodies.
The technician claimed the explosion occurred spontaneously. Based on this, charges included attempted murder and mass murder, considering the alleged explosive power. However, a detailed injury analysis and technical assessment of the device disproved this version, redefining the victim's position at the time of detonation and substantially reducing the inferred explosive capacity. This led to the reclassification of some charges.

Discussion: This case highlights the critical role of traumatology in forensic investigations. Through advanced diagnostic tools (e.g., imaging) and interdisciplinary collaboration (e.g., ballistics, toxicology, anthropology), the forensic pathologist can ensure precise injury interpretation. A thorough medico-legal analysis thus becomes essential in reconstructing criminal dynamics and supporting judicial decision-making.

Title: **The contribution of comparative forensic radiology in Disaster Victim Identification (DVI): a retrospective analysis of cases at the Ticino Institute of Legal Medicine (ILM), Switzerland**

Calestani L.[1], Mattiussi F.[2], Azzena A.A.[2], Rezzonico E.[2], Martinez R.M.[3]

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Abstract:

Introduction

The personal identification methods applied in the INTERPOL DVI protocol include comparative DNA profiling, fingerprinting and odontology. Comparative forensic radiology is currently employed as a second tier technique, mainly due to well-known logistical-organizational challenges and shortage of financial resources. Our aim is to further strengthen the utility of using forensic radiology in DVI procedures as a primary identifier.

Materials and methods

We retrospectively evaluated a cohort of 165 corpses, subjected to post-mortem Computed Tomography, full autopsy and/or external examination by personnel of the Ticino IML (Switzerland), within October 2022 and November 2024. Identity confirmation was preliminarily achieved visually or through other comparative primary identification methods. For each subject we conducted a research of all available AM radiological investigations in the database of the Ente Ospedaliero Cantonale (EOC). A blind comparative analysis of the collected imaging was then performed by a forensic pathologist of the IML supported by an ISII forensic radiologist. The identificative elements analysed were: cranial sinuses, orthopaedic prostheses, endovascular and surgical devices, medical implants, structural alterations in bones, tendons and joints, post-traumatic and surgical procedures outcomes.

Results and discussion

Radiologic comparative identification was possible in 88 cases out of the studied cohort (109). Imaging of the head, major joints, long bones and vertebral spine led to certain identification. Cranial sinuses, medical implants, prosthesis and morpho-structural alterations of bones, joints, and tendons showed the highest reliability as identificative elements. Our study confirms that comparative radiological analysis is a highly efficient tool to achieve personal identification.

Title: Diagnostic pitfalls and forensic implications of Hyperactive Delirium with Severe Agitation: A case series.

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Abstract

Introduction. Hyperactive Delirium with Severe Agitation is a controversial diagnosis, defined by ACEP Task Force (2021) as altered mental state with disorganized thinking and psychomotor agitation, accompanied by hyperadrenergic state. In forensic medicine, it presents significant diagnostic challenges, often related to cases of in-custody fatalities and/or substance abuse.

Methods. This study analyzes forensic consultations conducted between 2020 and 2024 by four forensic pathologists from Institutes of Legal Medicine in Bari and "Tor Vergata University" in Rome. Based on the definition proposed by ACEP, seven consultations were selected following joint evaluation by a forensic pathologist and a forensic psychiatrist.

Results. Six out of seven subjects were male, mostly in their thirties, and two had a history of mental disorders. In three cases, a rapid onset of psychomotor agitation was observed, with frequent disorganized behaviors (partial nudity and object destruction). Resistance to physical restraint was a recurring feature, often persisting after immobilization. In three cases death occurred after sudden attenuation of psychomotor agitation. Autopsies never revealed conclusive findings for determining the cause of death. Most toxicological analyses tested positive for psychostimulants at varying concentrations.

Conclusions. Due to rapid onset and fatal evolution in out-of-hospital settings, the retrospective identification of Hyperactive Delirium with Severe Agitation in forensic settings remains particularly challenging.

A more precise characterization of the underlying pathophysiological processes is essential, as the etiopathogenetic mechanisms behind the syndrome are still poorly understood.

Its association with in-custody fatalities and substance abuse highlights the need for a clear diagnostic framework to support medico-legal accountability.

Title: **Incidental finding of rare coronary anomaly during forensic autopsy**

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Abstract:

The Public Prosecutor's Office contacted us to perform an autopsy on a 70-year-old man who had been the victim of a road accident. The autopsy revealed that the man was affected by a very rare anatomical variant, presenting agenesis of the left coronary ostium, with the left coronary artery deriving directly from the right coronary sinus. Nonetheless, no thrombotic occlusions were found in the mentioned arteries, which were in excellent condition with occasional and minimal atheromasia. The multi-district traumatic injuries therefore seemed to be of absolute importance. Subsequent histopathological analyses also revealed a healthy myocardium, without signs of acute ischemia or scarring. The analysis of the clinical documentation also allowed us to exclude the presence of previous cardiological problems, with the subject reported as asymptomatic, despite the unknown anatomical variant of the coronary circulation. The investigations, therefore, allowed to identify the causes of death in the multiple trauma suffered following the accident and to clarify the dynamics of the same, also shedding light on a rare, unknown cardiac pathological condition. The study highlights the importance of the judicial autopsy procedure even when from an initial external examination the causes of death should be presumed

Title: **Procedural Framework of Medico-Legal Scene Investigation in the Francophone Cantons of Switzerland: Perspectives from a Joint Experience between the Centre Universitaire Romand de Médecine Légale and the Institute of Legal Medicine of the University of Messina.**

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Abstract:

The forensic medical inspection represents a crucial phase in the technical-scientific investigation. It involves the direct and methodologically structured observation of the death scene, allowing the collection of fleeting, non-replicable primary elements that are essential for determining the time of death, correctly identifying and collecting biological samples and traces, and initiating the reconstruction of the event dynamics. This communication aims to share the specific operational structure of forensic medical inspections as conducted by the *Centre Universitaire Romand de Médecine Légale* (CURML), based on a training exchange with the Institute of Legal Medicine of the University of Messina. CURML, established in 2007 through the merger of the institutes of forensic medicine in Geneva and Lausanne, is responsible for performing all autopsies ordered by judicial authorities in French-speaking Switzerland. In 2024, CURML conducted 820 scene inspections, 280 external examinations, and 620 autopsies. Forensic scene attendance is requested whenever police report a violent, suspicious, or unexplained death. In about half the cases, forensic police are also involved. Responsibilities are clearly defined: the police handle environmental and scene-related findings, while the forensic pathologist documents injuries and traces on the body. Upon arrival, the forensic pathologist immediately measures rectal and ambient temperatures, evaluate rigidity and hypostasis, but also perform mechanical, electrical, and chemical muscle stimulation tests, to estimate the post-mortem interval. Each CURML inspection follows a

systematic approach, ensuring methodological rigor and consistency, while also serving as a valuable hands-on learning opportunity for residents in forensic medicine.

Title: **Total Amniotic Maceration Score (TAMS): a proposal for the assessment of post-mortem interval in stillbirths**.

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Abstract:

Determining the time of death in stillbirths remains a complex and unresolved issue in forensic pathology, yet it constitutes a critical element in the assessment of alleged medical malpractice and the attribution of liability in cases involving complications during labor and delivery. Currently recognized methods in the literature for assessing the postmortem interval (PMI) include fetal maceration and histologic changes, such as the loss of nuclear basophilia in fetal and placental tissues.

This study proposes the Total Amniotic Maceration Score (TAMS) as a quantitative scoring system inspired by Total Aquatic Decomposition Score, to estimate the time of intrauterine death in stillbirths. TAMS uses photographic assessments of maceration across four body areas: face, trunk, limbs, and cord. These subscores are combined into a total score ranging from 4 to 20, quantifying fetal decomposition.

A retrospective analysis was conducted on 52 stillbirths delivered between 2017 and 2024. Data collection included circumstantial, clinical, postmortem information, and color photographs taken at delivery or autopsy. For each stillbirth, two different postmortem intervals were calculated from time of estimated death to the delivery of stillborn, called delivery PMI (dPMI) and from time of estimated death to the postmortem examination, called postmortem PMI (pPMI). Pathologists and clinicians applied TAMS based on photographs, assessing its association with dPMI and pPMI and cross-validation was performed.

The proposed TAMS, which requires standardized data collection, when integrated with current reference methods, could represent an innovative tool in the multidisciplinary autopsy evaluation of stillbirths for estimating the post-mortem interval and it may also contribute to addressing issues related to medical liability.

Title: Sudden Infant and Fetal Death: A Comparative Medico-Legal Analysis

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Abstract:

Introduction: Sudden Infant Death Syndrome (SIDS) and Sudden Unexpected Fetal Death (SUFD) raise complex clinical, ethical, legal, and forensic issues. Determining the cause of death is essential both for family bereavement support and for prevention strategies.

Materials and Methods: A comparative analysis was conducted on national regulations and standard practices in selected countries. Sources included national legislation, implementing regulations, and peer-reviewed literature. Comparison focused on: (1) performance of post-mortem examination/autopsy, (2) use of post-mortem imaging, and (3) implementation of national registries.

Results: In Italy, France, Spain, and Germany, post-mortem examinations may be authorized by hospital medical directors with parental consent, or mandated by judicial authorities in suspected criminal cases. In the UK, authority lies with the coroner, an independent judicial officer empowered to investigate unexplained deaths. Post-mortem imaging is fully integrated only in the UK; it remains non-standardized in other countries. Regarding registries, the UK (NCMD) and France (OMIN) maintain compulsory national databases for sudden infant deaths. Spain launched a stillbirth registry in 2023 (for gestational age ≥ 6 months), though clinical-epidemiological implementation is pending. Italy lacks a national registry, relying instead on a surveillance network coordinated by the Italian National Institute of Health (ISS).

Discussion: Marked differences in regulatory and operational frameworks persist across Europe. Harmonizing protocols, standardizing imaging use, and establishing national registries are essential steps toward improving diagnostic accuracy and implementing effective SIDS and SUFD prevention measures.

Title: **Forensic Medical analysis of the closed head acceleration-deceleration injuries**

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Abstract:

Closed head injuries have been already classified on contact injuries and acceleration-deceleration injuries. Two typical acceleration-deceleration injuries are acute subdural hematoma (ASDH) and diffuse axonal injury (DAI), which are characterized with high mortality and that is where they got their medico-legal importance. Using experiments, it has been shown that acceleration with an impact time of more than 20-25 ms (which occurs in traffic accidents in real life) causes diffuse axonal injury, whereas an impact time of 5-10 ms is more likely to produce acute subdural hematoma. The aim of this research is to show that some types of traffic accidents are more typical for the occurrence of DAI, as well as that the typical mechanism for the occurrence of ASDH is fall on a firm surface. The study has been conducted on 80 forensic autopsy cases with closed head injuries (traffic accidents, falls and assaults) where additionally to a complete forensic medical autopsy, a complete forensic-neuropathological examination has been undertaken. For the purpose of diagnosing DAI, immunohistochemistry using antibody against ß-amyloid precursor protein has been involved. Results show that ASDH is more likely to occur in cases of simple fall, assaults and cyclists and DAI is more typical for vehicular traffic accidents and cases of falling from a considerable height. The paper also comprises discussion about some open questions regarding the diagnosis of diffuse axonal injury in the medico-legal practice.

Title: **Forensic DNA phenotyping: prediction of eye and hair colour and allelic frequency estimation in the Italian population for the development of a reference dataset**

Fazio G.[1], Gianfreda D.[2], Amurri S.[1], Corradini B.[2], Ferri G.[2], Ferrari F.[3], Borciani I.[2], Campagna F.[1], Mauro E.[1], Bini C.[1], Cecchi R.[2], Pelotti S.[1], Santunione A. L.[2]

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Abstract:

In recent years, Forensic DNA Phenotyping (FDP) has emerged as an innovative "DNA intelligence approach" aimed at predicting externally visible individual characteristics from biological traces collected at crime scenes or from biological samples of unidentified corpses or skeletal remains. This study aims to analyse the allele frequency distribution of genetic markers involved in the prediction of eye and hair colour in an Italian population sample, to enhance the existing European dataset. A large cohort of Italian individuals with at least three generations of ancestry was recruited, ensuring representation of phenotypic variability. The 24 SNP markers included in the HIrisPlex panel was analysed using SNaPshot sequencing technique, and the genotypic data were uploaded to the FDP web tool validated for forensic use by the international VISAGE Consortium's. This tool provides prediction probabilities for three eye colour categories (blue, brown, and intermediate) and four hair colour categories (black, blond, brown, and red). The results confirmed a high predictive accuracy for the Italian population as well; however, the complex genetic structure of intermediate phenotypic traits highlights the need for novel prediction models that include genetic markers associated with complex phenotypes. The strong north–south European gradient in eye color, along with the hypothesis that variation in eye color is associated with skin pigmentation and UV environmental adaptation, underscores the importance for further research. These should focus on novel genetic markers to refine the European dataset, in which the Italian population may be included to enhance the accuracy of predictive models.

Title: **The role of autopsy in judicial investigation: a source of evidence and an essential guide for the formulation of appropriate charges. Analysis of three cases.**

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Introduction:Over the past decade, there has been a significant decline in the number of judicial autopsies, with a growing reliance on external examinations of corpses.However, such examinations often prove inadequate particularly in suspicious death cases.This report highlights the fundamental role of autopsy in accurately determining the cause of death and in guiding judicial investigations.

Case description:First case:a man died following a road accident involving a car and a truck,with major cranioencephalic and thoracic injuries considered compatible with the accident dynamics.The truck driver was charged with vehicular homicide.About nine months after the event,the body was exhumed and an autopsy was performed;the absence of vital reactions at the fracture sites indicated that the injuries were post-mortem.Second case: a woman with a history of domestic violence died at home with bruises,but the autopsy revealed a natural death due to aortic dissection,absolving the husband who was charged with homicide.Third case:a child died in hospital during treatment for an abscess; while healthcare professionals were initially investigated for medical malpractice,the autopsy revealed a cardiac rupture,prompting a reassessment of the charges.

Discussion:In the first case,the discovery of post-mortem injuries led to the defendant's acquittal.In the second case,the natural cause of death excluded the involvement of third parties.In the third case,the cardiac finding allowed for a reassessment of the clinical and legal scenario,leading to the reformulation of the charges.The autopsy thus,especially when supported by lab and radiological techniques,proves to be a crucial tool for accurately reconstructing the cause of death and providing scientific evidence essential to judicial proceedings.

Title: Impact of Urban Environmental Factors on Cadaveric Decomposition and Post-Mortem Interval Estimation: A Comprehensive Literature Review.

Cortese R.[1], **Gifuni C**.[1], Marseglia A.[1], Di Lorenzo P.[1], Niola M.[1].
Institute of Legal Medicine, University of Naples "Federico II", Naples

Abstract:

Introduction: accurate estimation of the post-mortem interval (PMI) is critical in forensic investigations to establish time of death and facilitate judicial reconstructions. In urban environments, however, PMI estimation is complicated by multiple environmental, biological, and anthropogenic factors interacting to significantly alter cadaver decomposition. Increased urbanization and population density have resulted in more frequent discoveries of bodies in urban rather than rural settings, emphasizing the need to understand urban-specific dynamics influencing PMI.

Materials and Methods: a systematic review of scientific literature published mainly in English and Italian was conducted using PubMed, Web of Science, Google Scholar, and IEEE Xplore databases. Specific keywords included "post-mortem interval," "urban decomposition," "urban heat island," "air pollution," "forensic entomology," and "necrophagous fauna." Of 275 studies initially identified, 220 met inclusion criteria concerning language, full-text availability, and methodological rigor, and were qualitatively analyzed.

Results: several urban factors significantly affecting cadaver decomposition were identified, including pronounced thermal fluctuations from urban heat islands, variability in environmental humidity, air pollutants (ozone, carbon monoxide, PM10), reduced necrophagous fauna availability, and anthropogenic influences like vehicular traffic, impermeable surfaces, and waste management. These factors disrupt entomological succession, microbial proliferation, and biochemical decomposition, frequently rendering traditional forensic models ineffective in urban contexts.

Discussion: these findings indicate current forensic PMI models, predominantly developed in rural or controlled environments, lack accuracy in complex urban settings. Innovative models integrating urban microclimatic variability and advanced technologies such as environmental sensors and artificial intelligence represent promising approaches to improve PMI estimation in urban forensic investigations.

Title: Pulmonary oedema in acute opioid intoxication: the role of AQP1

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Abstract:

Introduction. In opioid intoxication deaths, pulmonary oedema is a common finding, although its pathogenesis is still under investigation. Recent studies have shown that morphine can modulate the activity of aquaporins (AQPs), membrane channels involved in the regulation of cellular water flow; however, whether morphine regulate also pulmonary AQP has never been studied. This study aims to explore whether pulmonary oedema in acute opioid intoxication deaths is associated with AQP1 regulation.

Materials and Methods. Autopsy cases from the Institute of Forensic Medicine in Bellinzona (Switzerland), from 2020-2024, involving deaths with pulmonary oedema (autopsy performed within 72 hours) were reviewed. Eight cases (opioid intoxication) and 10 controls (death without opioid intake) were selected. Lung tissue was stained with haematoxylin-eosin and processed for AQP1 analysis by immunohistochemistry. Slides were evaluated microscopically to assess oedema intensity and AQP1 expression semi-quantitatively.

Results. Microscopic evaluation revealed that the expression of AQP1 was inversely related to oedema intensity. Furthermore, in the presence of pulmonary oedema, AQP1 expression was higher in intoxication cases than in controls. However, statistical significance was not achieved due to the small sample size.

Discussion. The immunohistochemical method proves to be easy to perform and promising, considering that the results obtained showed a higher expression of AQP1 in cases of opioid intoxication, although the correlation was not statistically significant, which is likely due to the small sample size, also influenced by the time constraints necessary to perform immunohistochemical analyses on this type of protein.

Title: Micro-CT for the Differentiation between Live Birth and Stillbirth: A Pilot Study

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Abstract: The distinction between live birth and stillbirth is crucial in forensic medicine, with significant legal, civil, and insurance implications. Traditionally, the main test used to assess whether respiration occurred is the lung flotation test, introduced in the 17th century. However, this method has several limitations: it only provides indirect evidence of air presence in the lungs and can be affected by postmortem factors such as decomposition or resuscitation attempts. To explore alternative methods, we conducted a pilot study to assess the feasibility of using postmortem Micro-Computed Tomography (micro-CT) to distinguish aerated from non-aerated lungs. We analyzed two groups: Group 1 included aerated lung samples (5 neonates and 5 adults), while Group 2 consisted of non-aerated lungs from 10 fetuses. All formalin-fixed samples were scanned using micro-CT to calculate gas volume percentage (GV%). Results showed a clear difference between the groups: Group 1 had a mean GV% of 9.52 ± 6.77, while Group 2 had a mean of 0.58 ± 0.66. Aerated samples showed high and dispersed values, while non-aerated ones displayed low and clustered values, except for five cases with slightly higher GV%, attributable to postmortem factors such as artificial ventilation or infection. Our findings suggest that micro-CT can reliably detect and quantify

pulmonary aeration, even in formalin-fixed tissues, providing an objective tool to support the postmortem distinction between live birth and stillbirth. This technique also enables retrospective case review and may complement traditional tests in forensic investigations.

Title: **Lethal Trajectory: A Case of Fatal Injury from an Accidentally Projected Metal Fragment**

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Abstract:

Introduction: Mechanical energy trauma is a major cause of death, especially in high-risk occupational settings such as agriculture and industry. These injuries result from the sudden transfer of mechanical energy to the body via impacts, compressions, or projected objects. This report presents an accidental fatality in a rural area involving an excavator with a brush-cutting attachment.

Material e methods: A male was found supine along a country road near an agricultural field. Inside the field stood an excavator with its boom extended toward a hedge, equipped with a brush cutter. The windshield was shattered, with glass fragments inside the cab and around the vehicle. A cylindrical metal fragment (15 cm long, 0.5 cm diameter) was found on the driver's seat.

Results: External examination showed an inwardly beveled wound on the right hemithorax and another in the lumbar area. Autopsy revealed a wound path from the chest injury, directed downward, left to right, and front to back, with soft tissue lacerations, rib fractures, pleural penetration, diaphragmatic and right liver lobe injury, and an outwardly beveled wound in the lumbar region. Death occurred from massive hemorrhage and respiratory failure as the victim reached the roadside. The projectile was a piece of metal mesh forcefully ejected by the brush cutter after impact with a wire fence. The injury pattern was consistent with high-energy trauma.

Discussion: This case highlights the importance of thorough scene investigation in violent deaths, as autopsy alone would not have revealed the projectile origin or the event dynamics.

Title: "**The Impact of Forensic Expertise on Postmortem CT Interpretation in Firearm Related Deaths: A Study on Interobserver Variability"**

Midiri M.[1] – Albano G. D.[1] – Malta G.[1] – Puntarello M.[1] – Pellerito S.[1] – Zerbo S.[1] – Argo A.[1]

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Abstract:

Introduction

Forensic radiology has become an essential tool in postmortem investigations, particularly in cases

involving gunshot wounds. This study investigates the impact of radiologists' forensic expertise on interpreting PMCT scans, evaluating whether specialized forensic training surpasses general clinical experience.

Materials and Methods

A retrospective observational study was conducted at the University of Palermo, analyzing 10 firearm-related deaths (homicides or suicides) that occurred between 2021 and 2024. Four radiologists with varying levels of forensic expertise reviewed the PMCT scans: an experienced forensic radiologist, an experienced clinical radiologist without forensic training, a radiology resident with forensic training, and a radiology resident without forensic expertise. Observers were provided with pre-filled templates and body diagrams and asked to review the PMCT scans and record the following items: the number and location of entry and exit wounds, the number and location of retained foreign bodies, and the sites of bone and visceral injuries. Results were compared with autopsy findings, which were considered the gold standard.

Interobserver agreement was evaluated using Fleiss' kappa and Cohen's kappa, while diagnostic performance was assessed using ROC curve analysis.

Results

The results demonstrated significantly higher diagnostic accuracy among radiologists with forensic training, particularly in identifying entry and exit wounds and organ injuries, than those without forensic education.

Discussion

These findings highlight the crucial role of forensic radiology training in improving the reliability of PMCT, especially in firearm injury cases. Standardized reporting protocols and structured training programs are essential to enhance medico-legal investigations and ensure accurate, reproducible forensic imaging assessments that optimally support postmortem diagnostics.

Title: **Lethal sodium nitrite intoxication: the contribution of immunoistochemical markers.**

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[2] Department of Medical Sciences, Section of Forensic Medicine, University of Ferrara, 44121, Ferrara, Italy.

Abstract:

Introduction: Sodium nitrite intoxication is an increasingly common method of suicide. However there are no specific signs, routine tests and toxicological tests do not always give reliable results. This study aims to validate scientifically useful methods for the diagnosis of NaNO2 intoxication, testing immunohistochemical techniques of three specific markers of hypoxia: HIF-1α, iNOS2 and VEGF.

Materials and methods: Seven cases of death caused by NaNO2 intoxication were examined; as a control case, a person who died from a stab wound was selected. Immunohistochemical analyses were carried out with specific antibodies to iNOS, HIF-1α and VEGF antigens on autopsy samples of heart, brain and lungs. On all sample collected during autopsy, 4 μm-thick paraffin-embedded sections were cut; they were pretreated by incubation for 120 minutes at 20°C using different substances; then they were incubated with the primary antigen. The sections were coloured in contrast to H&E and observed under an optical microscope.

Results: VEGF and iNOS2 were found to be significantly expressed in samples of cardiac, pulmonary and encephalic tissue in cases of death from nitrate intoxication, while HIF1α showed good expressiveness in lung and brain samples but poor in heart samples. The expression of VEGF, HIF1α and INOS2 was very poor or absent in the control.

Discussion: Deaths from suicidal NaNO2 intoxication are a challenge for forensic pathologists. This work highlighted how immunohistochemical techniques play a crucial role in clarifying death mechanisms in sodium nitrite poisoning, showing an increase in oxidative stress affecting the INOS2, VEGF and HIF1α lines.

Title: The Importance of the Forensic Pathologist at the Crime Scene as a Crucial Element for the Validity of Scientific Evidence

Nicolosi A.[1], Calabrese S. [1], Biondo T. [1], Abramo D. [1], Spadaro B. [1], Pellicano S. [1], Iannello D. [1], Pitrone C. [1], Tornese L. [1], Sapienza D. [1], Baldino G. [1], Asmundo A. [1], Ventura Spagnolo E. [1]

1 Legal Medicine – Dep. Biomorf – Messina University

Abstract:

Introduction

Crime scene investigation has a pivotal role in the forensic activity, allowing for the collection of key data to reconstruct event dynamics, estimate the post-mortem interval, and properly document biological evidence. The Italian Code of Criminal Procedure (Articles 348, 354, 359, 360) regulates protocols for the acquisition of scientific evidence, emphasizing urgent and non-repeatable assessments, such as the on-site medico-legal examination of corpses. The Council of Europe's Recommendation R(99)3 underscores the importance of scientific rigor, transparency, and impartiality, promoting early involvement of qualified experts. In Italy, the presence of forensic pathologists at crime scenes is still inconsistent, leading to operational difficulties, especially when the absence of on-site post-mortem assessments reduces the accuracy of later autopsies. Effective forensic investigations imply a multidisciplinary, coordinated approach, where structured collaboration and integration of diverse technical and scientific expertise are essential to ensure reliable evidence and the pursuit of judicial truth.

Materials and Methods

A retrospective analysis was conducted on judicial cases observed between 2021 and 2024. Selected cases involved scenarios where the absence of forensic pathologists at the scene limited the possibility to adequately respond to judicial questions.

Results

Our analysis found that excluding forensic pathologists from crime scenes undermined investigations and evidence quality, due to lack of standardization and reliance on non-specialists.

Conclusons

The multidisciplinary approach, involving different professionals in relation to the specific case, is now fundamental. It expresses its full potential when carried out through a

meticulously coordinated crime scene investigation, in collaboration and consultation with the judicial police forces involved. There is a need for national regulation of forensic investigations, which should not only define the procedures clearly but also mandate the systematic and essential presence of a forensic medical specialist

Title: **Comparison of different analytical approaches for calculating the likelihood ratio in LT-DNA paternity investigations**

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Abstract:

In low template DNA (LT-DNA) samples, the interpretation of short tandem repeat (STR) profiles by likelihood ratio (LR) calculations must take into account the possibility of stochastic artefacts in PCR. Several probabilistic genotyping software packages have been developed for this purpose, particularly for the personal identification of stains. However, less attention has been paid to applications in kinship studies.

We evaluated the performance of three software packages -Familias, EuroForMix (EFM) and EFMrep- in paternity investigations conducted by the laboratory in the period 2019-2025, which required the analysis of LT-DNA samples, including formalin-fixed and paraffin-embedded tissues, bones and personal items. LT-DNA samples were classified as "highly" (HD) or "mildly" (MD) degraded based on the quality of the STR profiles (risk of dropout, estimated using a logistic model). Calculations were performed using two PCR results for each LT-DNA sample (two PCR replicates of the same STR kit for Familias and EFM, and two different STR kits for EFMrep).

It was observed that in MD and HD cases, when maternal information was missing, the mean LR values obtained with EFMrep were significantly higher than with Familias and EFM. However, when maternal genotypes were available, Familias gave significantly higher LRs in MD samples than EFM and EFMrep. In HD samples, Familias and EFMrep performed equally well, but the proportion of cases with LR>10,000 was higher for EFMrep than for Familias.

The results obtained may form the basis for the development of standardised interpretation procedures in kinship cases with LT-DNA samples.

Title: **Glyoxal Acid-Free (GAF): A Non-Toxic Alternative to Formalin for Histological Fixation in Forensic Sciences**

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Abstract:

Introduction

Formalin is the gold standard for histological fixation but is toxic, carcinogenic, and hampers molecular analyses. Glyoxal Acid-Free (GAF), a novel acid-free glyoxal-based fixative, has emerged as a safe and reliable alternative (Ryska et al., 2024). This study aimed to assess GAF performance for histopathological, immunohistochemical, and molecular analyses in forensic and legal medicine**.**

Materials and Methods

Parallel samples fixed in GAF and neutral buffered formalin (NBF) were compared in multicenter studies assessing morphological preservation, IHC performance (marker expression), and molecular quality (DNA/RNA yield, fragmentation, PCR/sequencing compatibility).

Results

GAF-fixed samples exhibited excellent morphological preservation and superior DNA/RNA quality. IHC analysis yielded comparable results with minor protocol adjustments. Next-generation sequencing (OCAv3, TSO500) showed reduced fragmentation, fewer artifacts, and better target coverage with GAF. Long-term storage (10 years) confirmed GAF stability and diagnostic performance.

Discussion

GAF is a promising fixative in legal medicine: it eliminates formalin toxicity risks, ensures morphological integrity, and enables more reliable molecular forensic diagnostics. Multicenter studies validated its non-inferiority to formalin, supporting its application as a sustainable alternative for tissue preservation in forensic pathology.

References

Ryska A et al. Glyoxal acid-free (GAF) histological fixative is a suitable alternative to formalin: results from an open-label comparative non-inferiority study.Virchows Arch. 2024 Aug;485(2):213-222.

Title: Analysis of 402 post-mortem forensic examination of suicides

Petroni G.[1], Mandarelli G.[2], Introna F.[2], Sablone S.[2], Catanesi R.[2], Ceccobelli G.[1], Niolu C.[3], Tavone A.M[4], Marella G.L.[4]

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Abstract:

Introduction

Suicide is a major social and public health issue, ranking among the top three causes of death in individuals aged 15–44 years, regardless of gender. In Italy, few studies have analyzed suicide using forensic pathological data. Post-mortem findings offer critical insights into suicide methods, their execution, and related pathomorphological features. This multi-centre study aimed to examine suicide methods and places as well as their associations with clinical and sociodemographic variables.

Materials and Methods

We retrospectively analyzed n= 402 forensic reports of suicides retrieved at the Institute of Legal Medicine of the University of Rome "Tor Vergata" and Bari "Aldo Moro", in the period from 1998 to 2022. The data of post-mortem examination was further examined to collect socio-demographic variables, possible psychiatric and psychopharmacological history, suicide communications, place of death and suicide means. These factors were crossed with the eventual referral to a forensic autopsy. Chi-square, independent sample *t* test or Mann-Whitney U test were used to assess possible effects of sex, suicidal means, and psychiatric features.

Results

The study sample of N = 402 suicides included n=86 (21.4%) female and n= 316 (78.6%) male subjects with a mean age of 49.3 years (SD 18.3; range 15−93). We found no gender differences in the subjects mean age (M_{age} males = 49.3 ± 18.5; females = 49.3 ± 17.6; p=0.75). 46.8% of the subjects presented a psychiatric diagnosis at time of suicide (n= 134 missing

data) of whom 33.1 % was depression Among suicides 44.3% used asphyxiation (87.1% hanging), 25.9% high-energy trauma,15.2% firearms, 11.2 % drug poisoning, 3.5% cut weapons, and 5.7% other means. In our sample, 55.5% of suicides occurred at home, 18.7% outdoors, 9.2% in various facilities, 5.0% in healthcare facilities, 5.0% in vehicles, and 4.0% on the railway. Chi -square disclosed that female subjects used high-energy trauma more frequently than males (43.0% *vs* 21.2% $p<0.001$) while suicide by firearms was significantly less common in female than male subject (3.5% *vs* 18.4 %$p=0.001$); no other significant sex differential in modality of death were found. Regarding suicide locations, we found that females died by suicide at home more frequently than males (74.4% *vs* 50.3.$p<0.001$), whereas males were more likely to die by suicide outdoors (21.8% *vs* 7.0 $p<0.010$) or in facilities (11.1% *vs* 2.3 $p<0.05$).

Conclusion

This analysis of forensic reports of suicide integrates and enriches classical epidemiological data on suicide, highlighting specific patterns by method and place. The findings support the need for differentiated, targeted prevention strategies.

Title: From evidence to proof: application of 3D reconstructions in forensics. Analysis of two cases of dog bite injuries.

Scardina G.A.[1], **Piraino M.**[2], Fontana D.[1], Nigliaccio S.[1], D'Anna T.[2], Messina P.[1], Argo A[2]

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The use of 3D reconstruction technology in forensic science is gaining increasing relevance for the documentation and analysis of traumatic injuries, offering an innovative, non-invasive, precise, and reproducible approach that is particularly suitable for judicial evidence.

Materials and Methods

This study presents two forensic cases involving dog attacks, where 3D models were reconstructed to analyze bite injuries found on the victims' bodies and to distinguish them from bites by other species. Specifically, the "Dexis 3600" scanner was used, along with "Agisoft Metashape" for photogrammetry and "Geomagic Control X" for 3D analysis. Five bite injuries were analyzed in the first case, and ten in the second.

Results

The results demonstrate that integrating 3D scanning and photogrammetry into forensic medical and odontology can significantly improve the accuracy of animal bite injury assessment. This supports, in an objective manner, both the identification of injury types and the attribution of bites to specific animal species, as well as the reconstruction of the aggression dynamics an essential aid for expert analysis.

Discussion

3D reconstruction enabled the acquisition of high-resolution digital models of affected body surfaces. These models allowed objective, quantitative assessment of injuries, such as measuring the "intercanine distance", facilitating comparisons between dental arches and contributing to dynamic event reconstruction. The ability to rotate, slice, and zoom in on the models enhanced interdisciplinary analysis, improving collaboration among forensic pathologists, anthropologists, forensic odontologists, and veterinarians. The study proposes a reliable, innovative approach through morphologic and morphometric analysis, despite

variables like animal and victim movement, wound location, tissue resistance, postmortem changes, and soft tissue reactions

Title:V**erification of the Persistence of Sperm Traces under Different Chain of Custody Conditions, According to the Ge.F.I. (Italian Forensic Geneticists) Guidelines. Care Pathway for Victims of Sexual Violence and Abuse**

Argo A. [1], **Puntarello M**. [1], Tarantino M.[1], Malta G. [1], Albano G.D.[1], Pistorio M.[1], Calascibetta G.[1], Zerbo S.[1.]

[1] Department of Maternal and Child Health Promotion, Internal Medicine and Specialty Excellence (PROMISE), University of Palermo

Abstract:

Introduction:

In forensic investigations of sexual assault, the persistence and detection of seminal traces are crucial for probative evidence. However, environmental factors, contamination, and delays in evidence processing can compromise the reliability of these traces. This study investigates the persistence of sperm traces under various chain-of-custody conditions, following GE.F.I. (Italian Forensic Geneticists) guidelines, and evaluates the efficacy of modern detection methods.

Methods:

Four simulated scenarios were created to replicate common sexual assault contexts (e.g., on skin, hair, garments, vehicle interiors). Semen samples were deposited on different substrates and subjected to environmental and biological contaminants (blood, saliva, dust, soil). Detection tools included Sperm Tracker Lab® and Spray®, alternative light sources (ALS), and RSID™-Semen immunochromatographic tests. Samples were collected and handled under strict chain-of-custody protocols, followed by microscopic confirmation and DNA profiling when applicable.

Results:

Sperm Tracker Spray® consistently detected small semen volumes (1–2 µL) on diverse surfaces,

including skin and textiles. ALS had variable sensitivity, especially on dark or textured fabrics.

RSID™-Semen reliably confirmed the presence of seminal proteins even with contaminants.

Prolonged storage at room temperature (72 h) reduced test signal intensity but did not eliminate

detectability in most cases. Chain-of-custody documentation proved critical for maintaining

evidence integrity.

Discussion:

The study demonstrates that a multi-layered approach combining ALS, specific reagents (Sperm Tracker), and confirmatory RSID™ tests enhances sensitivity and specificity in detecting seminal traces. Environmental contaminants and time delay impact detection quality but can be mitigated with appropriate protocols. These findings support the adoption of integrated detection strategies and reinforce the importance of meticulous chain-of-custody adherence to ensure forensic reliability and legal admissibility.

Title: **Metabolomics investigation of post-mortem human pericardial fluid**

Sanna J. [1], Gozzelino C. [1], Amato G. [1]

1 Department of Medical Sciences and Public Health, University of Cagliari

Abstract:

Introduction: Pericardial fluid is a biological matrix of particular interest in the forensic field although available literature has mainly focused on post-mortem biochemistry and forensic toxicology, while post-mortem metabolomics has never been applied. Similarly, estimation of the post-mortem interval (PMI) has rarely been performed on pericardial fluid. A ^{1}H nuclear magnetic resonance (NMR) spectroscopy metabolomic approach was used ascertain the feasibility of monitoring post-mortem changes on human pericardial fluid metabolites and building a multivariate regression model for PMI.

Materials and methods: samples were collected in 24 consecutive judicial autopsies, in a PMI window ranging from 16 to 170 hours. The only exclusion criterion was the quantitative and/or qualitative alteration of the sample. Two different extraction protocols were applied for low molecular weight metabolites selection, namely ultrafiltration and liquid-liquid extraction following which samples were analyzed with H NMR and multivariate statistical data analysis.

Results: No notable differences were observed in the distribution of detected metabolites between samples treated with the two experimental protocols. A PMI estimation model based on 18 samples was validated with an independent set of 6 samples, giving a prediction error of 33–34 h depending on the experimental protocol used. Narrowing PMI up to 100 h, the prediction ability of the model improved with an error of 13–15 h. Choline, glycine, ethanolamine, and hypoxanthine were the most relevant metabolites in the prediction model.

Conclusion: The present study demonstrates that real-life pericardial fluid samples represent a biofluid of interest for post-mortem metabolomics, particularly for estimating PMI.

Title: Post-mortem Ultrasound Evaluation of the Coronary Vascular System in Ex-situ Hearts

Santelli S. [1], Ridolfi M. [2], Antonazzo G. [3], Giovannini E. [1], Berti L. [1], Montanari N. [1], Pelotti S. [1], Fais P. [1]

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Introduction

Sudden cardiac death is a leading cause of death in the 40-65 age group in industrialized countries. In approximately 80% of cases, it is attributable to atherosclerotic degeneration of the coronary circulation. This experimental study aims to evaluate the suitability of ultrasound for the morpho-functional characterization of the coronary circulation in ex situ hearts.

Materials and methods

The coronaries of six hearts were cannulated with a vascular catheter, and an aqueous contrast medium was injected using a pump. The cannulated vessel underwent ultrasound scanning for both morphological and functional study using color Doppler echocardiography. Subsequently, a cardiopatological examination of the heart was performed.

Results

Ultrasound and color Doppler echocardiography allowed the characterization of the coronary vessels, the morphology of atherosclerotic plaques, the degree of vascular stenosis, and related dysfunctional flow (reduced or turbulent). Subsequent cardiopatological examination confirmed the ultrasound findings.

Discussion

Preliminary results indicate coronary ultrasound as a promising diagnostic technique in cardiopatology, as a preliminary screening test for subsequent targeted investigations, since it enables the pathologist to assess the dysfunctional implications of atherosclerotic disease on coronary flow. However, further investigations with larger samples are needed to establish methodological standards, such as the contrast medium infusion rate for optimal post-mortem coronary circulation study, and the standardization of flow velocity data to achieve intra and interindividual criteria for the diagnosis of coronary artery disease. Future perspectives

include comparing post-mortem ultrasound with other tools commonly used for the study of coronary pathology, both in-vivo (coronary angiography) and post-mortem (CT angiography).

Title: **Estimating the Minimum Post-Mortem Interval: The Role of Forensic Entomology in Outdoor Cases in Central Italy**

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2: Institute of Legal Medicine, University of Parma, via Gramsci 14, Parma (PR)

3: Research Center Laimburg, Vadena (BZ), Italy

Abstract:

The authors present a series of ten case studies in which human bodies were discovered in the advanced stages of decomposition or full skeletonisation in outside locations in Central Italy. The cases occurred between 2019 and 2022, encompassing all seasons. The bodies were found in a wide variety of outdoor environments, such as woodlands, gardens or roadside spaces. Entomological evidence was collected during on-scene investigations and post-mortem examinations, while temperature data was retrieved from the nearest meteorological station or sampled at the location where bodies were found by placing a data logger on-site. The minPMI estimated using entomological evidence in the presented cases ranged between four days and six months, highlighting the application of this discipline across a broad range of timeframes.

Blow fly (Diptera: Calliphoridae) species were found in eight cases, with the most common being *Calliphora vomitoria* and *Lucilia illustris*. *Chrysomya albiceps* was found in six cases, while *Phormia regina*, *Lucilia ampullacea*, *Calliphora vicina*, *Lucilia caesar/illustris* were also discovered in some instances. Other insect taxa were also identified, including Muscidae (*Hydrotaea sp*.), Sarcophagidae (*Sarcophaga sp*.), Dermestidae (*Dermestes sp*.), Silphidae (*Necrodes littoralis*) and Staphylinidae (*Creophilus maxillosus*).

In this study entomologic evidence was able to refine the estimated minimum post-mortem interval (minPMI) in 90% of cases when compared to other forensic techniques. Furthermore, this research identifies the most prevalent insect species associated with outdoor human remains in Central Italy, providing critical taxonomic data for regional forensic investigations.

Title: **An overview of Metaverse in healthcare. Potential application in Forensic and Legal Medicine**

Sirago G.[1], Vinci A.[1], Visci P.[1], Solarino B.[1], Ferorelli D.[1], Dell'Erba A.[1]

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Abstract: In this review, we adopted a holistic perspective on healthcare as an integrated ecosystem that also encompasses forensic pathology and legal medicine, and we explore why these disciplines have so far remained largely detached from the developments of the Metaverse. Our objective is to assess the potential impact of virtual environments on these fields and to question whether forensic sciences may be overlooking significant opportunities. To this end, we conducted a comprehensive literature review—screening 1,200 relevant articles—across PubMed Central, Web of Science, Scopus, and Cochrane, using search terms related to the Metaverse and healthcare. The identified studies covered a broad spectrum of applications, including future clinical use, medical training, treatment, diagnostics, and predictive or preventive medicine. However, a notable absence of contributions from forensic pathology and legal medicine emerged. This gap may indicate a substantial missed opportunity, particularly in areas such as autopsy practice, crime scene reconstruction, and forensic case simulation, where virtual tools could prove transformative. Integrating immersive technologies in these domains could support new methods for education, scenario-based learning, and even retrospective analysis of unresolved cases—potentially marking a pivotal step forward in the evolution of legal medicine.

Title: **A Multidisciplinary Approach in Study of Human Remains Recovered from the Sea: the post mortem submersion interval.**

Spadaro B.[1], Sparacino F.[1], Calabrese S.[1], a Capra A.P.[1], Abramo D.[1], Biondo T.[1], Burrascano G.[1], Cianci V.[1], Iannello D.[1], Messina A.[1], Nicolosi A.[1], Pellicano S.[1], Pitrone C.[1], Trapuzzano G.[1], Tornese L.[1], Mondello C.[1], Gualniera P.[1], Baldino G.[1], Ventura Spagnolo E.[1], La Malfa R.A.[1], Castellaneta R.[1], Antonia Marcianò Somma R.[4], Asmundo A.[1], Sapienza D.[1]

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Medicine, University of Messina, Italy

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Abstract:

Introduction: The forensic investigation of human remains recovered from seawater presents considerable challenges, primarily due to the advanced decomposition processes that impede the assessment of submersion and postmortem interval, victim identification, cause and manner of death and the geographic provenance of the event. Aquatic-induced morphological alterations substantially limit the application of conventional forensic protocols, highlighting the need for alternative diagnostic indicators. This study analyzed four bodies in advanced decomposition, recovered along the northeastern Sicilian coastline and adjacent marine areas at different times and latitudes between spring and summer 2024. **Materials and Methods:** Myocardial and liver tissue samples were collected from three subjects for genetic analysis. In two cases, crustacean colonies were morphologically identified. All individuals underwent odontological examinations, including intraoral radiographs of the lower third molars and 3D photogrammetric scans of dental arches and the splanchnocranium. DNA analysis was performed using PCR (GlobalFiler kit) and SEQ Studio. Oceanographic models using OpenDrift (Norwegian Meteorological Institute) and

environmental data from Copernicus Marine Data Store were applied to reconstruct possible drift trajectories.

Results: Anthropometric analysis provided biological profiles (age, sex, constitution). Partial genetic profiles were obtained. Crustacean colonization timing and life cycles allowed estimation of submersion intervals. Drift modeling aligned with biological and geolocational data, linked all four individuals to a single maritime event .

Discussion: The multidisciplinary approach, combining geological, odontological-anthropological, genetic, and marine biological methodologies, proved effectiveness for victim identification, estimation of immersion time, and reconstruction of drift pathways offering innovative investigative tools for marine forensic practice.

Title: Till death do us part? Living with death and failure to process mourning: five paradigmatic cases

Violante M.G.[1] Barbieri C.,[2] De Leo A.[1] , Pagani K.[2] ,Cassano A.[3,] Bosco C.[4] , Rocca G.[5] Grattagliano I.1, Risola R.[1], Di Vella G.[6].

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[6] Legal Medicine, Bari

Abstract

The Authors present five cases which they have observed at the request of the judicial authority in which the combination between pre-existing psychiatric pathology or premorbid personality of the subjects under investigation and the recurrent dysfunctional relationship of these with their loved ones did not allow the physiological elaboration of grief and detachment from the loved one, pain management, with implications of criminological interest as well as legal medicine. In particular, the examination of the observed events has highlighted the presence of specific characteristics of the personality of the subjects compared to the surrounding reality, the existence of a symbiotic relationship in the family with a tendency towards isolation and mistrust towards third parties, ambivalence in interpersonal relationships, lack of expression of one's individuality outside the family context. Based on these assumptions, the family member's departure was a stressful event that did not allow to accept the separation from his loved one and led to the solution of living with the death. In the examined cases all deaths are secondary to natural pathological causes except for the last where the individual, with "double diagnosis", killed his partner, watched for days her death lying in the bathtub, highlighting a relational ambivalence, characterized by conflict with the loved one, culminated in murder, inability to detach from her and to proceed to a proper examination of reality.

PARALLEL SESSION IN THE CONSIGLIO ROOM: FREE COMMUNICATION

(alphabetical order)

Title: Clinical and Forensic Evidence of Torture in Asylum Seekers: Multidisciplinary approach with a multicenter study

Argo A.[1], **Albano G. D.**[1], Ferorelli D.[2], Solarino B.[2], Midiri M.[1], Puntarello M.[1], Pulin G.[2], Ferrero L.[1], La Spina C.[1], Tullio V.[1], Calascibetta G.[1], Geraci S.[1], Malta G.[1], Zerbo S.[1]

1- Department of Maternal and Child Health Promotion, Internal Medicine and Specialty Excellence (PROMISE), University of Palermo;

2- Section of Legal Medicine, Interdisciplinary Department of Medicine, Policlinico-University of Bari "Aldo Moro", Bari, Italy

Abstract

Introduction: In recent years, migration to Europe has increased significantly, with many asylum seekers reporting torture and violence in their countries of origin or along migration routes. Forensic medical evaluations play a crucial role in substantiating claims of persecution and assessing eligibility for international protection. This study assesses clinical and forensic evidence of torture in migrants evaluated at a specialized center in Palermo, Sicily, whose method concordance and reliability were validated by the research team at the University of Bari.

Methods: We conducted a retrospective analysis of 297 medico-legal reports issued between January 2018 and March 2024 by the Institute of Legal Medicine at the University Hospital of Palermo. Assessments followed the Istanbul Protocol and were carried out by a multidisciplinary team including forensic physicians, psychologists, cultural-linguistic mediators, and medical specialists as needed.

Results: Most individuals assessed were male (83.5%) with a median age of 25. The most common country of origin was Nigeria. Blunt force trauma was the most frequently documented injury (90.2%), followed by sharp force injuries (33.1%) and burns (28.9%). Female genital mutilation was observed in 61.2% of female cases. Psychological disorders were identified in 93.6% of subjects, making them the most prevalent consequence of torture. Clinical findings were consistent with the victims' accounts in 89% of cases. Injuries predominantly affected the limbs and aligned with known torture methods.

Discussion: Forensic certification is vital in asylum procedures. Our findings highlight a distinct vulnerable population and may assist healthcare providers across Europe in supporting refugee populations. A limitation is the time lapse between torture events and medical evaluation, potentially reducing the visibility of physical evidence.

Title: Development and Title: **Ultrasound for age estimation in forensic medicine: staging of the medial clavicular epiphysis in young adults**

Ardito L.[1], De Donno G.[1], Lorusso M. G. [1], Petruzzellis A. [1], Antonietti M. [1], De Donno A. [1]

1 University of Bari. Section of Forensic Medicine - DIM. AOUC Policlinico di Bari.

Abstract:

Introduction: The evaluation of medial clavicular epiphysis (MCE) ossification is crucial for forensic age estimation, especially near the age of majority. Ultrasound (US) offers a promising, radiation-free alternative to radiography (X-ray) and computed tomography (CT). This preliminary study assesses the reliability of MCE staging by US in adults and describes the distribution of stages according to Schmeling's classification.

Materials and Methods: A total of 108 healthy volunteers aged 18–29 years (72 females, 36 males) were recruited. Each underwent bilateral US scanning of the medial clavicle ends using a General Electric Logiq V2 machine with a 7.5 MHz linear probe, perpendicular to the epiphysis. Ossification stages were classified according to Schmeling (stages 1–4). Concordance between sides was evaluated with Cohen's Kappa, and stage distribution by sex analyzed using the Mann-Whitney U test.

Results: Bilateral concordance was moderate (Kappa = 0.513; agreement = 76%), suggesting frequent epiphyseal asymmetry. Stage 3 was most frequent (62.0%), followed by Stage 4 (30.6%) and Stage 2 (7.4%). Mean ages per stage were: Stage 2, 21.3 years; Stage 3, 21.0 years; and Stage 4, 22.4 years. Stage 3 appeared across all ages. A significant sex-related difference was found ($p = 0.023$).

Discussion: Ultrasound appears to be a useful method for MCE staging (stages 1–4) in young adults when combined with other techniques. Its radiation-free nature is particularly suitable for forensic age assessments. Larger studies are needed to evaluate inter-observer reliability and the impact of factors like diet, smoking, physical activity, and to include minors.

Title: Development and validation of a GC-MS/MS method for GHB and GABA detection in hair: application in GHB-facilitated sexual assault cases

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Abstract:

Introduction: Gamma-hydroxybutyrate (GHB) is a compound used both therapeutically and illicitly, frequently associated with Drug-Facilitated Sexual Assaults (DFSA). Its rapid metabolism and endogenous production make its detection in hair particularly challenging, especially after a single exposure. This difficulty is increased when endogenous and exogenous levels cannot be easily differentiated. Accurate analytical determination of GHB levels in hair, particularly following a single administration, is essential to differentiate between endogenous production and exogenous exposure.

Materials and Methods: The analytical method was developed using a gas chromatography coupled with tandem mass spectrometry (Agilent Intuvo 9000 Gas Chromatograph; Agilent 7010 Triple Quad Mass Spectrometer) to detect both GHB and its precursor and metabolite, gamma-aminobutyric acid (GABA). The method was validated according to OSAC international guidelines and applied to two real DFSA hair samples. In both cases, hair samples were collected and segmented into 5 mm sections shortly after the assault and one month later.

Results and Discussion: The method demonstrated excellent sensitivity, with limits of quantification (LOQs) of 0.1 ng/mg for GHB and 0.01 ng/mg for GABA. Endogenous GHB concentrations were detected in the samples collected immediately after the assault, while GABA was not. In the samples collected one month later, GABA was found in the second and third segments of the first case (19 and 15 pg/mg, respectively) and in the second segment of the second case (13 pg/mg). This approach improves discrimination between endogenous and exogenous GHB, offering valuable support in the forensic assessment of DFSA cases involving single, involuntary exposure.

Title: The role of toxicological analysis in the investigation of illicit and psychoactive substances in the adolescent population

Bertaso A.[1], Rinaldi R.[1], Casini C.[1], Murari M.[1], Porpiglia N.M[1], Rossella Gottardo[1], Bortolotti F.[1]

1 University of Verona, Department of Diagnostics and Public Health, Unit of Forensic Medicine

Abstract:

Introduction

The use of drugs and alcohol among adolescents is an increasing problem, so toxicological investigations on several biological matrices with different time windows are needed to identify the abuse of xenobiotics in this population.

This study aims to critically analyze cases of suspected acute and/or chronic intoxication by xenobiotics processed by the forensic toxicology laboratory of the University of Verona between 2016 and 2025.

Materials and methods

Ninety-four cases of patients admitted to child neuropsychiatry, psychiatry and pediatric units, or pediatric emergency room, have been processed. Blood and/or urine and/or hair samples underwent screening by immunometric methods for the most common drugs of abuse. Positive samples were confirmed by gas-chromatography coupled with mass spectrometry, while blood alcohol concentration by HS-GC-FID.

Results and discussion

Of the 94 patients, aged 11-19, 32% were male and 68% female. 67 urine, 71 blood, and 15 hair samples were processed. Regarding urine samples, 22.4% resulted positive for at least one substance, with 86.7% positive for cannabinoids. About 22% of blood samples were found positive for cannabinoids or alcohol. In addition, blood alcohol concentration was above 1.0 g/L for almost all cases.

Finally, 60% of hair samples tested positive for at least one drug, with the prevalence of cocaine and cannabinoids in poly-drug consumption.

This study highlights how cannabis is the most widely used substance in the under-20 population, despite its well-known side effects on the central nervous system, and confirms that hair is the most effective matrix for detecting chronic use.

Title: From inside to outside or vice versa? An in vitro study on the deposition of substances of abuse in dental tissues

Bianchi I. (1), Croce E. (2), Dimitrova A. (2), Gelli F. (1), Defraia B. (3), Focardi M. (4), Vaiano F. (2), Mannaioni G. (5), Pinchi V. (1)

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(5), Department of Neurosciences, Psychology, Drug Research and Child Health (NEUROFARBA), University of Florence, Italy.

Abstract:

Background Teeth represent alternative matrices for postmortem (PM) toxicology due to their high resistance and availability after the death of a subject. Dental tissues (pulp, dentine, and enamel) can provide information on occasional and/or chronic drug intake. The mechanism of the incorporation of molecules is still unknown since drugs can accumulate through the enamel from the oral cavity (external contamination).

Materials and Methods An in vitro study was conducted to investigate the permeability of enamel to molecules of interest (methadone and dextromethorphan hydrobromide - DXM). Nine teeth extracted for clinical reasons were collected and divided into three groups: intact teeth, enamel wear, and cementoenamel-junction (CEJ) exposure. Samples were immersed in solutions of methadone and DXM with and without sugar, and in acidified saliva to simulate the oral cavity of a subject addicted to chronic drug abuse. Teeth were separated into enamel, dentin, and pulp, and analyzed by a liquid-liquid extraction (LLE) technique and liquid chromatography coupled to mass spectrometry (LC-MS/MS).

Results and Discussion Preliminary results show that methadone and DXM can contaminate dental enamel, dentin, and pulp in high concentrations, regardless of the health status of teeth. The most influential factors on the enamel permeability are the acidity of solutions (pH 4.5) and the presence of sugar. Dental enamel and dentin could be applied as matrices for PM investigations of chronic abuse. Still, the pulp could be contaminated and not relate to the amount of substance circulating in the peripheral blood during the acute phase of intoxication.

Title: Artificial Intelligence - assisted combination of skeletal and dental methods for age estimation in subadults

Bianchi I.[1], Oliva G. [2], Vitale G. [1], Pradella F.[1], Focardi M.[3], Pinchi V.[1]

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2. University of Naples Federico II, Department of Neuroscience, Reproductive Sciences and Oral Sciences, Section of Orthodontics, Naples, Italy.
3. Forensic Medical Sciences, Department of Health Sciences, University of Florence, Florence, Italy.

Abstract:

Background

International literature and guidelines recommend combining dental and skeletal maturation assessments to estimate the biological age of subadults. However, few studies have compared the accuracy of these methods within the same sample or integrated them into a unified predictive model. Recent research indicates that artificial intelligence (AI), particularly machine learning models such as decision trees and TabNet, may improve predictive performance. This study assesses the effectiveness of AI in integrating dental and skeletal indicators to enhance age estimation accuracy.

Materials and Methods

A total of 456 subjects (230 males, 226 females; aged 6–20 years) with orthopantomograms (OPGs) and hand-wrist radiographs taken on the same day were analyzed. Dental and skeletal age were estimated using Demirjian 7-teeth (D-7), Demirjian 8-teeth (D-8), Willems (W), Tanner-Whitehouse 3 RUS (TW3), and Greulich & Pyle (GP) methods. Random Forest and Boosted models were trained on 70% of the dataset and tested on the remaining 30%. A second analysis used maturation stages from D, D-8, and TW3 to train Random Forest, Boosted, and TabNet models for optimized performance across age groups.

Results and Discussion

Skeletal methods were more accurate in predicting age up to 14 years, followed by D-7, Willems, and D-8. The Boosted model outperformed Random Forest and all original methods, achieving a mean prediction interval of ±1.45 years (95% CI) and ±1.26 years (90% CI). AI-based integration of multiple age estimates based on dental and skeletal methods improved the overall accuracy and reliability. Phase II is ongoing, with preliminary results forthcoming.

Title: Cyberbullying victims presenting to the Emergency Department: diagnostic challenges and medico-legal considerations

Bianchi I.[1], Gori V. [2], Lombardi G. [3], Defraia B. [4], Nanni L. [5], Losi S. [6], Gualco B. [2], Focardi M. [2], Pinchi V. [1]

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4. Forensic Pathology Unit, AOU Careggi, Florence, Italy.
5. Pediatric Emergency Unit, Department of Intensive Care and Emergency, Meyer Children's Hospital IRCCS, Florence, Italy.
6. Responsible GAIA Service, Meyer Children's Hospital IRCCS, Florence, Italy.

Abstract:

Introduction

Bullying is characterized by a series of intentional, aggressive acts repeated over time, highlighting a "power imbalance" between perpetrators and victims. Cyberbullying, the digital evolution of traditional bullying, exploits various online platforms, under conditions of anonymity, to intrude upon victims' private lives and enable the uncontrolled dissemination of information or videos without consent. International studies (HBSC 2017/18-ed.1.0; ISRD-3-2021; HBSC-Italy-2022) report a growing incidence of this phenomenon among adolescents. The anonymous and remote nature of cyberbullying contributes significantly to its underreporting.

Materials and Methods

A retrospective study was conducted at Meyer Children's University Hospital (IRCCS), analyzing suspected cyberbullying cases in minors over the age of 10 managed by the GAIA service—a multidisciplinary team focused on child protection—between 2010 and 2022. Among 416 minors assessed, 25 cases involved suspected bullying, three of which were identified as cyberbullying, with an average age of 15 years (two females, one male). Two emergency department visits were due to anxiety and panic attacks following digital assaults

by anonymous individuals. The third case involved eating disorders and self-harming behaviors linked to school-related cyberbullying.

Discussion

Diagnosing victims of cyberbullying is complex due to its indirect nature and the non-specific symptoms (e.g., somatization, anxiety, self-injury). The GAIA protocol ensured proper management, emphasizing the central role of forensic medicine and psychiatry in both legal reporting and compliance with new legislation (Law No. 70/2024). The case series complements ISRD-2 (2015) and ISRD-3 (2021) self-report survey data, supporting efforts to train healthcare professionals in early detection and victim support.

Title: **The approval of the Tuscany region's law on physician-assisted suicide**

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Abstract

Introduction: The absence of national legislation on access to physician-assisted suicide (PAS) has led to significant behavioral uncertainty. To fill this legal gap, in February 2025, the Tuscany region passed a regional law, translating into legislative action the guidance provided by two rulings of the Constitutional Court.

Materials and Methods: We analysed other European countries' legislations, as much as Italian Constitutional Court rulings No. 242/2019 and No. 135/2024, in combination with the previous regional adaptation attempts (Emilia-Romagna's resolution, Veneto's draft law), finally focusing on Tuscany's law.

Results: Our analysis highlights the heterogeneity of PAS regulations across Europe. Some countries—such as Belgium, Luxembourg, Switzerland, Spain, and Austria—have legalized forms of euthanasia or PAS through structured legal frameworks. Others—such as France, the UK and the Czech Republic—have severely restricted these practices. Ireland and Germany are currently undergoing legislative transitions. In Italy, the only existing regulation is Tuscany's law.

Discussion: The Constitutional Court deemed Article 580 of the Penal Code unconstitutional in the section where is not excluded punishment for assisted suicide under certain conditions. With no national legislative action, regions like Tuscany have acted. Tuscany's citizen-driven law differentiates PAS from euthanasia, defines the care process, involved professionals, traceability, ethical oversight and consent validation. The service is free with extra regional funds. Ethically, it raises issues of self-determination and the line between dying with dignity and therapeutic obstinacy. Notably, the law avoids addressing conscientious objection directly, stating only that participation is voluntary, in a "Tartuffian" way, leaving interpretation open.

Title: Alcohol, tobacco and substances use: an anonymous questionnaire for new mothers

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Introduction. The use of psychoactive substances in childbearing age and during pregnancy is a crucial issue of multidisciplinary interest, due to the possible negative consequences for women's and children's health. Epidemiological data in this subgroup are scarce also due to the lack of shared and validated screening tools, with the consequent risk of underestimating the phenomenon. In this context, this study aims to develop and test a questionnaire on alcohol, tobacco and drug use and to collect information for prevention and health planning.

Methods. A completely anonymous questionnaire consisting of fifteen multiple-choice questions concerning the use of alcohol, tobacco and substances was designed. The questionnaire was distributed to new mothers admitted to the Obstetrics-Gynaecology Unit of the Padova University-Hospital over six months in 2024.

Results. 350 questionnaires were distributed, 192 were completed. A total of 169 women (88%) reported drinking alcohol, 19 (9.9%) reported smoking tobacco. Over the lifetime, 51 women (26.6%) used cannabis, 6 (3.1%) cocaine. Most of women agreed introducing a specific questionnaire and receiving information material.

Discussion. The broader distribution of this questionnaire could help to estimate the extent of children at risk of being exposed to psychoactive substances during pregnancy and/or in the family environment and promote maternal awareness. The results suggest the importance of investing in information campaigns and providing women with comprehensive information on the effects of alcohol and other substances on children's health with a view to prevention.

Title: Medically assisted suicide in Italy through operative difficulties and open issues: comparison of regional models.

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Abstract

Introduction

In Italy medically assisted suicide (MAS) has been subject of judicial intervention by the Constitutional Court, through rulings no. 242/2019 and no. 135/2024, which conditioned the non-punishment of assistance in suicide on presence of specific requirements, including dependence on life-sustaining treatments (LST) or, alternatively, the refusal of such treatments when indicated. Assessment of these requirements and the definition of procedures are delegated to multidisciplinary commissions of the National Health Service (NHS). Lacking national legislation has conduct regions to adopt own regulatory procedures: currently, Tuscany is the only region with a specific law (Regional Law no. 16/2025), while Emilia-Romagna and Puglia rely on procedures approved by regional governments.

Materials and Methods

Authors analyzed cases of MAS requests performed to date in Italy. Furthermore, Tuscany Regional Law and guidelines of Emilia-Romagna and Puglia were examined to assess the state of art and to highlight similarities or differences between the various models and the open issues.

Results and Discussion

Currently, six people performed MAS in Italy. The analysis highlighted significant differences, attributable to the interpretative difficulties concerning the LST requirement - due to the lack of a medical-scientific consensus on its definition - and to numerous unresolved procedural and executive issues. Among these, the identification of the lethal drug, the availability of appropriate equipment for self-administration based on the patient's disability and clinical conditions, the performing of the procedure at the location chosen by the patient and the identification of voluntary healthcare personnel for procedural assistance.

Title: **Microbiological Reporting Times and Healthcare Liability: a Critical Issue in the Management of Healthcare-Associated Infections**

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Abstract:

The aim of this study is to analyze the role of microbiological reporting times in the management of healthcare-associated infections (HAIs) and to assess their clinical and medico-legal impact. These infections are among the most significant complications of healthcare, affecting approximately 7% of hospital admissions and causing considerable morbidity, mortality and costs. Rapid microbiological reporting is essential for the prompt initiation of targeted therapy: recent advances, such as liquid-phase microbiology and automated systems, now enable preliminary results and definitive reports in much shorter times compared to traditional methods. Delays in reporting can worsen clinical outcomes and increase the likelihood of adverse events. From a medico-legal perspective, such delays are relevant in assessing healthcare facility liability, particularly in light of recent case law that considers organizational standards and actual commitment to infection prevention and control as benchmarks for determining negligence. Nationally, there are currently no uniform regulations on microbiological reporting times, but some regions, such as Lombardy, have established organizational standards and maximum reporting times to ensure consistency and quality in laboratory services. These standards also serve as benchmarks for evaluating organizational appropriateness in cases of hospital-acquired infections. Failure to comply can constitute a significant liability factor in cases of clinical deterioration or loss of therapeutic opportunities. We assess the importance of integration among clinical medicine, microbiology and forensic medicine in managing HAIs to prevent clinical and legal risk and encourage a national standardization, as a key parameter for the management of healthcare liability in HAIs.

Title: **Forensic age estimation via combined analysis of medial clavicular epiphysis ossification and clavicle length on conventional radiography**

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3 University of Salento. Department of Experimental Medicine. Vito Fazzi" Hospital of Lecce.

Abstract:

Introduction: Accurate forensic age estimation is essential yet lacks a "gold standard" method. Medial clavicular epiphysis (MCE) assessment is useful around the 18-year legal majority threshold, but the limitations of using MCE staging alone, especially in medico-legal contexts, must be recognized. The correlation between clavicle length and age has been underexplored for forensic purposes. This study investigates a combined approach using MCE stage and clavicle length on conventional radiography (RX).

Materials and Methods: A retrospective analysis was performed on 743 PA chest RX (Italian population, 10-30 years). After exclusion due to fractures or obscuring superimposition, 666 radiographs (449 M, 217 F) were analysed. Two blinded operators assessed MCE stage and measured clavicle length. A combined multiple linear regression model estimated chronological age using MCE stage, clavicle length, and sex as predictors. The model was evaluated using R^2, RMSE, CCC, AIC/BIC, and classification metrics relative to the 18-year threshold.

Results: Inter-rater reliability was high (κ=0.92, ICC=0.963). Superimposition precluded MCE assessment in 7.81% of initial cases. The combined model demonstrated strong overall performance: good age prediction (R^2=68.5%, RMSE=3.20 years, CCC=0.813), good statistical fit (low AIC/BIC), and high accuracy in discriminating minors from adults (OA=87.2%), achieving a good balance between Sensitivity (91.4%) and Specificity (80.1%).

Discussion: The combined approach using multivariate regression on conventional RX proved reliable and accurate. This method demonstrated high overall accuracy in minor/adult discrimination, mitigating the low sensitivity inherent in the traditional Stage 4 cutoff by providing a quantitative age estimate. However, further studies on larger and diverse samples are necessary to confirm these findings.

Title: **“Abusive Head Trauma” (AHT) in children: case analysis from Meyer Children’s Hospital in Florence**

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Abstract:

Shaken Baby Syndrome” (SBS) or more recently ‘Abusive Head Trauma’ (AHT) refers to a severe form of child abuse, representing an important cause of mortality and disability in the pediatric age. Diagnosis is often difficult not only because of the age of the child who cannot report the facts of the case, but because caregivers often do not report the true dynamics of the event and there are usually no external manifestations of trauma.Ten cases of AHT were selected from the cases of suspected child abuse (183), between 0 and 3 years, that from 2010 to 2022 accessed the IRCCS Meyer in Florence and were taken in charge by the GAIA service, a multidisciplinary team of specialists dedicated to the protection of children's rights.The AHT’s cases all aged one year or less, some of whom were victims of other forms of physical abuse or neglect. The male sex was affected in equal proportion than the female sex (5 vs. 5); 6 children were foreign and 4 were Italian. The abuser was often a parent (in 4 cases both parents), in 3 cases the babysitter. Time of access to the IRCCS Meyer occurred within 24-36 h from the reported onset of the symptoms. All children were hospitalized.

Several reviews on the topic are reported in the Literature, however, there is still a lack of unambiguous classification regarding the diagnostic framing of AHT in order to avoid underdiagnosing the problem or mistakenly reporting as abuse an accidental event.

Title: **Voluntary tubal sterilization: analysis of the legitimacy criteria for access to the procedure in a population study**

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Abstract: Voluntary tubal sterilization is the most widespread contraceptive method in the world but has not specific law regulating the access to this procedure in Italy. The doctors or healthcare facility must choose the legitimacy criteria for the preliminary assessment of the requesting women, to minimize the risk of regret after the procedure. Without a specific legislation, these criteria cannot be used to deny access to sterilization but only as elements which deserve a greater support in the decision-making process. Medico-legal specialist guarantees the validity of the decision-making process after an exhaustive information. This observational study analysed data (nationality and legitimacy criteria) from 215 medico-legal consultations requested by gynaecologists for informed consent acquisition to access to tubal sterilization. The legitimacy criteria were selected according to the main risk factors for regret after sterilization: age ≥35 years, living children ≥2, caesarean section (previous or planned) ≥1, gestational complications (previous or ongoing), comorbidities and absolute contraindications to other contraceptive methods. The aim of the study was to evaluate a statistically significant difference between the two groups of women (Italian or not) in satisfying these criteria. A significant difference was found in satisfying the age criteria, less frequent in non-italian women. A significantly higher probability of resorting to tubal sterilization at age <35 years in non-Italian women, was found. This study can contribute to the issue of identifying uniformly valid criteria reliable also at an international level, with implications both on the risk of resorting to sterilization and on medical-legal litigation.

Title: Sudden, Unexpected Death due to Tuberculosis: The Role of Autopsy and Cardiac/Pulmonary Histopathology in Forensic Investigation

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ABSTRACT

Background:

Sudden unexpected death (SUD) poses a diagnostic challenge, particularly when underlying pathology is clinically silent. Tuberculosis (TB), particularly in extrapulmonary or disseminated forms, can cause fatal events revealed only post-mortem. This study presents two forensic autopsy cases of young immigrants who died suddenly due to advanced TB-related complications.

Methods:

Two male individuals (aged 24 and 29) underwent complete medico-legal autopsy, including gross examination, histological analysis (Hematoxylin-Eosin and Ziehl-Neelsen staining), and toxicological screening. Focus was placed on thoracic and abdominal organs, with pulmonary and cardiac histology analyzed and microbiological confirmation of *Mycobacterium tuberculosis* infection. Epidemiological surveillance of close contacts was conducted.

Results:

Case 1 involved sudden death following massive hemoptysis, with autopsy revealing bilateral pulmonary tuberculomas, caseous necrosis, and bronchial artery erosion, suggesting Rasmussen aneurysm rupture. Histology confirmed granulomatous inflammation and acid-fast bacilli.

Case 2 involved unwitnessed death with gastrointestinal bleeding. Autopsy revealed complete pulmonary parenchymal replacement by necrotic tuberculous nodules, septic cardiomyopathy,

and intestinal necrosis. The most likely cause was acute mesenteric ischemia due to TB-induced sepsis. Ziehl-Neelsen staining confirmed TB in the lungs, but intestinal involvement was inconclusive due to autolysis.

Conclusions:

These cases emphasize the importance of autopsy in determining the cause of TB-related SUD, particularly in the absence of clinical diagnosis. Histopathological evaluation is crucial, especially in hemoptysis or sepsis-related deaths. TB should be considered in sudden deaths in high-risk populations, such as recent immigrants, and post-mortem diagnosis aids in epidemiological interventions.

Title: **Diagnosis of 68 fatal intoxication deaths: demographic and toxicological profiles**

Lavenia A.[1], Palazzoli F.[1], Filippini T.[2,3], Balduini S.[1], Attanasi A.[1], Verri P.[1], Vandelli D.[1], Castagnetti V.[1], Fabris A.[1], Cecchi R. [1], Vinceti M.[2,4], Santunione A.L.[1]

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Abstract:

Introduction:

Despite progress in the development of analytical methods, the challenges in forensic toxicology analysis remain persistent, since it is not simple to establish a causal link between compound concentration in biological samples and its impact on real cases. A proper interpretation of toxicological results is required to assess their relevance for the identification of the causes of death. In the present work, we focus our attention on the role of the toxicological findings in different fluids and tissues for the diagnosis of acute intoxication.

Materials and methods:

The licit and illicit drug-related intoxication deaths of the Institute of Legal Medicine of the University of Modena and Reggio Emilia, from 2017 to 2022, were investigated. All data relative to demographics, death scene investigation, autopsy findings, histological examination, toxicological findings in several matrices, and manner of death were collected. A statistical analysis has been carried out.

Results and discussion:

68 deaths for acute intoxication were detected on a total of 504 (13.5%): males (M) 72.1% (median age 45.2 years), females (F) 29.9% (median age 60.2 years). 54 cases were classified as accidental deaths (41M, 13F) versus 14 suicides (8M, 6F). The most frequently classes of substances causative of acute intoxication death were illicit drugs, followed by benzodiazepines and alcohol. The study provides information on the quantitative distribution of xenobiotics in different districts. The combined assessment of these values strengthens the

toxicological data as scientific evidence. Knowledge of the distribution of substances in biological matrices, even non-traditional ones, makes it possible to assess their role in the cause of death.

Title: **Road accidents and gender differences: the role of psychoactive substances and attention disorders**

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Abstract:

Introduction

Psychoactive substance use and attention deficits are key risk factors for road-traffic accidents. Prior studies have shown gender differences in both substance use patterns and accident risk. This study aims to: analyze gender differences in individuals with a prior driving under the influence episode (DUI); identify factors associated with accident involvement; and develop gender-specific logistic regression models to predict accident risk.

Materials and Methods

This observational study included individuals sanctioned for a DUI episode, recruited from October 2022 to September 2023. Sociodemographic, clinical, toxicological, and circumstantial data were collected. Participants completed the CPT-3, a neuropsychological test evaluating attention. Statistical analyses included chi-square, t-test, Mann-Whitney and binary logistic regressions, with accident involvement as the dependent variable. Predictive performance was evaluated using ROC-AUC.

Results

A total of 167 individuals were included (137 males, 30 females). Significant gender differences emerged in smoking ($p=0.029$), BMI ($p=0.002$), and CPT-3 parameters "perseverations" ($p<0.001$) and "vigilance" ($p=0.042$). In males, accident involvement was associated with benzodiazepine positivity, older age at violation, family history of substance use, and blood alcohol level (BAC). In females, it was associated with inattention and BAC. Predictive models were significant: AUC =0.644 ($p=0.010$) for males, AUC =0.844 ($p=0.00033$) for females.

Discussion

The study confirmed the existence of gender differences among individuals with prior DUI or drug-related violations. Alcohol, psychoactive substances and attentional impairments were

confirmed as key contributors to accident risk. Predictive factors and regression models differed between sexes, supporting the relevance of a sex-based approach in the assessment of fitness to drive.

Title: Artificial Intelligence and Forensic Medicine: A Comparative Assessment of Biological Damage in the INAIL Context

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Abstract

Introduction: The quantification of biological damage for occupational diseases within the INAIL framework is a complex medico-legal task, often subject to inter- and intra-individual variability. This study presents a proof of concept aimed at exploring the integration of Artificial Intelligence (AI) in the evaluation of work-related biological damage, through a comparison with traditional medico-legal assessment applied to two high-incidence anatomical districts: the shoulder and the lumbar spine.

Materials and Methods: A retrospective analysis was conducted on 200 cases, including 100 shoulder and 100 lumbar spine conditions, all recognized by INAIL as occupational diseases. Each case underwent two evaluations: a traditional medico-legal assessment based on Legislative Decree 38/2000, and an automated AI-based evaluation using large language models (LLMs) trained on structured clinical, instrumental and anamnestic data. For shoulder cases, a proportional scoring system was implemented to break down joint movements. Statistical analysis included the Wilcoxon signed-rank test, Spearman's correlation coefficient, and Bland-Altman plots.

Results and Discussion: In shoulder cases, the mean physician-assigned score was 5.47 (median 6; SD 2.23), while the AI-generated score was 5.48 (median 5; SD 2.29). The Wilcoxon test showed a p-value of 0.8916. Spearman's correlation was 0.44. The Bland-Altman analysis revealed a mean difference of -0.01 with limits of agreement from -4.90 to+4.88. AI demonstrated higher accuracy in shoulder evaluations but tended to underestimate damage in complex, multi-comorbidity cases. AI proved to be a promising support tool for standardizing and accelerating assessments, though clinical judgment remains essential. Conclusions: This proof of concept supports the potential future integration of AI-assisted hybrid models in occupational medico-legal evaluations, promoting innovation and consistency in the field.

Title: Comparative analysis of the main and most recent tools for the estimation of biological damage between 10 and 100 points of Permanent impairment

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Abstract:

Introduction: personal injury assessment guidelines provide standardized criteria for evaluating permanent impairment and determining compensation. In Italy, Three key frameworks govern this process: 1) "Tabella delle menomazioni" of Ministry Decree (D.M.) n.12/7/2000 (INAIL); 2) "Tabella delle menomazioni alla integrità psico-fisica comprese tra 1 e 9 punti di invalidità" (D.M. 3/7/2003); 3) "Tabella delle buone pratiche cliniche di valutazione medico legale delle menomazioni alla integrità psicofisica comprese tra 10 e 100 punti di invalidità permanente" (RBPCA) published by Società Italiana di Medicina Legale e delle Assicurazioni (SIMLA) on "Istituto Superiore di Sanità" website. The RBPCA is flanked by SIMLA's "*Linee Guida per la valutazione del danno alla persona in ambito civilistico"* (LG).

Since these guidelines coexist, the same injury may be assigned different impairment values depending on the framework used, leading to significant economic implications especially for macro-permanent disabilities (10-100% impairment).

Materials and Methods: a comparative analysis was conducted among the guidelines assessing macro-permanent impairment, examining structure, entry count, detail level, and assigned disability percentages.

Results: LG and RBPCA feature extensive medico-legal semeiotics sections, followed by systematic categorization by anatomical systems. In contrast, INAIL lists entries without system-based classification and includes appendices for specific impairments. LG is the most detailed, with 697 entries, compared to INAIL (281) and RBPCA (243). However, impairment valuations vary considerably across guidelines, undermining consistency.

Discussion: harmonization is crucial to ensure reliable, reproducible injury assessments while respecting each framework's legal and clinical context. Standardization would improve fairness in compensation and reduce litigation risks stemming from valuation inconsistencies.

Title: Administrative-accounting liability in the Health Sector before the Court of Auditors: increasing cases of medical malpractice.

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3. State Police, Ministry of the Interior

Abstract

Introduction: Damage to the public purse caused by medical malpractice is the leading expression of administrative-accounting liability in healthcare. Judgment 2/25 of 17 January 2025 of the Court of Audit, Piedmont Section, clarified the subjective elements, causal tests and monetary ceilings of the recourse action under Art. 9 Law 24/2017 and Law 20/1994, offering firm interpretive guidance.

Materials and methods: We performed a jurisprudential review of this ruling, 46 regional audit decisions issued in 2023-2025 and the relevant statutes. A quali-quantitative analysis recorded medico-legal variables (type of conduct, causal link, claims settled out of court). We also examined audit-court questions on gross negligence and compared malpractice reports with other fiscal-loss cases.

Results: Gro**ss** negligence is defined as an inexcusable breach of clinical guidelines or good practice, assessed prospectively (ex-ante). Causation is reconstructed using adequate-causation and "more-likely-than-not" standards, confining liability to foreseeable outcomes. A single-expert opinion suffices because Art. 15 Law 24/2017 does not apply to audit procedure. Recourse is capped at three times the practitioner's annual salary. Conduct predating 2017 remains governed by prior law, the Court confirming the non-retroactivity of the Gelli-Bianco reform.

Discussion: The ruling consolidates a selective liability model that shields clinical discretion while safeguarding public finances. The gross-negligence threshold, ex-ante test and recourse cap curb defensive medicine yet require traceable decisions and guideline adherence.

Conclusions: Insurance for healthcare entities and professionals, with residual support from the Healthcare Liability Guarantee Fund, should neutralise fiscal risk and foster a sustainable balance between economic accountability and care quality.

Title: **Ethyl glucuronide (EtG) in the post-mortem hair matrix as a risk marker in road, railway, and work accidents: a pilot study**

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Abstract:

The correlation between chronic alcohol abuse and the risk of road, railway, and occupational accidents remains underexplored in scientific literature. Yet, identifying reliable biomarkers linking chronic alcohol consumption with increased accident risk is crucial for both forensic analysis and preventive strategies. Ethylglucuronide (EtG) is a highly sensitive marker of chronic alcohol use (≥60 g/day) when detected in hair matrices. Compared to carbohydrate-deficient transferrin (CDT), which has shown moderate correlation with blood alcohol levels at the time of road accidents[1,2], EtG offers greater diagnostic sensitivity and a longer detection window (3–6 months vs. 2–3 weeks), making it preferable for assessing long-term alcohol intake. This pilot study aimed to evaluate the correlation between EtG levels in post-mortem hair samples (scalp, thoracic, or axillary) and blood alcohol concentration at the time of death in 27 individuals who died from road (N=18), railway (N=5), or occupational (N=4) accidents. A four-step pre-analytical decontamination protocol was applied to avoid false positives due to peri- or post-mortem contamination. EtG was detected (>LOQ = 6.7 pg/mg) in 14 cases (52%): 7 with values between 7–30 pg/mg and 7 above 30 pg/mg, indicating chronic alcohol consumption. One case showed EtG only in scalp hair, suggesting contamination, supported by its presence in the first decontamination wash and in blood. Blood alcohol concentration was positive (>0.17 g/L) in 59% of all cases and in 11 of the 14 EtG-positive subjects. These findings support EtG as a valuable biomarker for identifying individuals at increased risk of alcohol-related fatal accidents.

Title: Counselling and support for citizens and training for health professionals on the subject of Advance Treatment Arrangements: the experience of the Reggio Emilia AUSL-IRCCS CHOICE Desk

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Introduzione

La legge 219/2017 ha introdotto nel nostro ordinamento le Disposizioni Anticipate di Trattamento (DAT) e la Pianificazione Condivisa delle Cure (PCC). Le DAT sono un documento con cui una persona maggiorenne e capace di intendere e di volere può esprimere le proprie volontà (consenso o rifiuto) rispetto ad accertamenti e trattamenti sanitari che possono rendersi necessari in futuro in caso di incapacità ad autodeterminarsi. Il 4.5.2021 l'AUSL-IRCCS di Reggio Emilia ha istituito, come servizio sperimentale oggetto di un progetto di ricerca, lo Sportello SCEGLIERE, acronimo di *Servizio di Consulenza Etica, Guida agli aspetti Legali, Informazione E aiuto alla REdazione delle DAT*. Il Servizio (costituito da medici legali, bioeticisti, medici palliativisti, infermieri e ricercatori) fornisce consulenza e supporto ai cittadini nella redazione delle proprie DAT tramite un colloquio personalizzato, attività di divulgazione rivolte alla cittadinanza tramite associazioni sul territorio ed Enti del terzo settore, attività di formazione rivolta ai professionisti sui temi del fine-vita, DAT, PCC e consenso informato e supporto ai professionisti aziendali nella redazione delle PCC.

Materiali e metodi

Sono stati valutati retrospettivamente i dati dell'attività svolta dal Servizio dal 4.5.2021 al 31.12.2024 relativi alle consulenze allo sportello, alla formazione dei professionisti e agli eventi divulgativi alla cittadinanza. Sono state valutate il numero e le adesioni agli eventi

divulgativi alla cittadinanza e della formazione ai professionisti, con riferimento alla tipologia dei partecipanti.

Risultati e discussione

Nel periodo analizzato sono state offerte 258 consulenze dagli sportelli DAT (86% con colloquio in presenza) distribuiti sui vari Distretti, con un notevole incremento nel 2024 (119 casi, +152% rispetto al 2023), a seguito degli eventi divulgativi svolti. Sono stati svolti 19 eventi rivolti alla cittadinanza e 17 incontri di formazione ai professionisti, con la partecipazione di oltre 500 professionisti.

I dati raccolti hanno consentito di riscontrare un elevato livello di gradimento della cittadinanza e degli operatori sanitari ed una ricaduta positiva in termini di maggior consapevolezza sul tema del fine-vita, dell'autodeterminazione e sui diritti garantiti dalla L. 219/2017.Alla luce dei risultati ottenuti, SCEGLIERE è stato formalizzato come servizio aziendale afferente al Servizio di medicina Legale e Bioetica dell'Azienda.

Title: The healthcare responsibility of the Hospital in the management of waiting lists: case study of the AUSL-IRCCS of Reggio Emilia.

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1 Legal Medicine and Bioethics - Azienda USL-IRCCS of Reggio Emilia

Abstract

Introduction:

The SARS-CoV-2 pandemic led to the suspension of non-urgent healthcare services, with repercussions that extended well beyond the emergency phase. The recovery of deferred healthcare activities was significantly hindered by the ongoing shortage of structural, organizational, and healthcare personnel resources. In the post-pandemic period, there was no adequate reinforcement of medical staff; on the contrary, in many regions, the pre-existing shortage of healthcare professionals worsened, further contributing to prolonged waiting times for diagnostic and surgical services. The recent conversion law of the waiting list decree (178/2024) introduced important changes to address the problem.

This scenario suggests a potential rise in healthcare-related claims due to delays in providing diagnostic/therapeutic services, with consequences on worsening of pre-existing conditions, temporary disability, loss of chances damage. Therefore, it is crucial to reflect on medico-legal implications that may arise.

Materials and Methods:

We analysed the claims database of the AUSL-IRCCS of Reggio Emilia over the past five years, focusing on requests related to the failure to deliver services within the timing based on priority levels. Additionally, relevant jurisprudence on the matter was reviewed.

Results and Conclusions:

Four claims were identified as relevant to the study. Their preliminary evaluation led to varying interpretations, highlighting the complex legal and medico-legal nature of such cases. The jurisprudence is still limited and unsettled, given the recent escalation of this phenomenon. This work aims to stimulate a medico-legal discussion regarding the liability of healthcare facilities for delayed provision of healthcare services, and the role of Operations Management in defining guidelines for managing future disputes.

Title: **Medical Malpractice Litigation in Pediatrics: Case Analysis from the Meyer University Hospital I.R.C.C.S.**

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Abstract

Introduction: The analysis of the case history of medico-legal litigation in a hospital structure is essential to identify any critical issues in the care pathways provided, allowing for the implementation of appropriate corrective actions.
The study of the experience of the AOU Meyer IRCCS allows us to evaluate how the phenomenon of disputes has declined in a highly specialised structure, dedicated to a specific category of patients, the paediatric one, and endowed with skills of excellence, which have made it first a third level centre and now a recognized IRCCS.

Materials and Methods:The study sample includes 158 claims submitted to AOU Meyer IRCCS between January 1, 2010, and December 31, 2023.
In this retrospective observational analysis, the variables examined included:

· age, sex, mode of access, hospitalization type, relevant medical specialty, and outcomes according to the International Classification of Patient Safety;

· content of the compensation claim, identified critical issues, outcome of the medico-legal evaluation, types of damages claimed, and their extent.

Results:

Descriptive and inferential statistical analysis was used to assess the trend of the phenomenon and to identify specific deficiencies within the facility or its departments.
In most cases, the patients were affected by rare, both congenital and non-congenital, diseases. Invasive procedures and surgical interventions were the main causes of claims, often

associated with higher rates of mortality and severe injuries.
The most frequent errors involved diagnostic mistakes and therapeutic errors.

Discussion:

The data highlight the efficiency of the Risk Management Unit and the relatively low claim rate, which suggests a high level of care safety.
The high number of rejected claims indicates a trend toward speculative or exploratory compensation requests.
Claim handling times emerged as a critical issue; thus, it may be appropriate to consider internalizing the Risk Management Unit functions, which are currently outsourced, in order to allow for a faster investigative process.
Finally, the low incidence of disputes regarding informed consent and patient information suggests the effectiveness of the communication strategies implemented by professionals at AOU Meyer IRCCS.
In pediatrics, the paternalistic attitude of healthcare providers is a well-known issue; therefore, the finding of such effective communication practices prompts further exploration of how the communicative approach used may adequately address the challenges posed by paternalism.

Title: The Reporting of Clinical Adverse Events Scale (I-RoCAES): validation and psychometric characteristics of the Italian version

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Abstract:

Objectives: Adverse event (AE) reporting is crucial to ensure patient safety and prevent future incidents, yet AEs are often underreported. Exploring healthcare professionals' attitudes toward AE reporting is essential for addressing this gap. This study aimed to translate and validate the Italian version of the Reporting of Clinical Adverse Events Scale (RoCAES), originally developed in 2008, and assess its reliability and applicability in the Italian healthcare system.

Methods: We developed the Italian RoCAES (I-RoCAES) through translation back-translation. Healthcare professionals were given an electronic scale version created using Google Forms for anonymous data collection between October 2021 and October 2023. Confirmatory Factor Analysis (CFA) was conducted to evaluate the original scale's factor structure, followed by Exploratory Factor Analysis (EFA) to refine the model. Internal consistency (Cronbach's alpha and Guttmann coefficient) and CFA results for the I-RoCAES were also analyzed.

Results: The study sample consisted of 778 healthcare professionals, including physicians, nurses, and nursing students, aged 44.2 years (SD = 15.4) on average. 51.9% had been involved in AEs, but only 33.7% reported it. The data we retrieved from Italian healthcare professionals did not fit well during confirmatory factor analysis, which led to an EFA identifying a four-factor solution that accounts for 41.1% of the variance. The I-RoCAES showed good internal consistency (Cronbach's alpha = 0.80; Guttmann coefficient = 0.77.) and improved CFA fit indices.

Conclusions: Due to its good psychometric properties, the I-RoCAES can be utilized to study and promote AE reporting among Italian healthcare professionals.

Title: **Per- and Polyfluoroalkyl Substances (PFAS) in Maternal Blood: An Italian Multicenter Observational Study**

Sech M.[1], Fais P. [1], Lenzi J. [1], Rossi F. [1], Mohamed S. [1], Fornasari A. [1], Benkhalqui A. [1], Garagnani M. [1], Vaiano F. [1], Morini L. [2], Pascali J. [1]

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2. Department of Legal Medicine and Forensic Sciences, University of Pavia, Italy

Abstract

This study is part of a national research project titled "Early Life Exposure to per- and polyfluoroalkyl substaNces (PFAS) and heAlth risks – ELENA" PRIN-PNRR (Prot. P20223ZH85). The objectives of this study are: 1) to investigate the presence of PFAS in blood samples from women giving birth in the metropolitan areas of Bologna and Florence; 2) to associate the presence of PFAS in maternal blood with lifestyle factors; and 3) to associate the presence of PFAS with maternal-fetal diseases. A total of 84 women were enrolled in the study between November 2023 and March 2024. Participants completed a questionnaire on lifestyle, living environment, and any pre-existing or pregnancy-related medical conditions, and subsequently donated a blood sample. PFAS detection was performed by using LC-HRAMS. The most frequently detected molecules were PFOA, PFOS, PFNA, PFHxS, PFBS, 6:2 FTS, PFHpS, PFHpA, PFHxA, and PFUnA. However, a different occurrence in PFAS was observed between the metropolitan areas. PFAS concentrations were compared to literature-proposed thresholds associated with health risks: 67% of subjects had PFAS concentrations below 2 ng/mL (low risk), while 33% had concentrations between 2 and 20 ng/mL, indicative of moderate/potential health risk. Consumption of fish more than twice per week was associated with higher PFAS levels (2–20 ng/mL). The most commonly observed pregnancy-related conditions were hypothyroidism (16%), gestational diabetes (13%), and hypertensive disorders (5%). However, no statistically significant association emerged between PFAS presence (qualitative or quantitative) and these conditions. Chemically, 98.7% of the detected molecules contained C>5, confirming a greater predisposition to bioaccumulation.

Title: **Medico-legal information left behind in emergency department imaging reports**

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Abstract:

Introduction: Medico-legal investigations frequently rely on medical documentation, including imaging reports made for diagnostic purposes in emergency settings, which may overlook medico-legal findings. Consequently, the accuracy and completeness of reports represent a limiting factor in ex-post medico-legal evaluations. However, imaging can be reassessed to retrieve potentially relevant forensic information, such as soft tissue lesions, which provide reproducible insights into trauma type, means compatibility, and event dynamics. CT scans, in particular, allow for deeper investigations using 3D reconstruction software and 3D printer for courtroom presentations.

Materials and Methods: To test the hypothesis that forensic information may be lost in imaging interpretation, we retrospectively evaluated 123 head CT scans and relative reports, conducted in December 2024 at the Emergency Department of the University Hospital of Cagliari, ensuring patients anonymity. An additional dataset of 28 scans with clinical indications suggesting possible forensic relevance (e.g., assault) was also analyzed. A senior radiologist reevaluated each scan, focusing on intra/extra-axial lesions, midline shift, bone fractures, and soft tissue injuries, classified by anatomical location. Data were evaluated with univariate statistical analysis.

Results: A full agreement was seen on major findings such as intracranial bleeding and fractures. A significant discrepancy in soft tissue lesions was instead detected across all the parameters. Results were superposable in the subgroup with a clinical indication directly suggestive for forensic implications.

Discussion: Results support that reevaluation of clinical indicated imaging may add significant insights in medico-legal investigations which effects may be of major help in the criminal law system.

Title: **Retrospective Analysis of Psychoactive Substance and Alcohol Use in Suicide Cases: The Contribution of Hair Matrix to Risk Profile Identification**

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Abstract:

Suicide is a major global public health concern, accounting for over 800,000 deaths annually according to the 2024 WHO report. In Italy, approximately 4,000 suicides occur each year, with a marked male predominance (78.8%). Evidence suggests a possible association between psychoactive substance use and suicidal behavior, highlighting the need for a deeper understanding of substance use patterns preceding the suicidal event.

The study, approved by the Ethics Committee of the University of Perugia (approval number 56/2023), analyzed 74 suicide cases using hair analysis to investigate chronic exposure to drugs and alcohol. Collected data included age, sex, suicide method, prior suicide attempts, chronic illnesses, and substance use in the months before death. The most represented age group was 36–64 years (52.70%), and 79.73% of cases involved males. A history of previous suicide attempts was found in 32.43% of individuals, while chronic conditions were reported in only 10.81%.

The most frequent suicide methods were hanging (51.35%) and jumping from heights (16.22%). Hair analysis revealed benzodiazepine use in 63.51%, antidepressants in 36.49%, antipsychotics in 11%, opioid painkillers in 16.22%, heroin and methadone in 9.46% each, cocaine in 22.97%, MDMA in 8.11%, ketamine in 2.70%, and cannabis in 17.57%. EtG levels >30 pg/mg, indicative of chronic alcohol consumption, were found in 75.68% of cases—more frequently in females (93.33%). Poly-drug use (2–4 substances) was present in 66.2% of cases. These findings suggest that identifying risk profiles associated with polysubstance use may assist in characterizing individuals at greater risk for suicide, supporting the integration of toxicological assessment into preventive strategies.

Title: Red bone marrow: an alternative matrix for qualitative and quantitative analysis of exogenous substances among well-preserved and decomposed dead bodies

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Bone marrow, a connective tissue in the medullary cavities of bones, exists in two forms: red and yellow, differing for composition and function. Red marrow, highly vascularized and protected by bone matrix, is less prone to mechanical damage and decomposition. making it suitable for toxicological analysis in decomposed bodies.

This study investigated the distribution of various xenobiotics, including ethanol, in red bone marrow, psoas muscle and femoral blood (when available), from corpses in different stages of preservation.

Bone marrow samples were collected during autopsies from 5th and 6th ribs through a longitudinal "book-like" opening with an oscillating saw. 1-3 g of matrix was removed by *curettage* and stored at -20°C.

In 32 well-preserved bodies, ethanol showed mean concentration ratios of 1.09±0.41 (blood/psoas); 2.63±0.98 (blood/marrow) and 2.71±0.75 (psoas/marrow). Among 49 decomposed cases, 18 resulted positive (>LOQ=0.17 g/L) in both psoas and bone marrow (mean ratio: 2.54±1.04); whereas in 15, ethanol was present in psoas and/or blood but absent in marrow. To assess post-mortem ethanol production, (1) fermentation products and (2) ethyl glucuronide (EtG) were evaluated. Putrefactive byproducts were found in psoas and/or blood but not in marrow and EtG concentrations were below the detection (5 ng/g), suggesting post-mortem origin.

Regarding other xenobiotics, good blood-to-marrow correlations were found for therapeutic drugs (r=0,8556; N=41); benzodiazepines (r=0,8274; N=51) and drugs of abuse (r=0,8756; N=51).

These findings suggest red bone marrow may represent a promising alternative matrix for detecting xenobiotics and assessing post-mortem ethanol in decomposed bodies, although further data are needed to define their ratios with conventional matrices.

Title: **Accuracy and reliability evaluation of Verzeletti's age estimation method on a contemporary European skeletal sample of 4th ribs.**

Vella R.[1], Vinci A.[2], Ceccobelli G.[1], Reitano C.[3], Vinci N.[1], Piizzi G.[1], Romaniello N.[1], Tavone A.M.[4], Giuga G.[1], Potenza S.[5], Maurici M.[2], Martinez Labarga M.C.[3] , Marella G.L.[4].

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Abstract:

Introduction: Assessment of the age-at-death is still one of the most difficult challenges in forensic anthropology, playing a fundamental role both in personal identification of skeletal remains and on living subjects. In 1984, İşcan published an estimation method based on the observation of the sternal end of the right fourth, that however had the tendency to underestimate the age in elder subjects. In 2010 and 2013, Verzeletti proposed an alternative compound method based on a linear regression model.

Materials and Methods: The study evaluates accuracy and reliability of Verzeletti's rib analysis method for age estimation in adults, using a sample of 127 pairs of ribs from a contemporary European population (88 males and 39 females). Alternative regression formulae were calculated, accounting for gender and laterality. Differences between right and left rib specimens belonging to the same subject were investigated using Welch's *t*-test.

Results: Verzeletti's method was reliability and accurate in age estimations ($R^2=0.70$ and 0.72 for males and females, respectively), albeit lower than in the original sample. Statistically significant differences ($p<0.05$) were found between the estimation results for right and left ribs of the same subjects, with a tendency for the left side to have a higher estimated age than the right side, up to 5-6 years.

Discussion and conclusions: Verzeletti's method has good reproducibility in estimating age at death. Differences in laterality may be due to the continuous mechanical action from the heart. Observation of the left fourth rib may allow a more accurate estimate of age at death.

POSTERs

(alphabetical order)

Title: Cadaveric Clots: A Systematic Review of the Literature

Ambrosi L.[1], Nicolì S. [1], Vergaro G. [1], Demarinis D. [1], Benevento M. [1], Solarino B. [1]

1 University of Bari Aldo Moro, Legal Medicine Section

Abstract:

Introduction

Blood is often encountered in autopsy practice, appearing in fluid, coagulated, or thrombus-like forms. Pulmonary thromboembolism is a leading cause of sudden death, and the coagulation state of blood is closely linked to the timing of death. Distinguishing between antemortem clots and agonal or postmortem clots (PMC) remains challenging. Misinterpretation can affect conclusions regarding the cause and timing of death, leading to significant medicolegal consequences. In particular, “chicken fat clots” (CFCs) raise important questions about their pathogenesis and time of formation.

Materials and Methods

A systematic literature review was conducted following PRISMA guidelines, searching PubMed, Science Direct, Scopus, and Web of Science for articles published between 2003 and 2023. The keywords included "clot", "thrombus", "chicken fat", "agonal", "postmortem", and "autopsy". Eleven articles met the inclusion criteria, focusing on the macroscopic and microscopic description of clots and their location in large vessels or heart chambers.

Results

The selected studies revealed significant variability in the definitions, appearances, and histological features of different types of clots. Postmortem imaging techniques (CT, MRI) and immunohistochemical analyses represent promising tools for distinguishing antemortem thrombi from postmortem formations; however, no universally accepted criteria exist. Some studies indicate that agonal states and pre-existing inflammatory or infectious conditions may contribute to CFC formation, although the data remain scarce.

Discussion

The review highlights the lack of standardized criteria for differentiating antemortem from agonal clots. Additional studies, especially multicenter research and collaborative autopsy protocols, are necessary to enhance diagnostic accuracy and medicolegal assessments in cases of sudden or unexplained death.

Title: **A fatal case of Munchausen syndrome by proxy in the father–daughter dyad**

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Abstract:

Munchausen syndrome by proxy – "Factitious Disorder Imposed on Another" (FDIA) according to DSM-5-TR – is a rare form of abuse where parents induce or fabricate symptoms in their child, exposing them to unnecessary and potentially harmful medical treatments. In 90% of cases, the perpetrators are mothers.

A rare case report is presented: a father with suspected FDIA was accused of killing his three-month-old daughter and eventually convicted of repeatedly inducing respiratory crises, ultimately causing her death. Investigations began after frequent hospital visits for respiratory episodes reported by the father but not observed by physicians: the attending pediatrician first hypothesized FDIA. Forensic-medical analysis excluded diseases justifying prolonged hospitalization or independently causing death; the only relevant autoptic findings were massive pulmonary congestion with minute subpleural petechiae and hemosiderin-laden intra-alveolar macrophages, indicating nonspecific acute respiratory failure without organic causes. Psychiatric evaluation of the father revealed a rigid personality, excessive conformity and interpersonal immaturity. Publicly, the father appeared caring and deeply involved with his daughter. He exhibited a propensity for development of somatic symptoms and tendency towards reality distortion. These traits aligned with FDIA, later confirmed by judicial findings. Despite no scientific evidence of the means of death, the multidisciplinary approach enabled to establish the judicial truth: a case of paternal infanticide by asphyxiation. In Italy, FDIA is not a mental illness excluding criminal responsibility, though the diagnosis may influence sentencing. The first-instance judgment classified the act as preterintentional homicide, considering Munchausen by proxy. The final verdict, however, convicted the father of intentional homicide.

Title: **Attitude, Awareness, and Responsibility Towards Gender-Based Violence: A Pilot Study Survey on health care professional students' education program**

Argo A. [1], Malta G. [1], **Ardoselli G**. [1], Albano G.D. [1], Puntarello M. [1], Midiri M. [1], Geraci S. [1], Zerbo S. [1]

[1] Department of Maternal and Child Health Promotion, Internal Medicine and Specialty Excellence (PROMISE), University of Palermo

Abstract:

Introduction: Gender-based violence (GBV) is a complex phenomenon involving physical, sexual and psychological acts of abuse, predominantly affecting women due to social, cultural and economic inequalities. Education plays a crucial role in preventing and reducing tolerance toward such violence. This pilot study, conducted at the University of Palermo, aims to evaluate the effectiveness of an educational intervention designed to change health professions students' perceptions and attitudes about gender-based violence by promoting awareness, responsibility and cultural change.

Materials and Methods: The study involved 571 students in the health sciences, including medicine, nursing and allied health professions. The students participated in a training course on gender-based violence, including legal aspects, cultural dynamics and medico-legal supports, with the integration of real cases treated at the University Polyclinic of Palermo. A questionnaire was administered based on the ISTAT survey, adapted to measure perceptions of physical violence, gender stereotypes and victim blaming attitudes. Data were analyzed using GraphPad Prism software (v 10.0).

Results: The analysis revealed a reduced acceptance of physical violence among participants compared to national data (0.4 percent vs. 6 percent). However, moderate levels of adherence to gender stereotypes (18%) and victim blaming attitudes (39%) persist. The majority demonstrated awareness of the structural causes of violence, attributing it to the perception of women as property and male superiority. These results indicate that educational intervention has helped reduce tolerance toward gender-based violence and improve understanding of cultural and legal dynamics, but they also underscore the need for continued and in-depth educational interventions.

Discussion: The educational intervention at the University of Palermo has shown a positive impact in reducing tolerance toward gender-based violence and challenging gender stereotypes, although some entrenched attitudes persist. Interdisciplinary and ongoing educational programs are needed to address misperceptions and promote lasting cultural changes, with particular attention to local cultural and social contexts.

Title: **“Please fasten your seat belts”: injury patterns in ultralight aircraft crashes. A case series**

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2. Section of Legal Medicine, Department of Clinical and Experimental Medicine, University of Foggia, Italy

Abstract:

Introduction:

Aircraft used for sport or recreational purposes include ultralight, experimental, and light-sport aircraft. Forensic pathology literature provides limited information on the injuries associated with these deaths. The injury pattern primarily depends on the body's velocity during landing, which is influenced by the fall's height, body orientation, and landing position, as well as contact with parts of the aircraft or other objects.

Materials and Methods:

Over the past 10 years, in the metropolitan area of Rome, 8 ultralight aircraft crashes have resulted in 12 fatalities. Each case was examined through autopsy, histological examination, and toxicological analysis. The crashes involved ground impacts, water crashes, fires after hitting high-voltage cables, and a collision with a mountain.

Results:

Most victims exhibited extensive blunt force trauma, with exposed fractures of the head and limbs, and thermal damage in cases with fires. Common fractures included those of the skull, ribs, limbs, and spine, along with subarachnoid hemorrhage and internal organ contusions and lacerations.

Discussion:

Post-mortem investigations focused on determining the cause of death and reconstructing the event's dynamics. In four cases with multiple victims, the pilot was identified in 3 out of 4 cases by analyzing injuries caused by aircraft control levers and pedals. This experience shows that forensic pathologists, through thorough study of the wounds, can reconstruct the dynamics of a crash when site investigation is affected by bystanders and healthcare providers.

Title: **Histiocytic Myocarditis: A Rare and Complex Cause of Cardiogenic Shock in Pediatric Age**

Belmonte B.[1], **D'Anna T.**[1,2], Malta G[3], Formisano E.[4], Zerbo S.[1,3], Argo A.[2,3], Florena A.M.[3], Orlando E.[2], Mare E.[3]

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Abstract:

Introduction: Histiocytic myocardial inflammatory disease (HMID) is a rare and under-recognized form of myocarditis, characterized by predominant histiocytic infiltration within the myocardial tissue. Unlike more common forms such as lymphocytic or eosinophilic myocarditis, HMID presents significant diagnostic challenges, especially in pediatric populations.

This study aims to describe the clinical course and diagnostic difficulties encountered in a pediatric case of HMID, emphasizing the histopathological and immunohistochemical findings required for accurate diagnosis.

Case description: A 4-year-old girl presented with persistent fever, abdominal pain, and vomiting. Initial cardiological assessment revealed mild pericardial effusion and preserved systolic function. Despite broad-spectrum treatment with corticosteroids and antibiotics, her condition deteriorated rapidly, culminating in cardiogenic shock and cardiac arrest. Forensic autopsy was performed, including histopathological examination and immunohistochemical analysis for CD3, CD4, CD8, and CD20 to characterize the lymphocytic infiltrate.

The autopsy revealed extensive histiocytic infiltration in the right ventricle, confirmed by strong CD68 immunohistochemical positivity. Immunocoloration for CD20, CD3, CD4, CD8 revealed minimal lymphocyte presence. No microbial pathogens were detected, and no previous history of autoimmune or systemic inflammatory diseases was noted.

Discussion: HMID, though rare, can mimic more common types of myocarditis, posing significant diagnostic challenges. The condition's fulminant progression underlines the

importance of early recognition and specific histopathological and immunohistochemical confirmation. This case highlights the need for heightened awareness and documentation of HMID in pediatric cases of unexplained cardiogenic shock or sudden cardiac death.

Title: Therapy or Trap? The Dual Face of Fentanyl Between Treatment and Addiction – A Prevention Model

Federica Spadazzi [1], **Tommaso Berloco** [1], Virginia Adelini [1], Lina De Paola [1], Miriam Ottaviani [1], Damiano Marchesini [1]

1. Department of Anatomical, Histological, Forensic and Orthopaedic Sciences, Sapienza University of Rome, Italy.

Abstract:

Introduction: Fentanyl is a highly potent synthetic opioid, with analgesic and anesthetic effects up to one hundred times stronger than morphine. Its mechanism of action —binding to μ-opioid receptors and activating G-proteins – makes it an essential drug in managing acute pain and providing palliative care, especially in oncology. However, its high lipophilicity, rapid onset, and prolonged half-life also make it particularly dangerous, increasing the risk of dependence, tolerance, and fatal overdose even at low doses.

Materials and methods: a literature review was conducted using PubMed with the keywords "fentanyl", "drug addiction", "mortality" and "prevention" focusing on publications from 2015 to 2025. Out of 217 results, relevant studies were grouped into prevention strategies, clinical case reports, geographic analyses, and non-relevant exclusions. Statistical data were obtained from the European Union Drugs Agency and the U.S. CDC WONDER database, while legal aspects were analyzed using "De Jure" legal database.

Results: findings show a dramatic rise in illicit fentanyl use, particularly in the United States, where it causes high annual death toll. In Europe, Estonia, Lithuania, and Latvia report similar overdose trends. Transdermal formulations, classified under Italy's less restrictive "fascia A" are easily accessible and often misused. Online trafficking via the Dark Web further complicates control efforts.

Discussion: This study proposes an integrated prevention plan: territory-wide screening, reclassification of fentanyl medications to a more restricted category, broad distribution of rapid detection kits, and legal measures against unauthorized Dark Web access. A multidisciplinary approach is essential to ensure safe medical use and reduce abuse.

Title: Beyond Traditional Drugs: A Prospective Observational Study on the Spread of NPS in the Urban Context of Bologna

Berretti E.[1], Grimaldi F. [1], Rochira A. [1], Giorgetti A. [1], Pelletti G. [1], Pelotti S[1]

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Abstract:

Introduction: New psychoactive substances (NPS) are drugs, often not subject to national regulamentation, requiring dedicated analytical methods. NPS prevalence in Italy is not known.

This study aims to evaluate prevalence of NPS by analysing their presence in emergency departments (ED) and the abusers' socio-demographic features. Materials and Methods: The current prospective observational study, approved by the Ethics Committee, was conducted on 110 patients admitted into ED of St. Orsola Hospital, Bologna, from March to November 2024, for suspected acute drug intoxication. Blood samples were collected and analysed by the Toxicology Laboratory of the University of Bologna using LC-MS/MS technology, including 190 substances (NPS and common drugs).

Results: Out of 110 samples, 60.9% tested positive to at least one drug, most frequently male, with a mean age of 30 years. Cocaine was the most prevalent substance (74.6%). Ketamine or Norketamine were detected in 25.4%, in a mean concentration of 54.98 ng/ml and 101.01 ng/ml, respectively. NPS were detected in 4.5%, consisting of methylone in two cases (<LLOQ), alpha-PHP (0.18 ng/ml) and 3,4-MD-alpha-PHP in one case (15.96 ng/ml).

Discussion: Results demonstrate a significant use of cocaine, as expected, and of ketamine. This latter is significant for physicians in emergency care settings, due to substance's anaesthetic properties. Among the NPS, stimulant-hallucinogenic substances show greater prevalence in Italy, often co-administered with stimulants such as amphetamines. Our research provides preliminary data that shows a rationale for future studies on the spread of NPS and for the development of preventive interventions against drug addiction.

Title: Child abuse, comparative analysis of national and European models and case studies

Argo A. [1], **Bilello A**. [1], Malta G. [1], Triolo V. [1], Albano G.D. [1], Piro E. [1], Zerbo S. [1]

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Abstract:

Introduction: Child abuse is a widespread and worrisome phenomenon globally, with serious and lasting consequences. Child maltreatment was only officially recognized as a health problem with the introduction of the ICD-9 code in 1980 (Child Maltreatment Syndrome, 995.5), allowing for more accurate epidemiological monitoring. However, many cases are not properly identified or reported, remaining hidden in the home.

Understanding the phenomenon is based on an ecological model that considers individual, family, community and social factors.

Materials and Methods: Fifty-five cases of child abuse taken in charge by the Institute of Forensic Medicine of the University of Palermo (2005-2024) were analyzed. Multiple variables were assessed: type of abuse, gender of the victim, family and social contextual factors; co-morbidity of the child and parental figures; rehabilitative interventions and taking care of the child and care-givers. Inter-assessor concordances (forensic physician, pediatrician, child neuropsychiatrist) at diagnosis were studied, both in the emergency-emergency assessment context and in the perital-judicial context, at the different levels of adjudication.

Results: Multidisciplinary assessment models of taking care of the abused have become PDTA since the year 2021 in the Palermo metropolitan area, and this has led to greater effectiveness and efficiency of diagnostic interventionsdiagnostic skills of the professionals involved has increased, standing at more than 70% in the last 3 years of observation.

Discussion: The child abuse prevention network still needs effective socio-health implementation in the local reality, using intervention and prevention experiences already gained in other national and European contexts.

Title: Legal, ethical and social challenges of the Forensic DNA Phenotyping in Italy (LetFor): an interdisciplinary project

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Abstract:

In recent years, forensic DNA phenotyping (FDP) has improved forensic investigations by allowing the inference of external physical characteristics- such as eye, hair and skin colour- as well as the prediction of biogeographical ancestry and age estimation from biological samples collected at the crime scene. In Italy, a discussion and legislative proposal are not yet underway for FDP analysis, and awareness among citizens, social partners, legal practitioners and legislators remains limited.

The LetFor project has two aims: to develop and validate genetic and epigenetic tools for analysing the FDP in the Italian population using massive parallel sequencing (MPS) technologies, which still lacks comprehensive genetic data on FDP; and to assess the knowledge and perception of FDP in Italian society and analyse its benefits and risks from ethical, social and regulatory perspectives.

A predictive model for age estimation based on methylation data of sites included in the VISAGE epigenetic clock was developed through the analysis of blood samples from Italian individuals.

The model is based on nine of the total sites analysed and can provide an age estimation with an accuracy of 2.8 years.

Additionally, anonymous interviews were conducted with stakeholders from the legal and civil spheres, which revealed a general lack of awareness regarding of FDP and difficulties in assessing the risks and benefits associated with it. Key concerns included risk of discrimination and privacy violations, the stigmatisation of population groups, and the probabilistic misinterpretation of analytical results, highlighting the need for legislation inspired by social protection principles.

Title: Cognitive Biases in Forensic Psychiatry: Practical Implications for Criminal Responsibility and Social Dangerousness

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Abstract

Introduction

Forensic psychiatry is pivotal in legal proceedings but remains highly vulnerable to cognitive biases that may compromise the accuracy and objectivity of expert evaluations, especially for the evaluation of criminal responsibility and social dangerousness. Following the Arksey and O'Malley framework, this scoping review systematically explores the prevalence and nature of cognitive biases in forensic psychiatric assessments across criminal, civil, and testimonial contexts.

Materials and Methods

A comprehensive search of five major databases identified 7,002 records. After screening, 24 studies met the inclusion criteria. Data extraction focused on the types of cognitive biases reported, their frequency, and the contexts in which they occurred, as well as the mitigation strategies evaluated within these studies.

Results

Analysis revealed ten distinct cognitive biases influencing forensic psychiatric practice. The most frequently discussed were gender bias (29.2%), allegiance bias (20.8%), and confirmation bias (20.8%), followed by hindsight, cultural, and emotional biases. Most studies addressed criminal settings, with only two focusing on civil contexts. Among mitigation strategies, structured methodologies and the "considering the opposite" technique were most positively evaluated, while self-awareness strategy were criticized for limited effectiveness.

Emerging tools, such as artificial intelligence, were noted as promising but require rigorous ethical oversight to avoid perpetuating systemic biases.

Discussion

This review provides an updated overview of research on cognitive biases in forensic psychiatry, with particular reference to expert evaluations regarding criminal responsibility and social dangerousness.

Title: Head trauma dynamics: fall or blunt object? Systematic review and proposal for a multicenter study

Calabrese S. [1], Nicolosi A. [1], Spadaro B. [1], Burrascano G. [1], Abramo D. [1], Biondo T. [1], Messina A. [1], Asmundo A. [1], Baldino G. [1], Ventura Spagnolo E. [1]

1 Legal Medicine – Dep. Biomorf – Messina University

Abstract:

Introduction: Forensic assessment of blunt force head injuries remains one of the most complex and sensitive challenges, particularly in cases involving suspected assaults, homicides, or accidental falls.

Accurate differentiation between injuries caused by direct blows and those resulting from falls is essential for reliable medico-legal interpretations. However, current forensic tools often suffer from interpretative limitations and subjectivity, underscoring the need for a more robust and multidisciplinary scientific approach.

Materials and Methods: A systematic review of the literature was conducted using major international databases (PubMed, Scopus, Web of Science) to critically evaluate the most advanced methods for distinguishing trauma mechanisms. The review focused on injury patterns, morphological features of cranial fractures, and emerging technological tools. Special attention was given to high-resolution techniques such as micro-computed tomography (μCT), finite element modeling (FEM), and 3D reconstruction. When combined with conventional imaging (CT) and forensic biomechanics, these tools offer a more objective basis for trauma analysis.

Results: The findings highlight the potential of advanced technologies to improve diagnostic accuracy and promote more standardized, reproducible evaluation criteria. Integrating circumstantial data with crime scene information, cadaveric examination and imaging, allows for a more comprehensive and scientifically grounded reconstruction of injury dynamics. This multidisciplinary strategy could enhance reliability in distinguishing falls from direct impacts and reduce interpretative variability among experts.

Conclusions:

Based on these results, we propose initiating a multicenter study across Italy to validate promising methodologies and develop a unified, evidence-based forensic model shared among medico-legal centers.

Title: Female genital mutilation in the assessment of torture outcomes of migrant asylum seekers: a single-centre, retrospective study

Argo A.[1], Albano G.D.[1], **Calascibetta G.[1]**, Tullio V.[1], Malta G.[1], Lee J.[2], Geraci S.[1], La Spina C.[1], Zerbo S.[1]

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[2] Wellesley College (USA)

Abstract:

Introduction

The practice of Female Genital Mutilation (FGM) consists of the partial or total removal of the female external genitalia, carried out for cultural reasons or otherwise not related to medical needs. FGM represents a form of gender-based violence associated with serious physical and psychological consequences, and is therefore considered a serious violation of human rights. The main objective of the study is to characterize the social and family context in which the woman has undergone FGM, in a sample of migrant women from African countries, asylum seekers undergoing medico-legal examination, aimed at certifying outcomes of torture; to verify aspects of vulnerability and determinants of health that hinder equitable access to care.

Materials and Methods.

Medical records of medico-legal examinations conducted at the Outpatient Clinic for the Assessment of Torture Outcomes of the Institute of Forensic Medicine at the University of Palermo were examined. The study included 33 female subjects, all migrants, with a history of intentional violence. Evaluations were conducted following the Istanbul Manual, according to the variables: country of origin, religion, age at time of escape, reason for escape, type of FGM, age at time of FGM, perpetrator of FGM, place where FGM was performed, type of violence, injury locations, outcomes, medical-legal judgment.

Results

The mean age of FGM was 7.3 ± 3.65 years, Type II FGM prevalent (78.79%). The average age at the time of escape from the country of origin stood at 17.09 ± 5.53 years. In 21 cases (63.64%) there were experiences of intrafamilial violence and/or social distress, including the absence of one or both parents. 51.52% of patients were involved in arranged marriages. A significant proportion of the sample (81.82%) reported experiencing sexual violence while traveling.

Discussion

The results of the study underscore the importance of medico-legal certification in providing objective evidence to support legal decisions about granting international protection and assistance in migration contexts.

Title: Clinical Audit in Risk Management: retrospective analysis of events at the Polyclinic of Bari

Calò F. [1], Visci P. [1], Vinci A. [1], Zotti F. [1], Ferorelli D. [1], Dell'Erba A. [1]

1 University of Bari "Aldo Moro", Medical-Legal Section of Policlinico di Bari

Abstract:

Clinical risk management is crucial for patient safety and healthcare quality, employing systematic approaches to identify, assess, and mitigate potential harm. Clinical audit is a fundamental tool, facilitating the improvement of clinical practice through systematic review against explicit standards. This retrospective study analysed the application and characteristics of clinical audits at the Institute of Legal Medicine, A.O.U.C. Policlinico di Bari, between 2019 and 2025. The objective was to evaluate the correlation between event type, particularly sentinel events, and clinical setting (surgical, medical, or services). Data were extracted from records of 43 clinical audits. The results indicate that sentinel events constituted the majority of audits (53.5%). Surgical departments initiated the highest number of audits (51.2%), followed by medical departments (34.9%) and service departments (14%). A significant portion of the audits (76.7%) concluded with a single meeting. The analysis did not reveal a statistically significant association, which underlines the need for larger datasets, between sentinel events and the surgical setting compared to other settings (OR 0.5, 95% CI 0.14-1.71, p=0.268). The results suggest that clinical audit is an actively utilized tool for risk management and demonstrates efficiency in processing reported events. Although high-risk departments showed greater engagement, the lack of statistical significance regarding sentinel events in surgery may be influenced by sample size limitations. Continuous efforts to promote a comprehensive reporting culture, refine protocols, and provide targeted training, especially in complex units, are essential for further improving patient safety.

Title: Suicide by Evisceration: Presentation of Three Cases and Review of the Relevant Literature

Campagna R. [1], Santamaria A. [1], Carpano F. [1], Solenne M. [1], Cappitelli J. [1], Giacani E. [1], Rinaldi C.M. [1]

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Abstract:

Introduction: This study examines three rare cases of suicide involving self-evisceration, a phenomenon occurring in only 1-3% of all suicides. These complex cases often create scenes that may initially suggest homicide, requiring careful forensic investigation to determine the manner of death. **Methodes:** Case 1: A man discovered in a burned apartment with evisceration and blood distributed throughout multiple rooms. Case 2: An individual found with multiple abdominal wounds and viscera separated from the body. Case3: A man with multiple abdominal wounds and a knife embedded in his epigastric region. **Results:** All three cases displayed similar forensic characteristics: abdominal wounds exposing intestinal mass, hemorrhagic infiltration, and extensive blood traces at the scene showing signs of stepping and scraping. One case involved sectioning of part of the intestine. **Conclusions:** The authors emphasize that investigating such complex suicides requires comprehensive examination of the victim's personal history, thorough scene investigation, and complete autopsy with laboratory analyses. These self-inflicted wounds typically concentrate in the left hemithorax (where vital organs are located) and often include hesitation marks. The forensic investigation of these cases employed an integrated approach including histological and toxicological analyses to confirm the vitality of injuries and their contemporaneous nature. Only through rigorous application of appropriate methodologies could investigators reach accurate conclusions in these complex scenarios, providing scientific evidence to support subsequent judicial proceedings.

Title: Reconstructing homicide dynamics using blood traces: scientific evidence from Bloodstain Pattern Analysis (BPA) in a case of patricide

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Abstract:

Introduction. The term *parricide* refers to the killing of a close relative, though it commonly indicates the murder of one's father (*patricide*) or mother (*matricide*). This paper presents a case of patricide in Genoa involving two brothers, A.S. and S.S., where Bloodstain Pattern Analysis (BPA) was key to reconstructing the crime dynamics.

Case Description. The victim was found lying supine in the entrance of home. Near the body were a bloodstained rolling pin and screwdriver. Autopsy revealed 23 head and facial injuries, multiple skull fractures, and diffuse subarachnoid hemorrhage. Death was due to "*rapid cardio-circulatory collapse from severe cranio-encephalic trauma caused by repeated blunt force*".

Injury characteristics did not exclude the possibility of either a single assailant or a joint attack.

Discussion. Analysis of the crime scene and the wounds found made it possible to hypothesize three phases of the attack in different parts of the house: a first attack while the victim was still conscious and trying to defend himself, a second while the victim was lying on the couch, at a disadvantage to the attacker, and a third with the victim now on the floor. BPA, applied to the scene and the brothers' clothing, distinguished between impact stains (spatter stains) and those from weapon movement, confirming this sequence. Notably, back-spatter stains on A.S.'s shirt back suggested he was turned away when a blow was delivered, indicating the presence of a second attacker. This evidence contradicted the defense's attempt to exclude S.S. from the crime, demonstrating both brothers' involvement.

Title: **On a case of death due to laceration of the internal carotid artery from indirect fracture of the anterior clinoid process of the sphenoid**

Catena A.M.[1], **Quarticelli S.**[1], Mazzatenta A[2]., Locatelli M.[3], D'Ovidio C.[4]

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2 Neuroscience, Imaging and Clinical Science Department, "G. d'Annunzio" University of Chieti-Pescara

3 Analytical Chemistry, Depatment of Science, "G. d'Annunzio" University of Chieti-Pescara

4 Departmental Section of Legal Medicine, "G. d'Annunzio" University of Chieti-Pescara

Abstract:

This report presents the case of an 18-year-old male who died following a cranial trauma with unusual characteristics. The trauma was inflicted by a single blow from an improvised blunt object (a paint roller handle), wielded by the victim's brother during a domestic dispute that arose while performing home maintenance tasks. The victim lost consciousness immediately and was initially assisted by his brother, who promptly contacted emergency medical services (EMS). The patient was subsequently transported via air ambulance to the General Hospital of Pescara, where a computed tomography (CT) scan revealed a massive subarachnoid hemorrhage, accompanied by a hemorrhagic collection in the sellar region, intraventricular blood (hemoventricle), and obliteration of the cortical sulci. In light of the radiological findings, neurosurgeons performed an emergency craniotomy to decompress the cerebral parenchyma. Despite the timely surgical intervention, there were no signs of neurological recovery. The patient remained in a comatose state and was subsequently declared dead in accordance with the provisions of Italian Law 578/1993 (criteria for determining brain death). The autopsy revealed the source of the bleeding—and thus the cause of death—as a laceration of the right internal carotid artery. The injury occurred just distal to the vessel's exit from the carotid canal and was caused by a partial detachment of the right anterior clinoid process, which had been fractured as a result of the trauma. This case report emphasizes the importance of studying TAC skull images together with autopsy data.

Title: Thirty Years of Forensic Psychiatric Evaluations: Reflections on Diagnostic Consistency and Expert Opinion

Cattaneo Narjis E.[1], Cestonaro C.[1], Righetto S.[1], Miazzi R.[2], Terranova C.[1]

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Introduction

Forensic psychiatry lacks objective biological markers and relies on clinical methodologies inherently influenced by the evaluator's cultural background and individual cognitive biases. This case study, spanning 30 years of clinical and forensic assessments, highlights challenges in achieving diagnostic consistency and objectivity in expert opinions.

Case Description

A 63-year-old man, first detained at 19 for attempted robbery and homicide, underwent multiple forensic psychiatric evaluations from 1989 to 2025. Initial assessments consistently found him not guilty by reason of insanity due to a schizophrenic disorder associated with mild cognitive impairment. Recurrent diagnoses included schizophrenic syndrome, paranoid schizophrenia and delusional disorder. Expert reports for the defense and court-appointed evaluations supported this view. In 2022 significant discrepancies emerged: a collegial panel concluded partial criminal responsibility; the Public Prosecutor's consultant proposed Ganser syndrome or prison psychosis, judging the subject fully criminally responsible; in contrast, the defense reaffirmed the opinion of not guilty by reason of insanity. In 2023 a new expert opinion found full criminal responsibility. A further evaluation is currently ongoing (2025). Over the years, a wide range of professionals—psychiatrists, forensic physicians, neurologists, and psychologists—applied differing methodologies with psychometric and neuroscientific tools appearing only in the most recent phase.

Discussion

This case illustrates how, in the absence of shared standards, forensic psychiatric assessments remain vulnerable to methodological variability and individual bias. Diverging conclusions on criminal responsibility highlight the urgent need for validated and multidisciplinary protocols to improve reliability, consistency and scientific rigor in forensic evaluations.

Title: Anaphylaxis-related deaths: how do we really diagnose?

Colombari M.1, Bessi C.1, Attico F.1, Bulfamante G.P.2, Verzeletti A.1

1 Institute of Legal Medicine of Brescia, University of Brescia, Piazzale Spedali Civili, 1, Brescia 25123, Italy

2 Department of Pathology, TOMALab Toma Advanced Biomedical Assays SpA, Via Francesco Ferrer, 25, 21052 Busto Arsizio VA

Abstract:

INTRODUCTION: Anaphylaxis-related deaths represent a significant challenge in forensic pathology due to the lack of highly specific histopathological markers. Anaphylaxis involves the activation of mast cells, with beta-tryptase degranulation as the key player. In tissue samples, such as the larynx and bronchi, mast cell count is assessed using IHC with anti-tryptase antibodies. More reliably, the degranulation of mast cells is detected with anti-CD117 antibodies targeting the activated form of c-KIT, a tyrosine kinase receptor crucial for mast cell maturation. Additionally, tryptase levels can be detected in blood or urine samples taken as soon as possible after death. Emerging research focuses on specific microRNA expression levels, which indicate the cell's "intentions" at the time of death.

CASE DESCRIPTION: The case hereby reported involves the sudden death of a 50-year-old healthy man. While alone in his car, he contacted emergency services, reporting feeling unwell and having an anaphylactic reaction. Upon arrival, responders found the subject deceased. The past medical history was negative for allergic reactions. IHC with anti-tryptase and anti-CD117 antibodies was performed revealing strong positivity in the laryngeal mucosa, trachea, major bronchi, pulmonary parenchyma, indicating numerous activated and degranulated mast cells and supporting the diagnosis of Anaphylaxis-related death.

DISCUSSION: According to the Literature review on the issue we performed, many different biomarkers has been taken into consideration for the diagnosis of Anaphylaxis-related death. Nowadays IHC staining with anti-tryptase and anti-CD117 antibodies still appear to be the most reliable indicators.

Title: Time as scientific evidence: forensic reconstruction of a case of death by hemorrhage from femoral artery severing by firearm

Malta G.[1], **Contorno S.**[1], Puntarello M.[1], Lo Re G.[2], Albano G.D.[1], Zerbo S.[1], Argo A.[1]

[1] Department of Maternal and Child Health Promotion, Internal Medicine and Specialty Excellence (PROMISE), University of Palermo;

[2] Department of Biomedicine, Neuroscience and Advanced Diagnostics, University of Palermo;

Abstract:

Introduction

In the context of traumatic deaths, scientific evidence plays a central role in reconstructing events—particularly when death results from hemorrhagic shock. Forensic analysis, by integrating thanatochronological data and injury dynamics, enables correlation between the moment of trauma and the theoretical survival time. This supports the assessment of potential liability for omissions or delays in activating emergency services. In this sense, time becomes a key element of proof.

Case Description A 47-year-old man was found with a gunshot wound to the left thigh. He arrived at the emergency department in advanced hypovolemic shock, pulseless, and was declared dead at 3:40 a.m. Autopsy revealed complete transection of the superficial femoral artery with massive hemorrhage and metallic fragments. The oblique, medial-to-lateral ballistic path also involved the posterior surface of the femur. Based on witness statements, surveillance footage, and hospital timestamps, the injury occurred between 2:00 and 2:30 a.m., with a survival interval of approximately 70 minutes and no evidence of timely emergency activation.

Discussion Scientific literature reports high lethality for superficial femoral artery injuries if untreated within 45–60 minutes. In this case, given the short distance to the hospital, prompt medical intervention could have slowed blood loss and improved survival chances. The absence of prehospital care and extra-hospital delay were decisive in the fatal outcome.

Conclusions

The integration of autopsy, contextual, and scientific data allowed precise reconstruction of the survival window. Here, the lack of timely medical response directly correlated with an otherwise preventable death. These findings are central to judicial evaluation and highlight the critical role of time-based scientific evidence in forensic medicine.

Title: **Personal Identification from Surveillance Images: A Review of Seven Cases**

Cristalli A. [1], De Gabriele G. [1], Di Trani S. [1], Colucci A. [1], Marzaioli A. [1], Capurso A. [1], Macorano E. [1], Mele F. [1], Introna F. [1]

1 Department of Legal Medicine, University of Bari "Aldo Moro", Policlinico of Bari, Bari, Italy

Abstract:

The widespread use of surveillance systems has made personal identification of suspects from digital images increasingly common. The main critical issues in personal identification—already outlined by Ottolenghi and Falco in the past century—are even more pronounced when dealing with surveillance footage.

This study reviews seven cases evaluated by the U.O.C. of Legal Medicine at the Policlinico of Bari, aiming to highlight the most frequent errors in identification or compatibility judgments. These cases were analyzed both as court-appointed and party consultants and they often included opinions by non-medical personnel issuing unsupported and hastily drawn conclusions. The assessments were based on non-standardized images, captured using various types of hardware and processed with different softwares.

The criminal cases involved different offenses, including terrorism, homicide, assault and resistance against law enforcement and theft—demonstrating the increasing forensic relevance of personal identification.

In none of the reviewed cases there were objective, repeatable, and scientifically validated procedures applied. There were no quantitative anthropometric assessments, nor qualitative analyses supported by statistical evaluation of facial traits or identifying features.

As a result, image comparisons never led to a reliable identification but, at best, to a statement of compatibility. It is crucial to emphasize that compatibility does not equate to personal identification.

This review confirms that current practices still fall short of the scientific standards necessary for definitive identification based on surveillance images. Such footage remains useful for contextual reconstruction but insufficient for certain identity attribution.

Title: **Differential diagnosis between post-mortem animal predation and caustic ingestion in a case of complex suicide**

Elia C.[1], de Laurentiis E.[1], Consalvo F.[2,3] , Sementa C.[4], Santurro A.[2,3]

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[2] University of Salerno – Department of Medicine, Surgery and Dentistry "*Schola Medica Salernitana*"

[3] San Giovanni di Dio e Ruggi d'Aragona University Hospital – Unit of Legal Medicine

[4] San Giuseppe Moscati Hospital, Avellino

Abstract:

Introduction: Cadaveric changes related to animal predation involve many issues related to identification, injury assessment, and sometimes the definition of the causes of death. Indeed, many animal species can be responsible of cadaveric depredation, with considerable variability related to geographic area, season, and environment (indoor/outdoor).

Case description: A 61-year-old man was found lying on the ground in the garden of his country house, partially suspended by a rope, fixed on the neck, close to a package of caustic household products. His clothes were diffusely soiled with filiform grayish-white material.

External examination showed, beyond the cervical furrow, the presence of extensive facial and cervical tissue loss exposing the underlying tissues. Also, both wrists showed multiple linear, variably deep, infiltrated incised wounds.

The autopsy showed partial laceration of the tongue, the thyroid, infrahyoid muscles, and the thyroid shield.

Discussion: Autopsy and scene findings supported violent mechanical asphyxia due to hanging, following an unsuccessful attempt at exsanguination. Caustic ingestion was ruled out due to intact oral and esophageal mucosa, while facial and neck injuries were attributed to macrofauna action, where the presence of non-infiltrated margins, with kerning or "double-track" appearance and the exclusive involvement of the undressed areas, allowed to hypotize a rodents postmortem aggression, confirmed by analysis of the material found on the clothing, attributed to animal hair.

This case highlights how a careful assessment of cadaveric injuries must consider environmental factors interfering with the cadaver, with particular attention to artifacts attributable to animal predation, capable of diverting the logical process underlying a correct postmortem diagnosis.

Title: **Engineering and medicolegal investigations of agricultural deaths: evidences and proofs to be searched**

Da Broi U.[1], Simonit F.[1], D'Elia F.[2], Perogio M.[2], Cappelli A.[3], Cividino S.[3], Zaninelli M.[3], Desinan L.[1]

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[2] Department of Medical Surgical and Health Sciences, School of Legal Medicine, University of Trieste, Trieste, Italy

[3] Department of Human Science and Quality of Life Promotion, S.Raffaele University, Rome, Italy

Abstract:

Evidences in agricultural accidents are:

1) Risk factors (absence or misuse of safety equipment/personal protective equipment, use of high powered vehicles or machinery or tools without adequate maintenance or training, carelessness when operating machinery, challenging environmental or weather conditions, unsafe workplace).

2) Direct causes (operator dependent: ignorance of or noncompliance with prescribed technical behaviour, lack of technical experience and training, underestimating technical and environmental risks, operator age and concomitant pathologies) - (machinery dependent: outdated and/or poorly maintained machinery/tools, use of equipment not fit for given task) - (system dependent: long hours working resulting in tiredness and a loss of care and attention, working alone in isolated locations without prompt rescue chances, unqualified and/or unskilled employed operators/trainees).

Proofs in agricultural accidents are:

1) Matching and uniqueness of the morphology and contour of lesions with the offending agent and dynamics (collision, crushing, cutting, fracturing, amputation, fragmentation, dismembering, burning on specific anatomical areas and/or organs).

2) Specific identified cause of death when any cause of death other than the lesions produced during the accident has been excluded, in order to be sure that it was not a concealed homicide made to look like an accident, nor it was a death from causes not covered by insurance that was made to look like a regular occupational fatality.

Close interdisciplinary cooperation between agricultural experts and the forensic team is essential to help investigators to understand the cause and dynamics of the event and to access relevant informations otherwise unavailable to forensic pathologists.

Title: **The importance of the multidisciplinary approach in forensic practice - a case study in forensic entomology**

De Gabriele G. [1], Cristalli A. [1], Colucci A. [1], Di Trani S. [1], Capurso A. [1], Marzaioli A. [1], Macorano E. [1], Introna F. [1]

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Abstract:

Post-mortem interval (PMI) of human corpses may be estimated based on insect evidence. Therefore, the major challenge for forensic entomology is to reduce the estimation inaccuracy. As a maturing field, forensic entomology contains under-researched area as also several weaknesses compared to "traditional" method for estimating PMI. In any case, it is of significant importance when correlated to transformative thanatochronological phenomena, or any other evidence gathered during judicial inspection. This case deals with the discovery of a corpse in an advanced state of decomposition largely colonized by cadaveric dipteran larvae. June, south Italy, a small farm in the countryside. At the entrance, two deceased large dogs colonized by cadaverous date beetles, a chicken coop where the chickens were all deceased. The state of the surroundings showed a degraded condition. The body was presented supine on a bed. The case was taken up with a request for cause and time of death. Findings:

-ambient temperature was 22°C inside the house with a seasonal average of 25°C.

-Absence of any third party injuries;

-Black state of decay.

Epimiscope analysis of the larvaewas performed analyzing those in the face and those furthest away (6m). It should be noted that neither pupae nor adult insects were detected at the site (closed door and window). All larvae sample taken turned out to belong to the Chrisomya albiceps species and all in the 3rd INSTAR stage. So that PMI was found to be compatible with 6-10 days since death according to the degrees of development and egg laying. Therefore cadaver, showed a "black decay" stage commonly found 20-30 days after death at mean high temperature. Data integration thus allowed to correct the pmi with a minimum estimate of 15-20 days after death. The case study example showed us how once again that forensic pathologist can leave nothing to chance in order to provide answers of judicial value.

Title: **Multidisciplinary analysis and evaluation by chemical-toxicological, microbiological, histopathological, and circumstantial-environmental investigation in acute and fatal phosphine intoxication**

de Laurentiis E.[1], Elia C.[1] , Consalvo F.[2,3], David M.C.[4], Leone S.[5], Sementa C.[5] , Santurro A.[2,3]

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[3] San Giovanni di Dio e Ruggi d'Aragona University Hospital – Unit of Legal Medicine

[4] Department of Public Security, Health Central Directorate, Research Center and Forensic Toxicology Laboratory, Ministry of the Interior, Rome

[5] San Giuseppe Moscati Hospital, Avellino

Abstract:

Introduction: Phosphine is a highly toxic gas released by the degradation of aluminum phosphide (AIP), a pesticide used in agricultural fumigation. AIP cytotoxic effects are mediated by inhibition of mitochondrial oxidative phosphorylation and generation of ROS, leading to severe metabolic dysfunction, acidosis, and cardiorespiratory failure. Human exposure occurs mainly by ingestion or inhalation, with early non-specific symptoms, delaying diagnosis. This case illustrates the forensic complexity of sudden death following aluminum phosphide exposure.

Case description: A 46-year-old woman accessed to the emergency department with abdominal pain and vomiting and was discharged with a diagnosis of gastroenteritis. Next day, she returned in a state of shock, was admitted to ICU with suspected botulinum and died within hours, due to acute cardiorespiratory failure secondary to ARDS, heart failure, and mixed acidosis. Autopsy revealed non-specific macroscopic findings with carenal submucosal hemorrhages and generalized enteric alterations. Histopathology showed multi-organ involvement with diffuse leukocytic infiltration (thyroid, subepicardial/intramyocardial, peribronchial) and hemorrhages (intra-alveolar, myocardial, splenic, renal, duodenojejunal), centrilobular hepatic necrosis, hepatocellular hydropic degeneration, and grade II colliquative myocytolysis. Post-mortem microbiological tests were negative for common enteric and respiratory pathogens. Toxicological analysis by GC-FID/HS (headspace gas chromatography with flame ionization detection) was negative for phosphine; ICP-MS analysis (inductively

coupled plasma mass spectrometry) detected aluminum concentrations between 30 and 218 µg/L, significantly above normal (<10 µg/L).

Discussion: Clinical, pathological, microbiological, and toxicological findings -along with environmental evidence of recent aluminum phosphide use for cereal fumigation at home- supported the diagnosis of acute fatal phosphine exposure. This case emphasizes the necessity of an accurate medicolegal evaluation employing a multidisciplinary approach to identify and interpret complex cases of environmental toxic exposure.

Title: When Insects Speak: Forensic Entomology in the Estimation of the Time of Death

De Martino F.[1], Ertola E.M.[1], Caprino E.[1], D'Antonio G.[1], Raffino C.[2]

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2 Forensic Medicine Centre, INAIL, via Roma 419, 94100, Enna.

Abstract:

This study presents a forensic case in which medico-legal entomology was employed to estimate the Post-Mortem Interval (PMI), supporting witness statements and investigative reconstruction. While scientifically robust, entomological evidence can be influenced by environmental variables, such as ambient temperature. The aim is to demonstrate how entomological data can acquire probative value and contribute to legal determinations.

A female body was found supine in a green area, with visible larval infestation on the face. To refine the time of death estimation, a forensic entomologist was consulted. Ambient temperature was recorded at 18.1°C and the larval mass at 23.8°C. Insect samples were collected from the body, but the ADD/ADH estimation methods were not applicable due to the high number and clustered arrangement of larvae. Based on larval stage (II larval stage), size (6 mm), and environmental temperature in the days prior, colonization was estimated to have occurred 60–72 hours before discovery. This timing aligns with testimonies indicating the victim was last seen alive at 06:00 on the same day.

No environmental or chemical barriers affecting insect activity were identified, increasing the reliability of the PMI estimation. This case illustrates how scientifically sound biological data, paired with expert interpretation and clear communication, can serve as credible legal evidence, potentially withstanding courtroom scrutiny. The approach highlights the forensic value of entomology and may serve as a procedural model in complex investigations.

Title: **The Right to Die: Assisted Suicide Between Legal Evolution and Medico-Legal Perspectives**

De Paola L. [1], Imbriani M. [1], De Martino F. [1], D'Antonio G. [1], Spadazzi F. [1], Ottaviani M. [1]

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Abstract:

Introduction

Assisted suicide represents a highly debated issue in contemporary bioethics and law. It involves an individual voluntarily ending their life with medical assistance, where the physician provides the means or information necessary but does not directly carry out the act. This distinguishes assisted suicide from euthanasia, where the physician plays an active role in causing death.

Materials and Methods

A literature review was conducted using the PubMed database with the keywords "end of life, assisted dying, Europe," focusing on studies published in the past five years, which yielded a total of 108 results. Additional manual research targeted legal and regulatory frameworks, with a particular emphasis on the Italian context. The aim was to examine the evolution of assisted suicide legislation across Europe and its medico-legal implications.

Results

The analysis revealed a progressive shift in legal frameworks, especially regarding eligibility criteria, the physician's responsibilities, and the balance between self-determination and the protection of life. In Italy, landmark rulings by the Court of Cassation have led to a notable softening of previously rigid legal restrictions, signaling a broader acceptance of patient autonomy.

Discussion

The results suggest that the right to die is gaining renewed centrality in public debate and that assisted suicide requires a multidisciplinary approach that integrates law, medicine, and ethics. It is essential to develop coherent and inclusive policies that respect individual autonomy while safeguarding the rights and responsibilities of healthcare professionals. Legislative advancements, such as those currently underway in Italy, will help shape the future of assisted suicide both nationally and internationally.

Title: **The Importance Of Scientific Evidence And Of The Integrated Multidisciplinary Approach In Complex Cadaveric Cases**

Delia A.[1], Di Paolo M.[2], Spinetti I.[2], Bortolini S.,[3] Bugelli V.[1]

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[2]Department of Surgical, Medical, Molecular Pathology and Critical Area, Section of Legal Medicine, University of Pisa

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Abstract:

The examination of human remains in an advanced state of decomposition poses a considerable challenge in forensic pathology. In such contexts, a multidisciplinary approach is essential to establish both the cause of death and post-mortem interval. The autors present a homicide case resolved through the integrated application of entomological, radiological, genetic, microanalytical (SEM), immunohistochemical and thanatological analysis. In May 2021, the decomposed body of a woman was discovered in an abandoned rural building. The corpse, partially skeletonised and wrapped in a blanket, exhibited a subtle cranial bone discontinuity.

A post-mortem CT scan revealed an oblique cranial fracture consistent with ballistic trauma. SEM analysis of cranial bone swabs detected residues of lead, barium, and sulphur, supporting the hypothesis of a gunshot injury. Immunohistochemical testing for glycophorin A showed moderate positivity, suggesting peri-mortem haemorrhage. Forensic entomology, conducted according to EAFE 2017 guidelines, identified *Calliphora vomitoria* and *Chrysomya albiceps*, allowing estimation of a minimum post-mortem interval (minPMI) of approximately three months. STR DNA profiling performed on bone samples allowed identification of the victim. Thanatological scoring yielded a Total Decomposition Score (TDS) of 14. Combined with regional temperature data (mean 9.9 °C), the overall post-mortem interval (PMI) was estimated at 4–5 months.

This case exemplifies how the combination of multiple forensic sciences enables a robust reconstruction of both the cause and time of death, even in highly degraded remains, allowing for a precise reconstruction of the event.

Title: **Work-related exposure to asbestos and criminal liability: forensic evidence from autopsies at the Institute of Legal Medicine, University of Udine**

D'Elia F. [1], Battistig L. [1], Sandoiu F.S. [2], Da Broi U. [2], Simonit F. [3], Desinan L. [2]

1 Department of Medical Surgical and Health Sciences, School of Legal Medicine, University of Trieste, Trieste, Italy

2 Department of Medicine, Legal Medicine, University of Udine, Udine, Italy

3 Department of Medicine, Legal Medicine, University of Udine, Udine, Italy. Legal Medicine Unit, ASUFC

Abstract:

Introduction Although asbestos has been banned in Italy since 1992, autopsies for presumed asbestos-related deaths remain frequent due to the long latency of related diseases. This retrospective study describes deaths subjected to autopsy by order of the Public Prosecutor's Office following documented asbestos exposure.

Materials and Methods We reviewed judicial autopsies conducted from 2016 to 2024 at the Institute of Legal Medicine, University of Udine. Inclusion criteria included explicit investigation of asbestos exposure, lung tissue analysis for asbestos bodies (National Working Group Biofibre method), confirmed cause of death, filed autopsy reports, and application of the 2014 "Helsinki Criteria."

Results A total of 132 cases met inclusion criteria: 122 males (92.4%) and 10 females (7.6%), aged 46–93 years (median 76.5). Causes of death were primary lung cancer (49.24%), pleural mesothelioma (22.73%), non-pleural mesothelioma (3%), other asbestos-related cancers (1.5%), non-asbestos-related cancers (5.3%), fibrotic interstitial lung diseases (4.55%), and other causes (13.64%).

Asbestos bodies were detected in 95.45% of cases, with counts ranging from 110 to 1,700,000 bodies/g of tissue. Occupational exposure (>1000 bodies/g) was found in 69% of cases, and a causal link between exposure and death was recognized in 58.3%. Other variables assessed included pleural lesions, occupational history, disease latency, smoking habits, and prior recognition of asbestos exposure by Italian institutions.

Discussion Given the lack of forensic guidelines on exposure thresholds, establishing shared criteria is crucial to ensure consistency in the legal evaluation of asbestos-related deaths, to establish when there was criminal negligence on the part of the employer.

Title: **Retrospective Analysis (2015-2019) Of Fatal Road Accident Cases Evaluated At The University Of Udine**

Tosku F. [1], Sechi G. [1], Perogio M. [1], Da Broi U. [2], Simonit F. [3], **Desinan L.** [2]

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3 Department of Medicine, Legal Medicine, University of Udine, Udine, Italy. Legal Medicine Unit, ASUFC

Abstract:

Introduction Injuries found in road traffic collisions provide essential informations involving crash dynamics and occupant seating position. This retrospective work aimed to give usefull informations, from evidences to proofs, in forensic practice.

Materials and Methods 49 fatal vehicles accidents cases at the University of Udine between 2015 and 2019 were screened: pedestrians and riders deaths were excluded (26 cases). Injuries were categorized for anatomical location and correlated with the victim's seating position and the collision direction, with specific search of seat belt injuries.

Results Among drivers (n = 37) the following injuries were found: 34 head/neck (91.9%), 26 left lower limb (70.3%), 24 right lower limb (64.9%), 22 thorax (59.5%), and 20 abdomen (54.1%). Front passengers (n = 8) suffered the following injuries: 7 head/neck (87.5%), 7 thorax (87.5%), right lower limb 7 (87.5%), and left lower limb 6 (75%). Rear passengers (n = 4) showed mainly head/neck and thorax injuries. In 19 frontal impacts the head/neck was involved in 18 (94.7%) cases. Left collisions showed 4 (100%) injury rates in head/neck, abdomen, and lower limbs, while right impacts involved head/neck and thorax in 2 cases (66.7%). Seatbelt injuries were found in 11 (22.4%) cases.

Discussion The location of injuries can provide useful informations on the position occupied in the vehicle; for examples, drivers suffered left lower limb injuries more frequently compared to front passengers, who suffered more frequently right limb injuries, but the most reliable injury pattern is that produced by the seat belts.

Title: **Fatal Carbon Monoxide Poisoning in a Domestic Environment: Environmental and Thanatological Scientific Evidence**

Scognamiglio L. [1], **Di Donna G**. [1], Punzo I. [1], Capasso E. [1], Niola M. [1]

[1] University of Naples "Federico II," Department of Advanced Biomedical Sciences – Section of Forensic Medicine, Via Sergio Pansini, 5, 80131, Naples, Italy

Abstract:

Introduction: Carbon monoxide (CO) poisoning is one of the leading causes of accidental intoxication, with a significant incidence in domestic settings, especially during winter. Its high danger is due to the gas's colourless, odourless, and tasteless nature, making detection difficult without specific monitoring devices. We present a forensic case involving a death due to CO poisoning in a domestic setting. The investigation revealed multiple environmental and structural factors that played a decisive role in the fatal event.

Case Report: A 15-year-old boy was found unconscious in the bathroom of his home during the night. At on-site investigation the body had been moved and placed on the bed. An autopsy was performed, revealing cherry-red lividity, pulmonary oedema, cerebral congestion, and intense pink coloration of internal organs. Toxicological tests measured a carboxyhemoglobin level of 60.1%, with no other xenobiotics detected. The prosecutor ordered a further inspection of the house together with the Fire Department, which led to detecting high CO concentrations in the room where the body was found. A malfunctioning gas boiler, lacking proper maintenance, was identified as the primary source of CO in a poorly ventilated area. The absence of CO detectors prevented timely danger detection.

Discussion and Conclusions: The death was attributed to acute CO poisoning, aggravated by multiple factors: faulty equipment, inadequate ventilation, and the lack of detection systems. The case highlighted the importance of forensic scene preservation, proper maintenance of heating systems, and safety device installation. A multidisciplinary approach—thanatological, environmental, and laboratory-based—is crucial in establishing causality and potential liabilities.

Title: **A cactus, an anatomical malformation and acute polyintoxication: the usefulness of collaboration between the forensic pathologist and the toxicologist in defining the cause of death and ascertaining the causal inference**

Di Francesco C.V.[1], Binda M.[2], Angeli I.[3], Lodetti G.[1], Minoli M.[3], Roda G.[2], Battistini A.[3]

1. Department of Biomedical Sciences for Health, University of Milan, 20133, Italy
2. Department of Pharmaceutical Sciences, University of Milan, 20133 Milan, Italy
3. Department of Biomedical, Surgical and Dental Sciences, University of Milan, 20133 Milan, Italy

Introduction:

A man was found dead in his home, with foam at his facial orifices and a cup containing a San Pedro cactus decoction nearby. His medical history revealed habitual use of alcohol, narcotics, and cactus-derived substances.

Materials and Methods:

A forensic autopsy was performed, including collection of biological samples for toxicological and histological analysis. Initial toxicological screening was conducted using LC-MS/MS, followed by detailed analysis with SPE and GC-MS/MS in MRM mode. A hair sample was also prepared and analyzed using GC-MS in scan mode, with confirmation by GC-MS/MS.

Results:

The autopsy excluded traumatic injuries. Pulmonary edema and congestion were observed, along with a rare vascular malformation: a double aortic arch. Toxicological tests identified benzofurans (stimulants) and mescaline (hallucinogen) in toxic concentrations. Hair analysis confirmed chronic use of these substances in previous months.

Discussion:

Benzofurans are psychoactive substances that cause sympathetic and serotonergic overstimulation. Limited research hampers toxicological interpretation and lethal threshold definition. Detected levels exceeded typical abuse cases, indicating toxicity. Mescaline, though psychoactive, wasn't clearly fatal. The aortic malformation can cause tracheoesophageal compression, which becomes clinically relevant when combined with sympathomimetic substances like benzofurans. Their effects increase cardiovascular and respiratory demands, potentially leading to acute failure. The manner of death probably stemmed from the interaction between anatomical vulnerability and acute drug intake. The inability to establish definitive causality highlights current gaps in knowledge on new psychoactive substances and underscores the need for integrated autopsy and toxicological evaluation.

Title: RETROSPECTIVE ANALYSIS OF SUICIDE CASES IN THE PROVINCE OF FERRARA

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[3]Dipartimento di Scienze Mediche, Università degli Studi di Ferrara

Abstract

INTRODUCTION

In 2016, the Postgraduate School of Forensic Medicine of the University of Ferrara presented a paper at the Annual Congress of the AAFS that analyzed some characteristics of suicides in the territory of the Province of Ferrara between 1996 and July 2016. This presentation is intended to stand as an ideal follow-up to that work.

Since 2017, the number of suicides in Italy has been progressively decreasing and peaked in 2021 (0.40 per 10,000 inhabitants). In Emilia-Romagna, available data confirm a steady decline in the number of suicides since 2001.

MATERIALS AND METHODS

Records collecting necrosectorial activity of the Institute were retrospectively analyzed. During the period between August 2016 and April 2025, about 1000 autopsies were performed, 153 of which involved suicide cases. For each of these autopsies, factors regarding the people who committed suicide, as well as the suicide method and the type of activity carried out by the Institute pathologists were examined.

RESULTS AND DISCUSSION

Among deaths by suicide, 77% are male (118 vs 35), with percentages not dissimilar to those between 1996 and 2016.

The most frequently used suicide method is confirmed to be hanging (49%), followed by the use of firearms (15.6%) and precipitation (9.8%).

Suicide cases come to the attention of the Institute overwhelmingly at the request of the Judicial Authority (87.2%) with judicial autopsy performed in 60% of cases.

Thus, the data collected show that suicide trends have not changed over the past nine years and are in line with national data.

Title: **Empirical Molecular, PAthological, Toxicological and Histological Investigation Chainwork: proposal of a protocol for sudden death in the young**

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6. Cardiovascular Genetic Center, University of Girona-IDIBGI, Girona, Spain
7. Section of Legal Medicine, Fondazione Policlinico A. Gemelli IRCCS, Rome, Italy

Abstract:

Introduction:

Sudden cardiac death in young individuals represents a major public health concern and a significant challenge in forensic medicine, particularly when illicit drug use coexists with genetic predispositions to cardiac disorders. In these complex cases, determining whether the cause of death is attributable to drug consumption or an underlying natural condition is essential due to its implications in both public health and legal contexts.

Materials and methods:

A comprehensive literature review was conducted to identify the main interactions between illicit substances and genetic predispositions to cardiac arrhythmias, aiming to propose a forensic investigation protocol for sudden cardiac death in young individuals where substance use is suspected. The review integrated pathological, toxicological, and genetic data, with particular attention to cases in which toxicological findings might not provide immediate diagnostic clarity.

Results:

The analysis focused on substances most commonly associated with cardiac fatalities: alcohol, cocaine, amphetamines, cathinones, opioids, cannabis, and hallucinogens. During the presentation, a forensic protocol will be outlined, structured into three main scenarios:

1. Substance levels above lethal concentrations, with or without histological signs of arrhythmogenic predisposition;
2. Substance levels exceeding clinical toxicity but below lethal concentrations, with or without histological indicators of arrhythmogenic predisposition;
3. Substance levels below clinical toxicity concentration, with or without microscopic findings suggestive of an underlying arrhythmogenic condition.

Discussion:

Implementing this integrated approach is essential to ensure an accurate and comprehensive forensic diagnosis, with significant implications for both judicial proceedings and public health prevention.

Title: The role of forensic entomology in the estimation of minPMI in a case of body displacement and concealment

Doci K.[1], Manelli L.[2], Buzzelli A.[1], Bugelli V.[1]

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INTRODUCTION

Forensic Entomology plays a crucial role in medico-legal investigations, especially in the estimation of the minimum post-mortem interval (minPMI) and the analysis of potential body displacement or concealment.

CASE DESCRIPTION

This case report describes a homicide case in which the body of a 40-year old man was found at the bottom of a well, wrapped in blankets, with the face sealed by a plastic bag and adhesive tape, and the limbs bound with nylon rope. The man was last seen alive about 34 days before the discovery of the body. Entomological samples were collected from the body and clothing and later analysed. Thermal analysis, recorded by a data logger positioned in the pit, showed a stable environmental temperature of 14.3°C, ruling out significant temperature changes in the period before the body's discovery. Taxonomic identification revealed the presence of *Calliphora vomitoria* (minPMI: 20 days), *Fannia canicularis* (minPMI: 6 days), and *Muscina stabulans* (minPMI: 11 days).

DISCUSSION

The body was initially placed in an area inaccessible to insects and then wrapped in blankets, a plastic bag and adhesive tape was placed on the face. This likely caused a delay in insect oviposition, which has an impact on the distance between the minPMI estimation using insect evidence, and the real PMI In conclusion, this study demonstrates the utility of entomological evidence for minPMI estimation in cases of cadaver displacement and concealment, enabling the temporal reconstruction of perimortem events.

Title: **Pellets or Buckshot? The Evidentiary Value of Ballistic and Forensic Medical Expertise in a Case of Homicide and Personal Injury**

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[2] Centro di Medicina Legale, INAIL, via Roma 419, 94100, Enna.

Abstract

This case report outlines the forensic reconstruction of an incident in which two individuals, G.D. and C.D., sustained gunshot wounds. The forensic assessment focused on shooting distance, bullet trajectory, and the relative positions of the shooter and victims, evaluating the compatibility with different firearm types. The case highlights the role of combined ballistic and forensic medical expertise in firearm injury analysis.

G.D. died at the scene due to three gunshot wounds causing bilateral hemothorax and aortic laceration. Autopsy revealed multiple projectile injuries consistent with 11/0 buckshot. C.D. survived and was hospitalized with multiple wounds: three entry points on each shoulder, tangential injuries to the left temporal region, and right lateral thoracic wall. Forensic examination of seized materials (cartridge cases, an unfired shell, wads, and pellets) indicated all were consistent with a 12-gauge shotgun loaded with 11/0 buckshot. Comparative ballistic analysis confirmed that all five spent cases were fired from the same firearm. G.D.'s injuries were consistent with three shots fired from distances ranging between 3 and 7 meters, while C.D. was likely struck by two shots fired from approximately 10–12 meters, using the same type of ammunition. The initial hypothesis of two different weapons—one loaded with pellets and the other with buckshot—was not supported. The metallic fragments found in C.D.'s temporal region were attributed to buckshot fragmentation. Shooting distance estimation was based on shot dispersion and wound morphology. In conclusion, ballistic evidence supports the use of a single 12-gauge shotgun with 11/0 buckshot in both victims' injuries.

Title: CHARM: Comparative Healthcare Acquired infections medico-legal Risk Management

Ferretti G.[1], Grassi S.[2], Focardi M.[1], Barranco R.[3,4], Ventura F.[3,4], Pinchi V.[1]

1 Sezione di Scienze Medico Forensi – Dipartimento di Scienze della Salute, Università degli Studi di Firenze

2 Laboratorio sulla Gestione dei Sinistri sanitari (LOGOS) – Dipartimento di Scienze della Salute, Università degli Studi di Firenze

3 Sezione di Medicina Legale – Dipartimento di Scienze della Salute, Università degli Studi di Genova

4 UOC Medicina Legale – Ospedale Policlinico San Martino di Genova

Abstract:

Introduction Every hospital in Italy that retains the medico-legal risk has different management strategies for medical malpractice claims (MMC) related to healthcare-acquired infections (HAI). Hence, we performed a comparative operational risk analysis in two different tertiary university hospitals (Careggi in Florence – FI - and S. Martino in Genoa - GE).

Materials and methods Only MMC allegedly related to HAI were considered. During the study period, in FI MMC were analyzed by a management committee that included experts in prevention and control of the infections, while in GE by two independent committees, a management committee and another specialized on the infectious risk. Variables of interest (stored up to the first trimester of 2022) were: date of incident, date of incident report/claim, administrative status of the claim, paid compensation (if any), and involved medical specialty. Operational risk analysis was evaluated as the resultant of: F- claims frequency, risk of loss (extrajudicial or judicial) as final outcome, and C- the cost of MMC.

Results F best fitted in FI with a negative binomial distribution (mean: 11.0, variance of 26.0) and in GE with a Poisson distribution (mean: 8.43). R was 0.51 for FI and 0,69 for GE. In both hospitals the highest concentrations of MMC fell into the 10’000-300’000 euros range with a mean compensation of 149.157 € for FI and of 123.679 € for GE. The two most impactful variables on economic cost were the involved medical specialty and the time required to close the MMC.

Discussion Our study showed that, albeit the frequency of the MMC is different, the MMC still tend to fall in the same cost ranges. Despite relatively few data impair full statistical representativeness, a management strategy based on a single management team was associated

with a higher probability of no losses. Medical specialty and the time spent to close the case most influenced the economic outcome.

Title: **ORACLE: O**rganizational **R**isk **A**nalysis of medical malpractice **C**laims based on **L**oss **E**xposure

Ferri E.[1], Grassi S.[2], Focardi M.[1], Costantino A.[1], Guerini M.[1], Bianco E.[3], Matarrese D.[4], Pinchi V.[1]

1 Medical Forensic Science Section - Department of Health Sciences, University of Florence
2 Laboratory on Health Claims Management (LOGOS) - Department of Health Sciences, University of Florence
3 Health Director - Careggi University Hospital
4 General Director - Careggi University Hospital

Abstract:

Introduction: Healthcare-acquired infections (HAI) represent a double cost for hospitals, since both prevention/control of infections and relative medical malpractice claims (MMC) management are expensive processes. Predictors of loss are then pivotal for the management of medico-legal risk. In this paper, we developed a prediction tree for HAI MMC based on the data of the Careggi University Hospital (Florence, Italy).

Materials and Methods: Variables of interest (stored up to the first trimester of 2022) were: age and sex of the patient, date of incident, date of incident report/claim, administrative status of the claim, paid compensation (if any), involved medical specialty, recognition of the infection as HAI, presence of virus/gram-positive bacteria/gram-negative bacteria (and type of germ). Association rules were based on conviction (indicating how much prediction depends on the predictor), Zhang's metric (indicating the strength of the negative/positive association between items), Jaccard index (indicating how often the items tend to co-occur), certainty (indicating how much the probability of an item under another is higher or lower than the probability of a single item) and Kulczynski (mean of the probability of an item under another and viceversa). Data management, selection of frequent itemsets, generation of association rules and calculation of relevant metrics were obtained through data mining tools of Python packages (Python Software Foundation, USA).

Results: We developed an analytical tree that stratifies the likelihood that a MMC is closed without compensation that considers these dichotomous (YES/NO) variables for its ramifications: recognition of the infection as HAI, presence of virus, presence of Staphylococcus epidermidis, presence of gram-positive germs, combined presence of gram-negative germs, biological sex.

Discussion: Our study found that besides sex, microbiological characteristics of the HAI (e.g., causative germ, combined infection) impact on the risk of losses, with some specific germs associated with a higher economic exposure.

Title: **Bang bang, he shot him down. Bang bang, he hit the ground. A trident harpoon as the murder weapon of a homicide: a case report**

Filippucci F.[1], Oliva F.[1], Buscemi L.[1]

[1] Institute of Forensic Medicine, Department of Biomedical Sciences and Public Health, Università Politecnica delle Marche, Ancona, Italy

Abstract:

Spear gun shots represent unusual murder weapons, rarely described in forensic literature. Most studies investigate surgical approaches from survivors attacked by harpoons. In this report, we present the first case of homicide due to a trident harpoon, normally used for underwater freediving fishing, where killer and victim argued for a parking space on a city street. The killer hit the victim with an unusual weapon in an atypical setting. After he committed the homicide, the killer fled and went fishing for octopus with the same spear gun. The police arrested him a few hours later. Forensic investigations permitted us to focus on particular lesions perpetrated by the trident harpoon and to explore physics' laws behind this atypical weapon. This assessment is significant for forensic investigators in order to underline the importance of ballistic studies and it has allowed the authorities to verify the intentionality of the killer.

Title: **A fatal intoxication by escitalopram. A case report**

Filippucci F.[1], Oliva F.[1], Di Mascio G. [1], Possanzini C. [1], Cintio M. 1, Montana A.[1], Zamparese R. [1], Pesaresi M.[1]

[1] Institute of Forensic Medicine, Department of Biomedical Sciences and Public Health, Università Politecnica delle Marche, Ancona, Italy.

Abstract:

Escitalopram is an antidepressant belonging to the class of selective serotonin reuptake inhibitors (SSRIs), commonly used in clinical practice.

In this case, a 73-year-old male was found dead at home 10 days after his wife died. No external evidence of external injuries was revealed. The crime scene showed numerous empty blister packs of escitalopram. An autopsy was performed and it did not reveal any macroscopic significant lesions justifying the cause of death. In order to better understand the cause of death, histological and toxicological analyses were performed on tissues and biological fluid samples.

Specifically, liver biopsy showed microscopic patterns characteristic of acute hepatitis, while toxicological-forensic analysis of blood samples detected escitalopram at concentration of 599,2 ng/mL, markedly above the therapeutic range.

The integration between autopsy findings and the review of the scientific literature, allowed us to determine this escitalopram concentration as the main causal factor of the fulminant hepatitis.

Within the scientific literature reviewed, and given the elucidation of escitalopram's pathogenic mechanism, this case report is characterized as exceptional due to the exceedingly high plasma concentration of the drug used in monotherapy.

Title: **The Importance of Scientific Evidence in Demonstrating Causation in Civil Medical Malpractice Liability**

Gabrielli F. [1], Bugelli V. [1]

1 Institute of Legal Medicine, University of Parma, via Gramsci 14, Parma (PR)

Abstract:

The authors present a case of civil medical malpractice involving a general practitioner and a dermatology specialist. In cases where a contractual obligation exists (as was the case between the general practitioner and their patient at the time of the events), the burden of proof lies with the accuser to demonstrate the existence of the contract, the occurrence of harm, and the causal relation between the conduct and the damage. The defendant, instead, must prove that they acted appropriately.

In our case, the patient—a 75-year-old woman with a medical history of hypertension, severe obesity, and chronic venous insufficiency with a varicose ulcer on the left lower limb, previously treated with a homologous skin graft—died of a pulmonary thromboembolism in the emergency room. In the weeks leading up to her death, she was examined at home by her general practitioner, who noted edema in the left upper limb, which was interpreted as positional (with a recommendation for a breast examination). A few days before her death, she was also seen by the dermatologist, who made no mention of the upper limb. Upon presenting to the emergency room, the patient exhibited dyspnea and tachypnea; a chest CT scan revealed extensive bilateral pulmonary embolism affecting both the right and left pulmonary arteries.

The peculiarity of this case is that, during the expert assessment, the accuser argued for a causal relation on the assumption that the pulmonary embolism originated from the left upper limb, despite no mention of this in the emergency department report. The defense contested the causal link, pointing out that, according to current medical literature, the embolism was more likely to have originated from the lower limbs. However, decisive evidence was obtained during the expert evaluation (CTU), when the judge authorized access to the chest CT images. With the assistance of a radiology specialist, thrombosis of the axillary and subclavian veins was identified, confirming the causal link and the professional liability of The doctors involved.

Title: **May – Thurner syndrome: a case report of a lethal undiagnosed left iliac vein thrombosis**

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[1] Department of Anatomical, Histological, Forensic and Orthopedic Sciences, Sapienza University of Rome

2 Department of Occupational Medicine, University of Rome Tor Vergata

Abstract:

Introduction: May-Thurner syndrome (MTS), also known as iliac vein compression syndrome, is a pro-thrombotic condition caused by the compression of the left iliac vein by the right common iliac artery, often resulting in deep vein thrombosis (DVT). MTS accounts for 2-5% of all DVT cases and is often underdiagnosed due to the difficulty of assessing the deep pelvic veins.

Case description: We present the case of a 63-year-old female with a history of Crohn's disease and scoliosis, who developed lower limb pain and venous ulcers. Despite negative Doppler ultrasound and exclusion of other conditions such as diabetes and vasculitis, the patient deteriorated after a fall, leading to cardiogenic shock and death. Autopsy revealed a thrombus in the left iliac vein and a thrombo-embolic formation in the inferior vena cava, causing fatal venous obstruction. Histological examination confirmed thrombotic formations in both sites.

Discussion: This case underscores the importance of comprehensive evaluation in patients with lower limb ulcers and pain, as Doppler ultrasound alone may not detect deeper venous abnormalities such as MTS. Advanced imaging techniques, including multi-detector computed tomography venography or magnetic resonance venography, may be necessary to diagnose MTS in such cases, preventing life-threatening complications.

Title: **Study of non-self DNA transfer, persistence, prevalence and recovery on cigarette butts in different scenarios**

Gianfreda D.[1], Corradini B.[1], Ferri G.[1], Ferrari F.[2], Borciani I.[1], Cecchi R.[1], Santunione A.L.[1]

[1] Institute of Legal Medicine, Department of Biomedical, Metabolic and Neural Sciences, University of Modena and Reggio Emilia, Modena, Italy.

[2] Institute of Legal Medicine, University Hospital of Modena, Modena, Italy.

Abstract:

Introduction

In forensic genetics analysis is nowadays essential to evaluate results considering activities that led to evidences. Daily actions are often used by suspects as alibis to justify their DNA, complicating the judicial proceedings.

Materials and methods

To deepen the understanding of activities leading to mixed profiles on cigarette butts and legal implications of such findings, ten pairs of smoker partners are asked to simulate two scenarios: each volunteer smokes a cigarette (traditional, IQOS or e-cigarette filtered, hand-rolled) at set time intervals after kissing (from immediately, to 3 hours); both partners shared a cigarette. The goal is to analyze how much DNA is transferred, to whom it belongs, how long is detectable after the kiss and at what proportion. The study also aims to assess the impact of degradation and filter composition on statistical analyses power.

DNA is extracted from reference swabs and from cigarette butts at various time points with QIAamp DNA Investigator Kit on QIAcube Connect, quantified with PowerQuant® System Kit on 7500 Real-Time PCR System, genetic profiles obtained using PowerPlex® Fusion and Y23 Kits were analyzed with SeqStudio HID Genetic Analyzer and GeneMapper™ ID-X Software.

Results

Preliminary results show partner's DNA alleles up to 2 hours after kissing, even in non-immediate extractions, partial Y profiles in the butts of female volunteers after more than an hour: individual variability and degradation make interpretations more complex.

Discussion

The study highlights the complexity of interpreting mixed traces generated by indirect contact and the crucial influence of time on statistical power of genetic results.

Title: **Chorioamnionitis in Intrauterine Fetal Death: A Forensic Histopathological Case Study**

Grosso E. [1], Fabris P. [1], Secco L. [1], Palumbi S. [1], Giordano R. [1], Franchetti G. [1]

[1] Legal Medicine and Toxicology, Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padova – Via G. Falloppio 50, Padova, Italy

Abstract:

Chorioamnionitis is an inflammatory process affecting the placental amniochorionic membranes, characterized by a maternal and/or fetal neutrophilic response to bacterial infections. This condition has a high incidence in preterm births and stillbirths and is frequently subject to medicolegal assessment in cases of suspected medical malpractice, with particular focus on its identification and evaluation of its causal role in death.

We present two cases of intrauterine fetal death investigated for suspected medical malpractice at the Institute of Legal Medicine of Padua (Italy). In both cases, histological examination revealed acute chorioamnionitis, although with differing roles in the cause of death.

The first case involved a fetal death during spontaneous preterm labor (GA 22+5), where the cause of death was identified as acute cardiac failure induced by acute chorioamnionitis due to Gram-positive bacteria and fungi, extending to the fetus with the involvement of the lungs and brain.

The second case concerned a full-term stillbirth (GA 41+3) during induced labor following the absence of fetal heart activity. Histological analysis revealed focal acute chorioamnionitis associated with chorionic vasculitis, without signs of inflammation or infection in the umbilical cord or fetal organs. Summary of clinical documentation and autopsy findings led to a diagnosis of SIUD (Sudden Intrauterine Unexplained Death). In both cases, no evidence of medical liability was found.

In conclusion, these two cases illustrate how histological findings of chorioamnionitis should be carefully evaluated and integrated with clinical and pathological data in order to determine the cause of death and assess potential medical malpractice.

Title: Obsessive-Compulsive Symptoms in Victims of Gender-Based Violence: Medico-Legal Implications

Gualtieri G. [1], Lipari S. [1], Bertolucci I. [1], Pozzi A. [1]

[1]University of Siena, Department of Medical, Surgical and Neurosciences

Abstract

Introduction:

Numerous studies have highlighted a correlation between gender-based violence and obsessive-compulsive symptoms (OCD), especially among women who have experienced abuse. Frequent symptoms include mental contamination, washing and checking compulsions, guilt, self-directed disgust, and avoidance behaviors. Despite their clinical relevance, these manifestations often go underdiagnosed, affecting both therapeutic outcomes and forensic evaluations.

Materials and Methods:

A systematic literature review was conducted between June and August 2023 using PubMed, MEDLINE, and Google Scholar. The keywords "gender-based violence" and "obsessive-compulsive disorder" were combined using the Boolean operator AND. Included studies focused on female victims of gender-based violence with OCD symptoms identified through validated tools and presenting quantitative and/or qualitative data. Studies on other psychopathologies or unrelated forms of violence were excluded.

Results:

From 682 initially identified articles, 23 met inclusion criteria. OCD prevalence was 6% among women who had experienced gender-based violence, compared to 2% in control groups. The most commonly reported symptoms included compulsions (washing, checking), intrusive thoughts, mental contamination, and avoidance. A persistent sense of guilt was frequently reported, particularly when the perpetrator was someone the victim trusted.

Discussion:

Recognizing specific psychopathological symptoms in victims of gender-based violence supports effective therapeutic interventions and can contribute to legal protection when adequately documented. The use of validated medico-legal protocols is essential to bridge clinical observations with evidentiary needs. Training healthcare professionals to identify psychological trauma signs can improve care, reduce misdiagnosis risks, and enhance the protection of victims' rights.

Title: Moral Distress and the Safety of Care: Scientific Evidence and Applications in Clinical Risk Management

Gualtieri G.[1], Macrì P.[2], Gorini A.[3], Viganò G.[4], Cesa S.[4], Parati M.[5], Casati M.[4], Marchetti F.[1], Fiaschi L[1]., Pozza A.[1]

1 University of Siena, Department of Medical, Surgical and Neuroscience Sciences

2 Azienda USL Toscana Sud Est, Department of Legal Medicine and Protection of Rights

3 University of Milan, Department of Clinical and Community Sciences.

4 Azienda Socio-Sanitaria Territoriale Papa Giovanni XXIII of Bergamo.

5 Istituti Clinici Scientifici Maugeri IRCCS.

Abstract

Introduction:

Moral Distress (MD) occurs when healthcare professionals recognize an ethically appropriate action but are unable to carry it out due to institutional or relational barriers. While MD has been linked to the quality of care, Italy lacked a validated and widely shared tool to assess it across healthcare settings.

Materials and Methods:

A cross-sectional, multicenter observational study was conducted in hospitals and territorial services of ASL Toscana Sud-Est and ASST Papa Giovanni XXIII of Bergamo. The Italian version of the Measure of Moral Distress for Healthcare Professionals (MMD-HP) and the Ethical Leadership Scale were used. Questionnaires were administered online to a diverse sample of healthcare professionals. Analyses focused on factor structure, internal consistency, and correlations between MD and perceived ethical leadership.

Results:

The sample included 567 participants (mean age 43; 74% female). The MMD-HP showed excellent internal reliability ($\alpha = 0.96$). Significant differences in MD levels were observed among professional categories and care settings (e.g., intensive vs. rehabilitative). A significant negative correlation was found between MD and perceptions of ethical leadership by service coordinators, indicating that a positive ethical climate is linked to lower MD levels.

Discussion:

The findings support the validity and reliability of the Italian MMD-HP, confirming its usefulness in clinical contexts. The association with ethical leadership highlights the potential of educational and organizational strategies to reduce MD. Recognizing and measuring MD is crucial for supporting ethical decisions and managing clinical risk. Standardized tools like the

MMD-HP enable the integration of staff distress data into predictive models for adverse events.

Title: **"It's a ME...MA! The missing piece in unraveling aortic dissection fatalities"**

Imbriani M. [1], Marchesini D. [1], Piras G. [1,2], Manta A.M. [1], La Greca M. [1], Baldari B. [1]

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[2] Regione Veneto, Azienda ULSS1 Dolomiti, Dipartimento di Prevenzione.

Abstract

Introduction

Acute aortic dissection (AAD) is a life-threatening condition characterized by a tear in the inner layer of the aorta, leading to impaired blood flow, organ failure, and sudden death. Due to its rapid onset and nonspecific symptoms, postmortem examination is often essential for accurate diagnosis.

Case description

We analyzed three fatal cases of AAD. The first involved a 41-year-old male found dead at home, with toxicology positive for cocaine; autopsy revealed hemopericardium secondary to ascending aortic rupture. The second case concerned a 44-year-old male who died shortly after hospital admission, with an autopsy showing aortic dissection extending through multiple segments. The third case involved a 12-year-old male initially discharged after presenting with chest pain; he was later found unresponsive, and autopsy revealed thoracic aortic dissection along with physical features suggestive of Marfan syndrome. Despite differing clinical presentations, all three cases showed histological evidence of mucoid extracellular matrix accumulation (MEMA), underscoring its potential role in aortic wall weakening.

Discussion

Our findings highlight the importance of systematically performing histological examination in cases of acute aortic pathology identified at autopsy, to detect specific pathological patterns that are essential for accurately determining the etiopathogenesis of death. The detection of rare and often underreported morphostructural alterations—such as MEMA—is particularly significant, given their potential medico-legal implications, especially in assessing potential profiles of professional liability.

Title: **Missed Radiological Diagnosis of Fatal Intestinal Volvulus: Autopsy Identification in the Adult and Medico-Legal Considerations**

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1 Unit of Legal Medicine, Department of Medical and Surgical Science, University of Bologna, Bologna, Italy.

Abstract: A 77-year-old man presented to the Emergency Department with abdominal pain and vomiting. Laboratory results showed elevated inflammatory markers and abdominal imaging was negative for signs of intestinal obstruction. The patient's condition rapidly deteriorated, leading to death 32 hours after admission. A judicial autopsy, requested due to suspected medical malpractice, revealed an ileo-jejunal volvulus with intestinal necrosis and peritoneal effusion, without signs of perforation. Upon review of the imaging, the court-appointed radiology expert identified clear signs of intestinal obstruction and small bowel volvulus (SBV). While the medico-legal cause of death was determined to be septic shock secondary to peritonitis caused by intestinal ischemia due to SBV, the radiologist's failure to recognize the condition – despite its rarity in adults – raised concerns regarding how such a diagnostic oversight could occur in a senior professional with many years of hospital experience. Analyzing errors in radiology is particularly complex, due to the subjective nature of image interpretation, and for the presence of cognitive and human factors, that may predispose physicians to follow mental shortcuts that are not always reliable, known as cognitive biases. In this case, specific attention is given to the roles of availability bias, zebra retreat bias, contextual bias, base rate bias, confirmation bias and cascade bias. Finally, the potential of Artificial Intelligence (AI) models in medical imaging to support clinical decision-making is explored, highlighting the fact that AI tools themselves may be influenced by cognitive biases, representing a growing challenge for both radiologists and forensic experts.

Title: **From Body To Identity: The Identification Process Overcomes The Sea**

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[1] Università degli Studi di Bari. Sezione di Medicina Legale – DIM. AOUC Policlinico di Bari.

[2] S.S.D. Medicina Legale e Rischio Clinico. Ospedale "Santissima Annunziata" di Taranto.

Abstract:

Introduction: Forensic odontology offers a highly accurate and scientifically reliable means of human identification, particularly valuable in cases where conventional methods—such as fingerprint or facial recognition—are compromised by advanced decomposition or environmental factors.

Case description: This contribution presents the case of a severely decomposed human body recovered from the rocky coastline of the Brindisi province. The absence of primary identifiers (documents, fingerprints, or visible distinguishing marks), combined with a recent missing person report concerning a woman allegedly deceased by suicide in the Abruzzo region, prompted the initiation of a comparative dental identification protocol. Post-mortem examination allowed the retrieval of mandibular and maxillary segments. After meticulous cleaning and preparation, a post-mortem orthopantomogram (OPT) was acquired and compared with an ante-mortem OPT from the suspected missing individual. The analysis demonstrated full congruence of distinctive anatomical features—including root morphology, pulp chamber configuration, and alveolar bone contours—enabling a positive identification with a high degree of scientific confidence. No discordant features were observed.

Discussion: This case highlights the robustness of forensic dental analysis, particularly under challenging conditions such as prolonged aquatic immersion and advanced putrefaction. Even in the absence of dental restorations, the unique anatomical characteristics of the dento-maxillofacial complex support a reliable and conclusive identification. The case reaffirms the central role of comparative odontology in modern forensic practice, especially when other biometric approaches are rendered ineffective.

Title: **Multidisciplinary Analysis of Carbonized Skeletal Remains: Differential Diagnosis Between Thermal Injuries and Perimortal Trauma**

Malta G.[1], Pellerito S. [1], Puntarello M [1]., D'Anna T. [1], Lo Re G.[2], Zerbo S. [1], Albano G.D [1]., Argo A. [1]

[1] Department of Maternal and Child Health Promotion, Internal Medicine and Specialty Excellence (PROMISE), University of Palermo;

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Abstract:

Introduction: The forensic examination of burned skeletal remains presents significant challenges in both personal identification and determination of cause and manner of death. High-temperature exposure induces complex morphostructural and histochemical changes in bone tissue, necessitating a comprehensive, multidisciplinary approach to analysis.

Methods: This study integrates macroscopic, radiological, and histological analyses to investigate thermal alterations in bone. Particular focus is placed on the role of post-mortem computed tomography (PMCT) in virtually reconstructing skeletal structures, identifying trauma patterns, and distinguishing between heat-related modifications and antemortem injuries. An extensive review of forensic and anthropological literature, supplemented by original casework, informs this investigation. Specific attention is given to colorimetric changes, fracture morphology, and mineral density variations to estimate exposure temperature and duration.

Results: Case studies spanning various forensic contexts—such as vehicular fires and open-air combustions—demonstrate how combustion effects vary based on anatomical site, body position, and fire dynamics. Notably, PMCT proves effective in differentiating between heat-induced epidural hematomas and blunt force trauma, a critical diagnostic challenge. Comparative data also highlight the value of integrating entomological, toxicological, and ballistic findings to enhance interpretative reliability.

Discussion: The findings underscore the necessity of a standardized, multidisciplinary protocol for analyzing thermally altered remains. Future directions include the refinement of quantitative techniques, particularly RGB and LAB colorimetry, to reduce subjective bias and improve forensic reconstructions of perimortem events. This study reinforces the importance of developing objective criteria for the medico-legal interpretation of burned bodies.

Title: "**Designed to Die: A Case of Suicide through Remote-Activated Machinery"**

Marchesini D. [1], Imbriani M. [1], Piras G. [1,2], La Greca M. [1], Baldari B. [1]

1 Department of Anatomy, Histology, Forensic Medicine and Orthopaedics, Sapienza University of Rome, Italy

2 Regione Veneto, Azienda ULSS1 Dolomiti, Dipartimento di Prevenzione

Abstract:

Introduction. Unusual suicide methods involving heavy machinery pose significant challenges in the forensic determination of the manner of death. This case highlights the importance of scene-based evidence in reconstructing a complex deliberate fatal act and illustrates how structured scientific analysis contributes to the formation of a reliable cause-of-death determination in ambiguous contexts.

Case Description. A 43-year-old man was found dead inside a private warehouse, with his head trapped beneath the front blade of a loader vehicle. The body was in a prone position, lying perpendicularly to the axis of the front blade. The blade rested firmly on the posterior cervical and cranial regions. The deceased was employed at the company operating the facility and had unrestricted access to both the premises and the machinery. A 4.3-meter-long purple load strap with terminal loops was tied to the hydraulic control lever, enabling remote blade activation. The strap's opposite end was located near the body, suggesting intentional manipulation by the victim. The vehicle was turned off at the time of discovery. On-scene documentation included photographic evidence of the body and machinery configuration, and the seizure of the strap as physical evidence. No signs of third-party involvement were noted. The mechanical controls of the vehicle were intact and consistent with deliberate use. Surveillance footage confirmed that the victim entered the facility alone, tested the machinery multiple times, and ultimately activated the hydraulic blade remotely while positioned beneath it.

Discussion. Photographic documentation and autopsy findings were consistent with the video analysis. The autopsy revealed fatal cervico-cranial trauma, including internal decapitation and extensive hemorrhagic infiltration of the cervical musculature. The injury pattern was anatomically compatible with the reconstructed mechanical event, and no defensive injuries were observed. Histological examination confirmed extensive hemorrhagic infiltration and tissue disruption consistent with the compressive trauma. This case underscores not only the value of multidisciplinary forensic investigation, but also the critical role of a detailed medico-

legal scene inspection in guiding the reconstruction of complex deaths involving machinery. When direct eyewitness accounts or conventional evidence are lacking, the integration of dynamic scene analysis, digital video review, technical inspection, autopsy, and histological findings allows for the construction of a coherent scientific narrative. It exemplifies how scientifically grounded, convergent findings may support a non-contestable conclusion in the forensic and judicial setting, particularly in rare and technically complex suicides.

Title: "**Cheers to death: fatal acute intoxication following ingestion of a homemade liquor. A case report".**

Marchesini D. [1], Manta A.M. [1], Imbriani M. [1], Spadazzi F. [1], Ottaviani M. [1], David M.C. [1], Aromatario M. [2]

1 Department of Anatomy, Histology, Forensic Medicine and Orthopaedics, Sapienza University of Rome, Italy

2 INMP, Istituto Nazionale Salute, Migrazioni e Povertà, Rome, Italy

Abstract:

Introduction.

Death following the ingestion of a seemingly innocuous drink may remind one of something related to espionage fiction, yet the forensic implications are very real. This case concerns a fatal intoxication involving nitrobenzene and aniline—two industrial compounds capable of inducing methemoglobinemia and ultimately cardiorespiratory failure. It underscores the complexity of diagnosing chemically induced death and highlights the value of integrative forensic methodology.

Case Description. A 62-year-old man was admitted to the hospital shortly after ingesting a homemade liqueur offered during a private dinner. He had developed nausea, vomiting, psychomotor agitation, cyanosis, and progressive confusion. Other guests who consumed the same drink developed similar symptoms. Despite intensive care treatment, he died a few hours later. Post-mortem examination showed non-specific findings, with no evidence of traumatic injuries. On the other hand, toxicological analysis reported the presence of nitrobenzene and aniline in the blood and tissues. These substances are known to impair oxygen transport by promoting the formation of methemoglobin, a non-functional variant of hemoglobin.

Discussion. Although no methemoglobin measurement was available, the convergence of toxicological data, histological findings, clinical chronology, and circumstantial evidence supported the diagnosis of fatal methemoglobinemia. This case illustrates how scientific evidence can be constructed through the integration of multiple partial findings—each individually insufficient but collectively robust. It exemplifies the essential contribution of multidisciplinary forensic investigation in producing coherent, defensible conclusions, especially when direct parameters are lacking. Such an approach reflects the evolving role of forensic medicine in providing scientifically grounded, process-relevant expertise.

Title: **"Ketamine Use and Road Safety: Insights from a Systematic Literature Review"**

Marchesini D[1]., Lippi M. [1], Rinaldi R. [1], Marinelli E. [1]

1 Department of Anatomy, Histology, Forensic Medicine and Orthopaedics, Sapienza University of Rome, Italy

Abstract

Ketamine and its enantiomer esketamine are increasingly used in clinical and recreational settings, raising concerns about their potential impact on driving performance and road safety. Understanding the association between ketamine intake and driving impairment is crucial for clinical recommendations and medico-legal evaluations.

Methods

A systematic review was conducted according to PRISMA guidelines. Comprehensive searches were performed in PubMed, Scopus, and Cochrane Library databases up to April 2025, using combined terms related to ketamine/esketamine and driving impairment or traffic accidents. A total of 558 references were initially identified, of which 41 full-text articles were included for qualitative synthesis. Both experimental and epidemiological studies were analyzed.

Results

Preliminary analysis indicates that acute ketamine administration significantly impairs driving performance in both simulated and real-world conditions, notably affecting lateral vehicle control, cognitive functioning, and reaction times. Epidemiological studies report an increasing detection of ketamine among drivers involved in traffic accidents, frequently in association with polydrug use. Substantial heterogeneity in study designs, populations, and outcome measures was observed.

Conclusions

This systematic review highlights that ketamine use, particularly at subanesthetic doses, leads to measurable impairments in driving performance. Experimental data consistently show acute deterioration of driving-related skills within the first hours after administration, while epidemiological evidence supports an association between ketamine detection and increased accident risk. Instead, clinical studies on intranasal esketamine indicate no significant impairment of driving performance when driving is resumed at least 6 to 18 hours after administration, depending on the dosing regimen and patient characteristics. These findings have important medico-legal implications for fitness-to-drive assessments, attribution of

responsibility in traffic accidents, and development of guidelines for driving restrictions following ketamine exposure.

Title: Sudden death from ruptured cardiac aneurysms: description of two autoptic cases

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[*2] Legal Medicine Unit, Policlinico San Martino Hospital, Largo Rosanna Benzi 10, 16132, Genova, Italy

Abstract:

Introduction. Cardiac aneurysms can cause cardiac death following rupture. Different areas of the heart can be affected, with different etiopathology. We present two autopsy cases of death from cardiac tamponade due to cardiac aneurysm rupture, one right atrial and one left ventricular.

Description of the case. First case: 71-year-old man, with a known atrial fibrillation. During the diagnostic check-up, hemopericardium and cardiomegaly were detected (1055 grams). A large aneurysm (6 x 5 cm) was evident in the right atrium, the wall of which presented an evident rupture point. After isolation of the aneurysm, the presence of an intracavitary thrombotic formation was evident, occupying almost the entire aneurysm. Second case: 66-year-old man. The heart (620 grams) presented an aneurysm of the posterolateral wall of the left ventricle with a rupture of approximately 1 cm. Inside, a thinned ventricular wall was found with a circular area of approximately 4 cm in diameter, fibrotic, consistent with the outcome of a previous myocardial infarction.

Discussion. Atrial and ventricular aneurysms have different etiologies. Ventricular aneurysm's usually a complication of acute myocardial infarction, although it's particularly infrequent in infarctions of the posterolateral wall (5-10% of cases). Atrial aneurysm represents a rare pathological condition, with few cases reported. Its etiopathogenesis, congenital or acquired, remains controversial to date. Its presentation's more common in the left atrium and, frequently, diagnosis occurs in the third decade of life. Clinically, atrial aneurysm can be totally asymptomatic or present with supraventricular tachycardia, or atrial or thromboembolic events. This condition's associated with a 5% risk of sudden cardiac death.

Title: Impact of Storage Time on Ethanol Concentration in Blood and Vitreous Humor Samples After Autopsy

Mihajlović F. [1], Slović Z. [1,2], Todorović M. [1,2], Vitošević K[1,2]., Mijailović S. [3], Vujović M. [4,5], Milić M. [4,5], Dorđević S. [6,7], Bošnjaković K. [1], Andrić I. [1]

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2. University Clinical Center Kragujevac, Department of Forensic Medicine and Toxicology, 34 000 Kragujevac, Serbia
3. Faculty of Medical Sciences Kragujevac, Department of Medical Statistics and Informatics, 34 000 Kragujevac, Serbia
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5. Institute of Forensic Medicine in Nis, 18 0000 Nis, Serbia
6. National Poison Control Center, Military Medical Academy, 11 000 Belgrade, Serbia
7. University of Defense, Medical Faculty of Military Medical Academy, 11 000 Belgrade, Serbia

Background and aim: In forensic toxicology, analysis of alcohol in post-mortem samples is crucial for reconstructing events and determining cause of death. Molecules such as ethanol exhibit a certain correlation between blood and vitreous humor concentrations. Objective of this study is to examine changes in ethanol concentration in blood and vitreous humor and correlation between ethanol concentration in blood and vitreous humor in samples stored under appropriate conditions six months post-autopsy. Additionally, study aims to validate the method for determining ethanol in blood and vitreous humor and assess stability of ethanol in these two sample types six months after autopsy.

Methods and Materials: Multicenter, autopsy-based, observational, and prospective study was conducted from January 2023 to November 2024. Study design involved repeated measures, where blood ethanol and vitreous humor analyses were performed using gas chromatography with flame ionization detection.

Results: Positive correlation was observed between blood alcohol concentration and vitreous alcohol concentration at all four time points. Correlation was highest after one month (r=0.967), slightly decreasing over time (r=0.958) during autopsy, (r=0.922) after three months and (r=0.938) after six months. Results of this study indicate the stability of vitreous humor as a reliable toxicological sample, because there was no statistically significant change in ethanol

concentration ($p>0.05$). Statistically significant increase in ethanol concentration in blood samples was observed ($p<0.05$) after six months of storage at a constant temperature (-20°C).
Conclusion: Concentration of ethanol in the blood increased by 39% from moment of autopsy to six months. Validated method demonstrated precision, accuracy, specificity and sensitivity. Due to the statistically significant change in the concentration of ethanol in blood samples, it is not suitable for recalculating the concentration of ethanol in blood from vitreous humor, after storage for more than six months.

Title: **Modular tools for the analysis of pulmonary histological images: a pilot study on the differential tanatological diagnosis between born alive and stillbirth**

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[1]Section of Legal Medicine, Interdisciplinary Department of Medicine, Policlinico-University of Bari "Aldo Moro", Bari, Italy.

[2]National Research Council (CNR), Institute for the Study of Nanostructured Materials (ISMN), Bologna, Italy.

Abstract:

Introduction. The determination of autonomous life signs in neonatal cadavers is crucial in forensic practice to establish legal capacity. Current techniques, though not individually exhaustive, often focus on verifying the occurrence of autonomous respiration, despite potential artifacts from decomposition and/or resuscitation efforts. This pilot study proposes a new technique for more accurate differential diagnosis by using modular tools for the visualization and histological analysis of neonatal lungs.

Methods. Lung sections from one fetal intrauterine death (case 1), two postnatal deaths due to intrapartum asphyxia (cases 2 and 3) and one neonatal death (control case), were digitized using NanoZoomer S60® scanner. Two forensic pathologists performed double-blind analyses with NDP.view2® and Gwyddion® software and extracted a parameter ("grain") corresponding to the aerated alveolar area. Assessed parameters included: number of grains, total area, average grain area, average grain size.

Results. Case 1 showed a high number of small grains, reduced total surface area and low image coverage, indicating non-aerated lungs. In cases 2 and 3 were observed fewer but larger grains and surface area than 1, covering a larger image percentage, corresponding to respiratory distress and artificial ventilation. Control case had even fewer grains with greater size and area, covering the highest image percentage, consistent with spontaneous neonatal breathing.

Conclusions. The results aligned with available clinical and thanatological data. The tested modular tool, while dependent on the operator's expertise, proved to be reliable and provided reproducible results with high predictive value in differential tanatodiagnosis. However, future forensic applications need for a casuistry expansion.

Title: **Case Analysis of Post-Mortem Examinations at the 'Alfredo Paolella' Forensic Medicine Center, San Giuliano Hospital, Giugliano in Campania (Naples)**

Nappi G. [1], Migliaccio F. [1], Lauritano L. [1], Capponi Y. [1], Campobasso C.P. [1], Municinò M. [2], Monetti P. [2]

1 Università degli studi della Campania "Luigi Vanvitelli"

2 Centro di Medicina Legale "Alfredo Paolella"

Abstract:

Introduction

The "Alfredo Paolella" Center for Investigative Medicine at San Giuliano Hospital in Giugliano in Campania has operated since November 2019. It is the main facility for death investigations ordered by the Prosecutor's Office of North Naples, covering 38 municipalities in Naples and Caserta provinces, serving about 1 million residents. This report presents the necroscopic case data collected by the center from 2020 to 2024.

Methods and Materials

This retrospective study includes all death investigations requested by the Judicial Authority between January 2020 and December 2024, categorized by year, type (autopsy or external exam), cause and manner of death.

Results

A total of 510 examinations were performed: 343 autopsies and 167 external exams. Males accounted for 406 cases (79.6%), females 104 (20.4%). There were 158 natural deaths, 127 confirmed via autopsy. The most frequent causes were acute myocardial infarction and cardiac arrhythmia.

The total number of violent deaths was 352, with 185 autopsies performed. Distribution:

- **207 accidental deaths**: road accidents (130), acute intoxications (51), work-related injuries (21), falls (11), railway accidents (2), choking (2);
- **17 homicides** (13 males, 4 females): 10 by firearm, 3 by sharp weapon, 3 by mechanical asphyxia, 1 by blunt trauma;
- **107 suicides** (88 males, 19 females): hanging (46), falling (26), firearms (17), sharp weapons (7), poisoning (3).

Discussion

Despite European Recommendation No.99 advocating autopsies in violent deaths, in 167 such cases only external exams were conducted—often due to apparently clear

dynamics (hangings, traffic accidents). Notably, the number of homicides is low, aligning with national trends.

Title: **The evolution of Scientific Evidence between Artificial Intelligence and legal validity**

Ottaviani M. [1], Bubbico T. [1], Spadazzi F. [1], Caprino E. [1], De Paola L. [1]

[1]Department of Anatomical, Histological, Forensic and Orthopaedic Science, Sapienza University of Rome, 00185 Rome, Italy.

Abstract:

Introduction: The use of AI is transforming the production and legal validity of scientific evidence in the forensic context, raising critical questions regarding admissibility in court. While traditional forms of scientific evidence rely on methodologies already validated and accepted by the scientific community, AI systems introduce unprecedented challenges in terms of explainability.

Materials and Methods: We conducted a search on PubMed using the keywords "artificial intelligence scientific proof" over the past 10 years. Applying the relevant filters, we obtained 243 results. The aim of this research is to analyze the reliability of AI in judicial proceedings and the potential admissibility of scientific evidence, by comparing major legal systems. This study examines the impact of AI with particular focus on compliance standards. For completeness, we also carried out additional hand-searching.

Results: The investigation reveals that the use of AI in the forensic field offers undeniable advantages. However, there are still several issues to address, primarily associated with the "black box" nature of AI. In this international context, there are also regulatory gaps between the EU system and the US approach, which is already utilizing such systems with flexible but controversial criteria.

Discussion: The integration of AI into legal processes requires a balance between innovation and procedural safeguards. The U.S. *Daubert Standard* provides a framework for assessing the scientific reliability of algorithmic evidence but needs adaptation to address the challenges posed by AI. The future challenge lies in reconciling technological advancement with the principles of procedural fairness, ensuring that AI does not become an "incontestable" form of evidence due to its complex nature.

Title: **Opioid-Induced Respiratory Depression in Cosmetic Surgery: A Medico-Legal Analysis of a Fatal Adverse Event**

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Abstract:

Aesthetic surgery is an elective procedure intended to enhance physical appearance under controlled and safe conditions. In the eyes of public opinion, life-threatening complications are considered unacceptable, as they violate the core expectation of safety.

The authors present a case of death following a cosmetic surgery procedure and offer a literature

review on fatalities associated with this type of intervention. The case is of particular interest due to the clinical and medico-legal methodological issues it raises.

A middle-aged woman underwent major elective cosmetic surgery under local anaesthesia combined with sedation with Propofol (30 mg bolus followed by 2 mg/kg/h until the end of the intervention) and Sufentanyl (10 mcg). An additional 10 mcg dose of sufentanyl was administered postoperatively.

Initially stable, the patient was found unresponsive approximately one hour later. CPR restored spontaneous circulation, but diffuse brain damage had already occurred. The patient died three days later.

Autopsy findings ruled out cardiac abnormalities. Toxicological testing was inconclusive. The cause of death was identified as cerebral oedema secondary to cardiac arrest following recent cosmetic surgery. Alternative hypotheses to cardiological abnormalities for cardiac arrest include local anaesthetic systemic toxicity (LAST) or an opioid-induced respiratory depression (OIRD). The latter was considered plausible and was discussed from a medico-legal standpoint.

This case underscores the importance of a thorough pathophysiological reconstruction of events, achieved through an integrated medico-legal approach and supported by the contribution of cardiovascular pathology, anaesthesiology, and pharmacology. A precise understanding of the underlying mechanisms is essential both for forensic assessment and for improving clinical risk management.

Title: **A Case of West Nile Encephalomyelitis in a Young Woman with Hypoparathyroidism and Sjögren's Syndrome: An Immunohistochemical Investigation of the Central and Peripheral Nervous System**

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Abstract:

West Nile virus (WNV) is an arthropod-borne flavivirus first identified in 1937. Over time, WNV has spread globally and is now endemic in Italy. Although most human WNV infections are asymptomatic (80%), less than 1% progress to a neuroinvasive disease with high mortality rates.

This case involves a 45-year-old woman with post-surgical hypoparathyroidism and Sjögren's syndrome who developed severe encephalomyelitis linked to WNV, leading to ventilated assisted pneumonia and death and a claim for medical malpractice.

Neuropathological findings revealed a bilaterally cribriform thalamus and reddish punctate lesions near the dentate nucleus of the cerebellum. The trachea and bronchial hilum branches contained whitish foamy liquid. The left lung showed multiple brownish-violet areas, with whitish regions at dissection. The heart appeared unremarkable.

A detailed neuropathological examination focused on areas involved in motor control pathways. Tissue samples were stained with hematoxylin and eosin and trichrome techniques, and immunohistochemistry was performed using CD68, CD3, and CD20. A significant damage was observed in the lenticular nucleus and motor thalamus, with prominent concentric vascular calcifications. The cerebellar cortex showed near-total depletion of Purkinje cells. In the spinal cord, CD68 and CD3 positivity was noted in the lateral funiculi, anterior horns, and Clarke's column.

Lung findings showed pulmonary edema, chronic emphysema, and bronchopneumonia.

The observed CD3 and CD68 positivity confirms that WNV spreads trans-synaptically along motor control pathways. The observed widespread calcifications, likely due to hypoparathyroidism, and Sjögren's syndrome might have played a role in the neuroinvasive progression of the disease. No medical malpractice issues were identified.

Title: Medico-Legal Aspects of a Rare Case of Nosocomial Malaria

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Introduction: Nosocomial infections represent a major public issue, potentially leading to serious clinical, management, and especially medico-legal consequences. Although rare, nosocomial transmissions of malaria have been described in the literature, typically linked to prolonged hospitalization and invasive procedures. We describe a case occurred in Florence in 2017.

Material and methods: A 13-year-old boy was admitted to hospital on October 13, 2017, for respiratory distress, headache, and afebrile vomiting, and was discharged on October 19 following resolution of symptoms and negative test results. He returned to the ER on October 28 and was discharged the same day with a suspected viral illness. On October 31, he presented again with persistent fever and was re-hospitalized. During his hospital stay, following an initial worsening of his conditions, a diagnosis of *Plasmodium falciparum* malaria was made on November 16, confirmed by PCR. Specific antimalarial therapy led to rapid clinical improvement, with minimal residual scarring (striae rubrae) attributed to prolonged corticosteroid therapy.

A multidisciplinary investigation - epidemiological, clinical, entomological, and genetic - revealed the concurrent hospitalization, during the patient's first admission, of another patient with imported malaria. Microscopic and molecular analyses confirmed the presence of *P. falciparum* in both cases, with identical size and complete sequence of the amplicons of Pfmsp1-K1, Pfmsp2-FC27, GLURP (region II), Pfhrp2, and Pfhrp3.

Conclusions: Although infection control procedures were in place and the case could have been classified as cryptogenic, the pathogen identity posed a high risk in potential civil litigation. The Claims Management Committee therefore recognized the case as eligible for compensation.

Title: POST-MORTEM MICROBIOLOGICAL INVESTIGATIONS: DEVELOPMENT AND APPLICATION OF A STANDARDIZED PROTOCOL

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Abstract:

Introduction: Post-Mortem Microbiology (PMM) studies the cadaveric microbiota, divided into epinecrotic (surface) and thanatomicrobiota (internal), and how it is affected by environmental conditions, decomposition, and post-mortem bacterial translocation. PMM is applied in forensic science, particularly for estimating the post-mortem interval (PMI) and identifying the cause of death.

Materials and Methods: This study analyzed data from 40 forensic autopsies performed between 01/12/2023 and 31/12/2024. Cases met inclusion criteria (any gender or age, PMI < 96 h, and cause of death: 1) unknown with no evidence of infection, 2) suspected/confirmed sepsis, or 3) non-infectious). Exclusion criteria included advanced decomposition, PMI > 96 h, or organ donation. Microbiological tests followed a standard protocol. Samples were stored at +4°C and processed within 24–48 hours. Microorganisms were cultured on general and selective media under aerobic and anaerobic conditions. Molecular techniques were used in specific cases.

Results: The 40 cases were divided into three groups by cause of death. Seventy-three microbial species were identified (e.g., Enterobacterales, Staphylococci, Enterococci). In group 2, findings matched ante-mortem and post-mortem results. In 3 suspected sepsis cases, microbiology confirmed the cause of death. In 3 group 1 cases, microbiological and histological findings suggested an infectious cause.

Discussion: PMM proves to be a valuable tool when combined with forensic investigations. It highlights the importance of integrating clinical and laboratory data for correct interpretation of microbiological results.

Title: **The corpse bride: forensic investigation into the discovery of two skeletons buried near a medieval castle**

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Abstract:

Introduction

We present a case of medico-legal and archaeological interest involving the discovery of two skeletons buried near a medieval castle.

Case Description

In the summer of 2024, the inclement weather unrooted some trees on a hill adjacent to a castle near Udine. Some months later, a passerby discovered a human cranium among the exposed roots and promptly alerted the authorities. A medicolegal inspection of the remains at the scene, recognized the complete skeleton and recommended the involvement of an archaeological expert for proper recovery and documentation. Further investigations established that the unrooted tree was originally planted in the 1960s and revealed, through a historical inquiry, that the site had been used in 1944 for the execution of partisans. With access restricted and appropriate safety measures in place, the hill was surveyed using metal detection and geophysical techniques to locate additional findings. The human remains were excavated and documented using an archaeological stratigraphical methodology. Although the absence of data supporting a precise dating, the contextual evidence provided significant insights into the depositional processes. A later survey discovered another skeleton intermingled with the roots of a nearby tree, suggesting a complex burial history of that area.

Discussion

This multidisciplinary investigation, with the integration of forensic archaeology, physical anthropology, and biochemistry approaches, enabled the complete recovery and detailed

forensic examination of two skeletons highlighting chronological details of these burials, demonstrating the effectiveness of teamwork in forensic research.

Title: On the Prevention of Healthcare-Associated Infections: A Narrative Review of the Technical and Scientific Foundations Underlying the Supreme Court Protocol

Piras G.N.[1,2], Obici N.[2], Berloco T.[1], Guarnaccia F.R.[1], Lippi M.[1], Imbriani M.[1], Marchesini D.[1], Manta A.M.[1], Montanari Vergallo G.[1], Ciallella C.[1]

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Introduction Healthcare-associated infections have been recently discussed by the Italian Supreme Court to portray their predictability and the possibility of prevention. Healthcare facilities should follow a list of thirteen principles to demonstrate adherence to standardized protocol in case of medical malpractice claims related to nosocomial infections, while considering that, regardless of the efforts made, part of them cannot be prevented.

Methods and results A narrative review of the literature was conducted to establish the scientific validity of the Italian Supreme Court's guidelines. Over 75,000 articles were examined, and eventually, 156 studies were selected. Only papers such as meta-analyses, systematic reviews, and randomized clinical trials, were included.

Discussions and conclusions The comparison with the literature highlighted that the guidelines issued by the Supreme Court are practically unachievable. Notably, they do not allow for the eradication of healthcare-related infections, which therefore remain a health issue with significant social and economic consequences. Although some measures could lead to a reduction in the prevalence of infections, as of today, they would require enormous state funding to revolutionize the core organization of healthcare facilities. On the other hand, according to the retrieved studies, their practical implementation does not seem to lead to a significant reduction in mortality associated with healthcare-associated infections.

Therefore, from a medico-legal perspective, while physicians are compelled to take into account the Supreme Court's guidelines in the evaluation of the conduct of healthcare professionals in medical malpractice claims regarding nosocomial infections, these should be always applied to the single scenario while acknowledging their flaws and limitations.

Title : Medico-Legal Aspects of Retinopathy of Prematurity (ROP): A Case Report

Pitrone C. [1], Mondello C. [1], Sapienza D. [1], Cianci V. [1], Ventura Spagnolo E. [1], Tornese L. [1], Gualniera P. [1], Asmundo A. [1]

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Abstract:

Introduction. Retinopathy of Prematurity (ROP) is an ocular disease affecting some preterm infants due to abnormal development of retinal vasculature. Major risk factors include low gestational age, low birth weight, and prolonged oxygen therapy. Excessive oxygen can inhibit physiological angiogenesis and trigger abnormal proliferative responses mediated by vascular endothelial growth factor (VEGF), contributing to the disease progression. Effective management of ROP requires a careful balance between life-saving ventilatory support and the prevention of retinal damage, as well as an appropriate ophthalmological follow-up to enable timely diagnosis and treatment when indicated. Failure to comply with the targeted diagnostic and therapeutic path is the leading cause of medico-legal disputes reported in the literature.

Case description. We present the case of a professional liability claim submitted to the Claims Management Committee of a Sicilian hospital, concerning blindness secondary to ROP, allegedly linked to inadequate ophthalmologic follow-up. The case involves a preterm infant born at 25 weeks + 2 days, weighing 880 g, who was admitted to the Neonatal Intensive Care Unit. The patient underwent five ophthalmological exams during hospitalization, the last of which, conducted just before discharge, reported no abnormalities. A follow-up examination was scheduled 12 days after discharge but was not performed. The next check, three weeks later, revealed iridolenticular synechiae, suggestive of retinal damage.

Discussion. This case highlights the multifactorial nature of ROP, which complicates both clinical management and the attribution of individual responsibility in pediatric, neonatal, and ophthalmological care. Establishing a clear causal link between clinical management of ROP and retinal damage remains a significant medico-legal challenge.

Title: **Usage of BioFire FilmArray in post-mortem microbiological diagnostics**

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Abstract:

Introduction

Identifying infections during autopsy is a challenge in forensic pathology. While microbiological testing can assist, distinguishing true pathogens from contaminants is often difficult. Molecular methods, such as PCR, may support diagnostic conclusions.

Case Description

On August 22, 2024, a 30-year-old woman was admitted to the Department of Emergency Medicine, Clinical Centre, University of Debrecen, Hungary, presenting with severe vomiting and diarrhea. Her medical history included treated congenital adrenal hyperplasia. Within 30 minutes of admission, she developed sudden cyanosis and respiratory insufficiency. Despite resuscitation efforts, the patient died shortly after arrival.

Two days before hospitalization, she had collected sewage samples from the river Kraszna (Hungary) as part of her job. According to colleagues, she wore no protective equipment (mask, gloves, or coveralls). The samples were later analyzed at the National Center for Public Health and Pharmacy and tested positive for Norovirus.

Postmortem examination, including microbiological and molecular investigations **(**BioFire FilmArray GI multiplex PCR) confirmed Norovirus infection. These findings supported the suspicion that the viral infection significantly contributed to the rapid clinical deterioration.

Discussion

It is an example, how useful can be the application of a test, usually used in medical treatment. This case highlights the importance of postmortem microbiological testing and molecular diagnostics in identifying infectious causes of death.

Title: The value of evidence on bone and prosthetic remains for the purposes of personal identification

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Abstract:

Introduction

Forensic investigations, in the event of the discovery of human skeletal remains, must address a question: the identification of the subject.

The search for evidence on bone remains for the purpose of personal identification is crucial.

Description

Bone remains found in the Monte Pellegrino area of Palermo reached our observation.

The main characteristics can be found at the level of the skull and the right hip, where there was a prosthetic implant.

We proceeded to verify their compatibility with the data reported in the received Medical Record of a patient diagnosed with "Perthes disease of the right hip" who underwent total right hip replacement surgery at the age of 31, 7 years before the remains were found.

Discussion and conclusions

The analysis of the bone remains found led them back to a female human skeleton.

The compatibility test of the numerical identifier between the prosthetic devices detected and what was present on the adhesive labels reported in the file gave a positive result.

From the identification point of view with evidentiary value, it was possible to trace the bone elements subject to prosthetic implantation characterized by numerical identification, to what was implanted on a woman, thanks to the compatibility with the data in the labels reported in the known medical record.

Title: Gorham-Stout-affected child death: disease complication or medical error?

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Abstract:

Introduction

Gorham-Stout disease (GSD) is a rare (300 cases) disease with lymphangiomatosis that causes massive osteolysis. Usually diagnosed in children and young adults, it presents with asepcific symptoms (pain, pathological fractures), dependent upon its localization. Worst cases show involvement of thorax (respiratory distress), spine and skull (neurological complications).
Authors present the case of a child affected by GSD who died after a neurosurgical operation and was diagnosed during autopsy, with assessment of medical responsibility.

Case description

A 9-year-old child complainer right leg pain. MR showed multiple lumbar and sacral radicular cysts, with nerve root compression, and hypointensities in the spine and hip bones. The child underwent cysts marsupialization, with improvement of pain, with simultaneous biopsies of vertebrae and hip bones, that showed blood vessels within the bone at histopathologic examination. The pain got worse and non-responsive to analgesics; so he underwent cyst marsupialization surgery, after which he slipped into a coma with non-responsive mydriasis. CT-scan showed brain edema and intracranial hypertension that did not respond to surgical decompression; therefore the child was declared brain-dead 24h after surgery. Autopsy confirmed GSD diagnosis and pre-operative imaging exams were reevaluated, discovering Chiari I malformation, rarely associated with GSD.

Discussion

The child was affected by GSD and Chiari I malformation, both potentially responsible for post-surgical complications and the patient's death. Even though Chiari malformation could be secondary to GSD, forensic findings confirmed GSD diagnosis but associated the child's death with marsupialization surgery, which did not consider Chiari

malformation, undiagnosed, causing tonsillar herniation, cerebral edema and intracranial hypertension.

Forensic medical evaluation of the causal link between Covid-19 vaccination and death: a case analysis

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Abstract:

Introduction. mRNA vaccines against SARS-CoV-2, such as Comirnaty (Pfizer/BioNTech), induce the production of the Spike protein, triggering an immune response. Surveillance of post-vaccination adverse events is overseen by the National Pharmacovigilance Network (AIFA) and international organizations such as the WHO, which provide algorithms to assess potential causal links between vaccines and adverse events. The authors report the case of a 60-year-old woman who died five days after receiving her second dose of Comirnaty. The analysis integrated autopsy and toxicological findings with clinical records, scientific literature, and official vaccine surveillance data.

Case Description. The woman, with a history of hypertension, was found dead at her workplace. Autopsy revealed a large hemorrhagic collection in the cerebral falx, bleeding at the base vessels—enlarged and dilated—and infarction around the circle of Willis. A deferred brain section, examined after formalin fixation, showed diffuse hemorrhage centered in the mammillary bodies and extending toward the third ventricle. Histopathology confirmed the absence of hemosiderin deposits, indicating an acute hemorrhagic event. Death was attributed to massive acute intraparenchymal and intraventricular cerebral hemorrhage.

Discussion. Assessment of a potential link between death and vaccination revealed no signs of known adverse reactions such as thrombosis, myocarditis, or pericarditis. While vaccination may cause a hypertensive spike leading to cerebral hemorrhage, such events typically occur within the first few hours—no later than 24 hours—after administration. In this case, the five-day interval made this hypothesis unlikely. Applying the WHO (GACVS) algorithm, a causal link between vaccination and death was excluded.

Title: Suicide by Self-Inflicted Penetrating Chest Wound: A Forensic Case Report with Multiple Hesitation Injuries

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Abstract:

Introduction

Suicide by stabbing is a relatively rare phenomenon, particularly when the fatal wound involves the chest. The presence of multiple superficial injuries, along with a single deep and deadly wound, often suggests a pattern of self-infliction. Accurate event reconstruction requires integrating autopsy findings, scene investigation, and forensic context.

Case report

A 37-year-old woman was found dead in the bathroom of her locked home, lying in a large pool of blood. In the adjacent room, investigators observed blood stains on the floor, blood-soaked tissues, and a single-edged kitchen knife with blood on both the blade and handle.

External examination revealed six incised wounds on the neck, one penetrating stab wound to the chest, and three linear abrasions on the abdomen. Autopsy confirmed that five of the neck wounds were superficial, involving only the skin, and one extended into the subcutaneous fat without damaging underlying musculature or vascular structures. The chest wound penetrated the left pleural cavity, injured the lung, and perforated the anterior wall of the heart. Its oblique trajectory—from top to bottom and left to right—was compatible with a self-inflicted, fatal injury. The abdominal and cervical wounds were consistent with hesitation marks.

Discussion

The closed environment, lack of signs of struggle, absence of defensive injuries, and the presence of hesitation wounds strongly supported a suicide diagnosis. This case emphasizes the role of forensic pathology in distinguishing between homicidal and suicidal injuries, particularly in complex scenarios involving sharp force trauma.

Title: **Fetal Alcohol Spectrum Disorder (FASD): Clinical Manifestations, Pathophysiology, and Medico-Legal Implications in Italy**

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Abstract:

Fetal Alcohol Spectrum Disorder (FASD) encompasses a range of neurodevelopmental alterations resulting from prenatal alcohol exposure. Characterized primarily by neurological impairments affecting cognitive and behavioral functions, FASD may also present with craniofacial abnormalities, growth retardation, and congenital anomalies. Pathophysiologically, alcohol and its toxic metabolites, such as acetaldehyde, cross the placental barrier, impacting fetal development due to the immaturity of fetal detoxification systems and the teratogenic effects on cellular division, migration, and growth. Clinical manifestations are diverse, including deficits in abstract thinking, planning, learning, memory, language, social skills, and emotional regulation, often resembling attention-deficit disorders and leading to difficulties in daily activities and social integration. Neurological damage can extend to sensory deficits (visual, auditory) and motor impairments (gross and fine motor coordination, dysgraphia), with epilepsy occurring in a subset of individuals. Systemic effects of chronic alcohol abuse seen in adults (e.g., esophagitis, pancreatitis, liver cirrhosis, cardiomyopathy) underscore the multisystemic impact, although the presentation differs in the context of fetal development. From a legal-medicine perspective, FASD represents a significant cause of disability, impacting educational attainment and future work capacity, thus falling under the scope of civil invalidity and handicap assessments (Italian Law 118/1971, Law 104/1992, Legislative Decree 62/2024). Multidimensional assessment tools like the International Classification of Functioning, Disability and Health (ICF) and the WHO Disability Assessment Schedule (WHODAS) are crucial for evaluating the complex interplay between body functions/structures, activities, participation, and environmental factors, providing a comprehensive map of the individual's lived experience with FASD for both social assistance and welfare purposes.

Title: A study comparing blood and synovial (SF) ethanol concentration in autopsy cases: new proof evidence for alcohol intoxication?

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Abstract:

INTRODUCTION

Blood alcohol concentration (BAC) has proof value in both criminal and civil law, but in many autopsy cases blood specimens are not available or not reliable. Therefore, many authors analysed the relationship between alcohol concentration in blood and other biological fluids but very few studies were performed on the SF.

The aim of this study is to investigate a possible relationship between BAC and SF alcohol concentration (SAC).

MATERIALS AND METHODS

Ethanol concentration was determined in post-mortem samples of femoral blood, urine (UAC) and SF through Headspace-GC-MS analysis (inclusion criteria: BAC>0.10 g/L and SF without macroscopic bloody contamination).

Stage of ethanol metabolism at the time of death was estimated considering the ratio UAC/SAC (<1.20=absorption phase, >1.32=post-absorption phase; Chao, 1993).

Pearson correlation and Lin concordance coefficients were used to analyse the association between SAC and BAC.

RESULTS

Inclusion criteria were met in 20 cases, with 7 decedents considered to have dead during the absorption phase and 5 during the post-absorption stage. BAC/SAC ratio ranged 0.73-7.78 (median=1.20).

Pearson and Lin coefficients were 0.64 and 0.56 respectively (0.40 and 0.27 in the absorption phase and 0.98 and 0.95 in the elimination stage, respectively).

DISCUSSION

The association between BAC and SAC resulted to be weak during the absorption phase, but very strong in the post-absorption phase of ethanol metabolism, confirming the conclusions of a German clinical study.

Title: **Forensic Genetics in Court: the importance of a national Proficiency Test**

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Abstract:

Introduction

Forensic laboratories should adhere to recognized scientific standards. ISO 9001:2015 certification ensures the adequacy of procedures, although it cannot guarantee the accuracy of results. In this context, Proficiency Tests (PTs)—provided by accredited organizations that supply known samples and verify laboratory results—are crucial tools for ensuring analytical reliability and identifying methodological issues.

This work aims to conduct an analytical evaluation of the most widely used PTs to identify the essential parameters to be included in a potential shared quality control framework for forensic genetics laboratories operating within Italy.

Materials and Methods

Thirteen different DNA PTs were examined. Various parameters were assessed, including the requirement for affiliation with the national scientific society, the type of samples used, and the type of genetic analyses required.

Results and Discussion

Only a few PTs are organized by groups affiliated with the International Society for Forensic Genetics (ISFG); most are provided by accredited private providers active also in other sectors. All PTs include essential parameters such as general analysis of biological traces, autosomal and Y-chromosome marker typing, and fundamental biostatistical analysis. However, only some include X-chromosome or mitochondrial DNA analysis, mixture interpretation, or kinship assessments. The Grupo de Habla Española y Portuguesa de la ISFG (GHEP) also offers the evaluation of massively parallel sequencing results.

Based on these findings, a shared national entry-level PT could be proposed, focusing on the aforementioned essential parameters. This model could be expanded with additional modules featuring increasing complexity, fostering broader participation and standardization across Italian forensic laboratories.

Title: **Drug Seizures and Detection of Novel Psychoactive Substances (NPS) in Campania: Retrospective Analysis and Future Perspectives**

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Abstract:

INTRODUCTION

The illicit drug market is growing steadily throughout Europe, according to the increase in quantities seized. In Italy, the amount of seized substances has also increased significantly (+18.32% in 2023 compared to 2022; +50.8% compared to 2020). Aim of the study is to define the types and quantities of drugs seized analysed by the Forensic Toxicology Laboratory of the University of Campania "Luigi Vanvitelli" since 2020 up to 2024.

MATERIALS AND METHODS

Analytical procedures included gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-tandem mass spectrometry (LC-MS/MS).

RESULTS

From 2020 to 2022, 177 seizures totalling 342.68 kg of illicit substances were processed. In 2023-2024, the number of seizures rose to 193, totalling 1,005.47 kg. Comparing the two periods, cannabis remained the most common drug of abuse, with an increase in Δ^9-tetrahydrocannabinol. Significant increases were observed for ketamine, cocaine, heroin and MDMA. Among the most frequent associations in 2023-2024, procaine is highlighted as a cocaine adulterant, and metorphane and caffeine for heroin. In 2024, two synthetic cathinones with psychotropic-stimulant properties were identified: 2-methylmethcathinone and α-pyrrolidine-cyclohexane-phenone, the latter as part of the "FentanyLabNet" project.

DISCUSSION

Data confirm the growth of the illicit drug market and the emergence of psychoactive substances in Campania. Due to the limited understanding of the health risks associated with new psychoactive substances, it is crucial to strengthen the surveillance efforts, to update the analytical protocols and to provide integrated strategies that bridge scientific research, forensic practice and public health policy.

Title: Analysis of Post-Mortem Variations in the Microbiota and Microbiome of the Oral Cavity, Cornea, and Rectum: A Systematic Review of the Literature

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4. Department of Law, Institute of Legal Medicine, University of Macerata, Macerata, Italy.

Abstract:

Forensic microbiology is gaining increasing prominence within legal medicine, particularly for its potential to refine post-mortem interval (PMI) estimation through the study of microbial succession following death. This systematic review focuses on analyzing microbiome and microbiota changes in three anatomically accessible and non-invasive sites during autopsy: the oral cavity, cornea, and rectum.

The aim is to explore the existing scientific literature to understand how microbial composition in these areas evolves over hours and days after death. Special attention is given to the influence of post-mortem time, environmental conditions, and individual characteristics of the deceased (e.g., age, cause of death, nutritional status) on the detectable microbial communities.

The review was conducted in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and is registered with PROSPERO (registration number: CRD420251002151). The search strategy included major bibliographic databases (PubMed, Scopus, Web of Science), without time restrictions but limited to English-language publications. Eligible studies included observational and experimental research, as well as prior reviews, involving deceased human subjects and providing data on post-mortem microbiome composition.

A total of 3,526 articles were identified; 1,729 duplicates were removed. After screening, 70 articles were preliminarily included in the review.

Preliminary findings indicate growing scientific interest in post-mortem microbiomes but also reveal significant methodological heterogeneity, particularly in sampling and analytical techniques (e.g., 16S rRNA sequencing, metagenomics, traditional cultures).

Title: **Markers of Acute Ischemic Injury: A Preliminary Study on the Use of c-FLIP**

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Abstract: Introduction: The FLICE-inhibitory protein (c-FLIPL) is expressed in numerous tissues and, due to its structural similarity to caspase-8, acts as a negative regulator of apoptosis by inhibiting caspase-8 activation. FLIP plays a critical role in regulating apoptosis, blocking cell death induced by various signals such as TNF, T-cell receptor, TRAIL, and Fas. Overexpression of FLIP has been observed in several malignancies, contributing to apoptosis resistance. In forensic pathology, c-FLIP has been used as an immunohistochemical marker, particularly for assessing the vitality of hanging marks, with cytoplasmic depletion observed in cases of antemortem hanging but absent in postmortem suspension. **Materials and Methods**: This study analyzed five cases of death due to acute myocardial infarction (AMI), compared with a negative control group (traumatic deaths) and a group of hanging cases. Immunohistochemical analysis was performed using anti-FLIP and anti-Troponin I antibodies. **Results:** A significant depletion of both FLIP and Troponin I expression was observed in the myocardial tissues of AMI cases. **Discussion:** Currently, the most widely used immunohistochemical markers for AMI detection include Troponin I, myoglobin, desmin, and C5b-9 (terminal complement complex). These markers reveal structural or functional myocardial alterations, aiding in the diagnosis and timing of ischemic lesions. Our findings suggest that anti-FLIP immunostaining represents a promising approach for the forensic diagnosis of AMI, providing results comparable to Troponin I. Further studies are needed to better define the expression dynamics, practical application, and reliability of FLIP as a forensic and pathological marker of acute ischemic damage.

Title: **Hypothermia in mild climate countries: an unexpected cause of death**

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Abstract

Introduction: Death by hypothermia in mild climates requires an integrated analysis of environmental conditions, the state of the body, and case-specific circumstances to accurately interpret thanatological findings.

We present a case illustrating how hypothermia can be fatal even without extreme cold.

Case description: the body of a 56-year-old homeless man was found in mid-winter in a windowless, doorless rural building in the province of Bari, Apulia. Autopsy revealed mummification of the head, neck, and hands, partial skeletonization of the face, and complete skeletonization of the left leg, with the remaining areas in the chromatic stage of putrefaction. An intracranial hemorrhage was observed, likely from non-lethal head trauma but potentially sufficient to impair consciousness. Histology showed pulmonary edema, focal myocardial sclerosis, hepatic vacuolization, and Wischnewski gastric lesions (highly suggestive of hypothermia). Toxicology revealed blood alcohol levels of 0,59 g/L. A priest reported no contact with the man for over a month, thus providing useful information for the time-of-death estimation.

Discussion: Hypothermia was identified as the cause of death, facilitated by social marginalization, physical decline, alcohol intoxication, and prolonged exposure to a cold, dry environment. The coexistence of mummification and skeletonization reflected unequal exposure of body parts to environmental factors and cadaveric micro- and macrofauna. Medico-legal, circumstantial, and meteorological data supported an estimated time of death between one and four weeks before discovery. This case emphasizes the importance of considering hypothermia as a potential cause of death even in temperate climates, particularly among vulnerable populations.

Title: Carbon Monoxide Intoxication and Unilateral Basal Ganglia Hemorrhage: A Case Report

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Abstract:

Introduction: Carbon monoxide (CO) is a colorless, odorless, and tasteless gas produced by the incomplete combustion of organic fuels. In Italy, CO poisoning causes approximately 500–600 deaths annually, two-thirds of which are intentional. CO is inhaled and binds to hemoglobin with an affinity 200–300 times greater than oxygen, forming carboxyhemoglobin and impairing oxygen transport and release to tissues. Its toxicity involves indirect tissue hypoxia and direct inflammatory damage.

Case description: We report the case of a 63-year-old man with a medical history of hypertension, type II diabetes, and hypercholesterolemia, found dead at home. The partner reported that the man had been complaining of general illness since the previous evening. The house had a makeshift heating system; suspicion of CO poisoning led to a forensic autopsy.

The external examination revealed no traumatic injuries, but bright red livor mortis suggested CO poisoning. Autopsy showed atherosclerosis and a large hemorrhage in the right globus pallidus and putamen. Histology confirmed the hemorrhagic lesion, and post-mortem arterial blood gas analysis showed 53.8% (normal range: 0.5–1.5%), carboxyhemoglobin, confirming intoxication.

Death was attributed to cardiopulmonary arrest secondary to right basal ganglia hemorrhage during CO poisoning.

Discussion: Literature typically describes bilateral basal ganglia hemorrhages in such cases, possibly due to hypotension or CO's affinity for iron-rich areas like the globus pallidus.

The unilateral hemorrhage in this case may be linked to greater atherosclerotic compromise of the right cerebral circulation, making that region more vulnerable to hypoxic injury in a patient with significant cardiovascular risk factors

Title: **Death From Systemic Complications Of A Cervical Fasciitis Following Acute Pharyngitis: Description Of An Autopsy Case**

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Abstract:

A necrotizing soft tissue infection is an infection that, affecting subcutaneous tissues and causing their necrosis, can produce systemic signs of acute illness up to septic or toxic shock. We report the case of a 36-year-old patient who, without significant medical history, died due to complications of cervical fasciitis from pharyngitis.

Based on the documentation examined, the patient had been suffering from pharyngitis with local signs and hyperpyrexia for three days prior to death. Despite antibiotic therapy, the infection progressed till causing, the evening before death, a picture of acute systemic illness. That same evening the patient was taken to the Emergency Room and shortly after was transferred to Intensive Care in a state of shock. After a further clinical deterioration, he died in the afternoon of the following day.

The external examination of the autopsy (performed seven days after) revealed a swelling of the right laterocervical region, more prominent than on the opposite side.

The cadaveric section individuated a greenish-brown and crepitant subcutaneous tissue in the right laterocervical region. Pulmonary parenchyma showed congestion, oedema and docimase-positive consolidations.

Histological examinations identified massive necrosis at the fascial/muscular planes and glossoepiglottic area of the laterocervical district, along with foci of acute pneumonia.

Therefore, according to documentation and investigations, the initial pharyngitis evolved into a cervical gas-forming/necrotizing fasciitis which extended to the mediastinum and lungs till resulting in septic shock and terminal multiorgan failure.

The cause of death was attributed to multiorgan failure due to septic shock from bilateral bronchopneumonia from cervical fasciitis.

Title: Ten Years of Incident Reporting: A retrospective analysis of reports at the University Hospital A.O.U.C. Policlinico of Bari

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Abstract

Background

Clinical risk management plays a critical role in enhancing patient safety and improving healthcare quality. Among the key tools, incident reporting allows for the detection and prevention of adverse events, fostering a culture of transparency and learning from errors.

Objective

This study retrospectively analyzes incident reports submitted to the Clinical Risk Management Unit at the University Hospital "Policlinico di Bari" between 2015 and 2024. The aim is to identify the most frequent types of reported events, contributing risk factors, and areas for quality improvement.

Methods

A sample of incident reports was examined, including adverse events, sentinel events, and near misses. Reports were categorized and analyzed using descriptive statistics and qualitative tools such as Root Cause Analysis (RCA) and the Global Trigger Tool (GTT). Additional attention was given to system-related factors and reporting trends over time.

Results

An increasing number of reports was observed throughout the study period, reflecting growing awareness and engagement among healthcare professionals. The most commonly reported incidents involved medication errors, accidental falls, and communication failures. Educational interventions and proactive monitoring were associated with improved safety culture and reporting behaviors.

Conclusions

Incident reporting proves to be a valuable strategy in identifying systemic weaknesses and supporting corrective actions. Encouraging a non-punitive culture and ensuring anonymous, accessible reporting systems are essential for building resilient and high-quality healthcare services.

Title: Clinical Tools for the Assessment of Suffering: A Systematic Review and Forensic Implications

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Abstract: Assessing suffering, encompassing physical and psychological dimensions, is challenging clinically and medico-legally. Jurisprudence requires objective evaluation distinct from biological injury, yet suffering lacks standard forensic measurement tools. To identify and characterize validated clinical instruments for suffering assessment and evaluate their potential medico-legal applicability. A systematic search (major databases, to July 2024) identified studies validating clinical suffering/distress scales in human populations. Standard exclusion criteria were applied. Data on scale characteristics, validation, and populations were extracted, and risk of bias was assessed Twenty studies validating diverse instruments (e.g., Distress Thermometer, K10, MSSE, pictograms, SAQ, CEMS) were included. Tools utilized varied scales (numeric, visual analog, interview-based). Significant heterogeneity existed across studies in clinical context (oncology, palliative care, chronic illness, psychiatry), geographical setting, and population. Measurement approaches differed, assessing overall distress, emotional states, or total suffering. Most studies demonstrated a low risk of bias. No single universal tool is recommended; selection is context-dependent. Crucially, clinical validation does not equate to medico-legal applicability. This gap hinders objective forensic quantification of suffering and increases the risk of duplicated compensation when assessing non-patrimonial damages. Development or adaptation of forensically validated instruments is needed.