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Review Article

Occupational infection risks and infection prevention gaps in autopsy and mortuary practice: a narrative review and public health recommendations

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ABSTRACT

Autopsy and mortuary services represent a frequently overlooked occupational setting with potential for exposure to blood-borne pathogens and airborne infections. In many institutions, undiagnosed infections, incomplete clinical histories, inconsistent screening, and resource limitations can contribute to "silent" transmission risks for mortuary and autopsy personnel. This narrative review highlights key infection control gaps across mortuary workflow, staff practices, personal protective equipment use, waste handling, and environmental disinfection. Evidence and guidance relevant to infection prevention and control (IPC) are summarized with emphasis on low-resource and high-workload settings. Public health relevance includes protection of healthcare and support staff, strengthening of occupational surveillance, and reducing preventable exposure events. Practical recommendations include standard precautions, risk-based PPE, safe handling of sharp instruments, improved triage and communication of infection status, staff training and vaccination (where applicable), and strengthening institutional policies and audits. Addressing infection control in mortuary and autopsy practice is essential for workforce safety and overall health system preparedness.

Keywords: Autopsy, Mortuary, Infection prevention and control, Occupational exposure, Biosafety, Personal protective equipment, Sharps injury

INTRODUCTION

Autopsy practice is indispensable for determining cause and manner of death, validating clinical diagnoses, and identifying emerging diseases.[1] In forensic settings, autopsies often represent the only objective record of occult injury or disease. However, the autopsy suite is also an environment where exposure to infectious agents is inevitable. Cadavers may contain viable pathogens within blood, body fluids, and organs, and these organisms may persist beyond death, remaining transmissible to staff handling the body.[2]

Historically, infection risks in mortuaries were overshadowed by clinical infection control priorities. The COVID-19 pandemic changed this perception dramatically, as it became clear that respiratory viruses could be transmitted in inadequately protected post-mortem settings.[3] Parallel research has demonstrated that bloodborne viral infections are present even in routine medicolegal autopsies, often without prior clinical suspicion.[4] These findings reinforce the principle that everybody must be treated as potentially infectious.

From a public health perspective, mortuary and autopsy personnel constitute an essential but under-recognized workforce. Preventable occupational exposures can contribute to infections among staff and subsequent household or workplace transmission, especially in settings with inadequate surveillance, vaccination

coverage, and training. Strengthening infection prevention and control in these services supports workforce safety and health system preparedness.

LITERATURE SEARCH (NARRATIVE)

A narrative literature search was conducted using PubMed and Google Scholar for English-language articles published between 2000 and 2025. Search terms included "autopsy", "mortuary", "biosafety", "infection prevention and control", "occupational exposure", "sharps injury", "tuberculosis", "HBV", "HCV", "HIV", and "COVID-19". Relevant guidance documents from WHO, CDC, and OSHA were also reviewed. Articles were included based on relevance to infection risks, transmission mechanisms, barriers, and preventive strategies in autopsy and mortuary practice.

PATHOGENS OF CONCERN

A wide spectrum of pathogens has been documented in cadaveric tissues like Mycobacterium tuberculosis has been repeatedly implicated in occupational infections among pathologists, particularly during lung dissection, hepatitis B virus (HBV) and hepatitis C virus (HCV) can persist on instruments and surfaces for prolonged periods, making sharps injuries significant, human immunodeficiency virus (HIV) remains relevant in the context of percutaneous or mucocutaneous exposure, respiratory viruses, including influenza and SARS-CoV-2, have been found at high titres in airways and lung parenchyma during autopsy, fungal infections, particularly mucormycosis, emerged prominently in association with COVID-19, and Prion diseases although rare, represent a unique hazard because prions are resistant to standard disinfection methods and can persist on instruments used for neuropathological examination.[5-10]

A recent autopsy-based study from North India provides important epidemiological evidence. In 228 post-mortem blood samples, HIV was positive in 0.87%, HBV in 2.19%, and HCV in 0.43%, with several infections not diagnosed during life.[4]

This highlights the silent burden of transmissible disease in medicolegal autopsies.

MECHANISM OF TRANSMISSION OF INFECTION DURING AUTOPSY

Transmission occurs through multiple overlapping pathways.

Sharps injuries

Sharps injuries are among the most clearly documented routes of transmission in mortuary workers. Scalpel cuts, rib shears, needle sticks, and bone fragments may inoculate bloodborne viruses directly into personnel.[6,7] These injuries occur most frequently during body opening, organ dissection, or cleaning of instruments.

Aerosol and droplet generation

Aerosols are generated during oscillating bone saw use, skull opening, lung dissection, forceful cavity irrigation

These procedures can disperse tuberculosis bacilli, influenza, or SARS-CoV-2 into the air.[3,5,8] In poorly ventilated or non-negative-pressure rooms, aerosols may accumulate and remain suspended, increasing the risk of inhalational exposure.

Mucosal exposure

Manipulation of highly vascular organs such as the lungs, liver, and spleen, or the opening of fluid-filled cavities, frequently leads to splashing of blood and body fluids. If eye, nose, or mouth protection is inadequate, these splashes can result in mucocutaneous exposure.[11] The risk is magnified when staff do not routinely use face shields or fit-tested respirators.

Surface and equipment contamination

Autopsy tables, instruments, floors, drains, and storage areas can retain viable pathogens for hours to days if cleaning is inconsistent.[11] Many pathogens, including hepatitis viruses and mycobacteria, can survive for prolonged periods in moist organic environments. If cleaning and disinfection procedures are inconsistent, subsequent examinations may take place in an environment that remains biologically hazardous.

Improper handling of high-risk specimens

Tissues rich in pathogens such as lungs in respiratory infections, or spleen and liver in systemic infections require careful containment. Improper packaging, labelling, or storage can lead to leaks, spills, and secondary exposure for laboratory technicians and transport personnel.[12]

DOCUMENTED OCCUPATIONAL INCIDENTS

Reports from various countries describe infection among pathologists and mortuary workers attributable to occupational exposure. Tuberculosis transmission among pathologists has been linked to aerosol generation from lung dissection.[5] HBV and HCV seroconversion has occurred after scalpel injuries in mortuary workers.[6] COVID-19 infections were reported among autopsy personnel where respirators were not used or inadequate.[3] Prion contamination resulted in destruction of instruments after neuropathological autopsies.[10]

The prospective Indian study adds recent, real-world evidence: A prospective study from North India demonstrated HIV, HBV, and HCV positivity in

medicolegal autopsy cases, even when infection was not suspected before death.[4]

Under-reporting of exposure incidents is common due to fear of blame or administrative consequences, preventing learning and improvement.[13]

BARRIERS TO EFFECTIVE BIOSAFETY

Several structural and behavioural barriers interfere with guideline implementation:

Infrastructure limitation

Lacking negative-pressure rooms or appropriate ventilation.[8] Many mortuary facilities are housed in older buildings not designed with modern airflow and negative-pressure systems. Retrofitting such spaces can be costly and technically challenging.[14]

Resource constraints

Regular supply of high-quality PPE, enclosed oscillating saws, and appropriate disinfectants may be inconsistent, especially in low-and middle-income settings.

Training gaps

Mortuary attendants and support staff often receive less formal infection-control training than clinical personnel. They may be unfamiliar with the rationale for negative-pressure rooms, fit-testing, or post-exposure protocols.[15]

Cultural and attitudinal factors

A longstanding culture of "autopsy toughness" in some departments may lead to underestimation of risk, reluctance to use "cumbersome" PPE, or normalization of unsafe practices.

Poor reporting systems

Fear of blame or administrative consequences can discourage staff from reporting sharp injuries or near-miss events, preventing systems from learning and improving.[13] Autopsy areas often receive fewer resources than operating theatres despite comparable biohazard risks.[15]

PREVENTION AND BIOSAFETY STRATEGIES

A comprehensive approach to biosafety in autopsy settings should integrate engineering controls, administrative policies, and PPE.

Engineering controls

High-impact measures include negative-pressure autopsy rooms with adequate air changes per hour to prevent recirculation of contaminated air, local exhaust ventilation positioned near aerosol-generating activities such as bone sawing, enclosed oscillating saws to reduce aerosolization, suction devices near dissection sites.[14,16]

Even in resource-limited settings, incremental improvements- such as installing exhaust fans and improving airflow patterns- can reduce risk.

Administrative control

International biosafety standards for handling infectious material are outlined in the World Health Organization (WHO) Laboratory Biosafety Manual.[17] Institutions should develop clear, written protocols covering risk stratification of bodies based on known or suspected infection status, while still treating all cadavers as potentially infectious, standard operating procedures (SOPs) for autopsy of high-risk cases (e.g. tuberculosis, COVID-19, suspected viral hemorrhagic fever), incident reporting systems that are non-punitive and encourage early disclosure of exposures, post-exposure prophylaxis (PEP) pathways with immediate access to expert consultation and medications for HBV, HIV and other relevant infections.[18]

Regular biosafety audits and checklists can help maintain compliance and identify gaps.

Personal protective equipment and safe technique

Core components of PPE for routine autopsies should include fluid-resistant gowns, double gloves, eye and face protection, and respirators (FFP2/FFP3 or N95 equivalent) for aerosol-generating procedures.[13] Additional measures include using blunt-tipped instruments and needleless systems where possible to reduce sharps injuries, avoiding hand-to-hand passing of sharp instruments, and using controlled, deliberate dissection techniques rather than forceful or hurried movements.[18,19]

Vaccination

Vaccination of mortuary workers against hepatitis B, influenza, and region-specific infections is strongly recommended.[20] Vaccination reduces occupational risk in Hepatitis B, Influenza, and region-specific vaccines.[20]

Education, training and culture change

Biosafety should be integrated into the training of medical students, pathology residents, and all mortuary staff. Simulation-based training, including drills on donning and doffing PPE and managing spills or sharps injuries, can improve competence and confidence.[15] Supervisors should model good practice, reinforcing that safety is not optional but integral to professional standards.

Creating a culture that values transparency—where reporting an exposure is seen as responsible rather than blameworthy—is critical for continuous improvement.[13]

Limitations

This manuscript is a narrative review and not a systematic review; therefore, formal quality appraisal tools and meta-analysis were not performed. However, the focus remains on practical infection prevention gaps and implementable recommendations for routine mortuary and autopsy practice.

CONCLUSION

Autopsy is indispensable to medicine and law. However, transmission of infectious agents can occur through sharps injuries, aerosols, splashes, and contaminated surfaces. Recent evidence demonstrates that blood-borne viral infections may be present in routine autopsy cases without prior documentation, validating universal precautions.

Strengthening autopsy biosafety requires institutional commitment, adequate resourcing, and a shift in mindset that recognizes mortuary workers as frontline health professionals deserving the same level of protection as clinical staff. As new pathogens emerge and old ones re-emerge, investment in safe autopsy practice is essential to sustaining the vital contributions of forensic pathology to medicine and public health.

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