

## Review Article

# Health hazards at autopsy - A review article

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	International Archives of Integrated Medicine, Vol. 2, Issue 8, August, 2015. Copy right © 2015, IAIM, All Rights Reserved. Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a> ISSN: 2394-0026 (P)                      ISSN: 2394-0034 (O)	
	Received on: 22-07-2015 Source of support: Nil	Accepted on: 29-07-2015 Conflict of interest: None declared.

## Abstract

The postmortem room is a source of potential hazards to the health of forensic experts, pathologists and mortuary technicians. Infectious pathogens in cadavers that present particular risk include mycobacterium tuberculosis, HBV, HCV, HIV and prions that cause transmissible spongiform encephalopathies such as Creutzfeldt-Jakob disease (CJD) and gerstmann-strausster-sheinker syndrome (GSS). This review focuses specifically on these hazards associated with the autopsy of infected patients.

## Key words

High risk autopsy, Infectious pathogens, Mortuary.

## Introduction

“The chapter of knowledge is very short, but the chapter of accidents is a very long one.” - **Lord Chesterfield (1694-1773)**.

The high risk autopsy can be defined as the “ postmortem examination of a deceased person who has had , or is likely to have had, a serious infectious disease that can be transmitted to those present at the autopsy, thereby causing them serious illness and/or premature death” [1].

The postmortem room is a source of potential hazards and risk to the attendants and the

forensic experts. The decline in mortuary acquired infections such as tuberculosis and blood-borne Hepatitis in the past 25 years can be largely attributed to the increased awareness and adoption of safe working practices [2].

On the basis of pathogenicity to humans, risk to laboratory and autopsy workers, transmissibility to the community and availability of the effective prophylaxes, microorganisms have been classified into four hazard groups by ACDP (Advisory Committee on Dangerous Pathogens) [3].

**Group - 1:** An organism that is most unlikely to cause human disease.

**Group - 2:** An organism that may cause human disease, may be a hazard to laboratory worker, effective prophylaxis available, unlikely to spread to the community e.g. adenovirus, herpes virus, para mixo virus and pecorino virus.

**Group - 3:** An organism that may cause severe human disease, severe hazard to laboratory worker, usually effective prophylaxis or treatment available. Present a risk of spread to the community e.g. HBV, HIV, Rabies, Japanese encephalitis, tuberculosis, rift valley fever and yellow fever.

**Group - 4:** An organism that causes severe human disease, serious hazard to laboratory workers usually no effective prophylaxis or treatment available high risk of spread to the community e.g. viral hemorrhagic fever, Ebola virus, Russian spring summer encephalitis and small pox.

### **Health hazards**

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The person who is attending the autopsy is at risk of getting infections. Pathogens may be acquired by inhalation, ingestion, direct inoculation, entry through preexisting breaks in the skin and through the mucus membrane of the eyes, nose and mouth. Any procedures that may result in infection through one of these routes constitute a hazard [4].

The principle biological risks faced by mortuary workers are the infections caused by mycobacterium tuberculosis, the blood-borne hepatitis, HIV and agents responsible for transmissible spongiform encephalopathies (TSE) such as Creutzfeldt-Jakob disease (CJD). All of these pathogens retain their infectivity after death [5-9].

Such diseases are frequently asymptomatic and may be present without morphological evidence at autopsy. So, the mortuary staff may be unaware of the risks associated with autopsy.

### **Infectious diseases and their agents**

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**Mycobacterium tuberculosis:** Tuberculosis is a slowly progressive, chronic infection usually of the lungs. Pulmonary tuberculosis accounts for approximately 90% of cases. Cutaneous infections (prosector's paronychia, prosector's warts, verruca necrogenica) accounts for 5-10% of cases, the bacillus being introduced into previously traumatized skin or via a skin puncture [10]. Muco-cutaneous transmission of tuberculosis at autopsy has not been reported [11]. The emergence of multidrug resistance strains of tuberculosis reinforces the importance of the disease. Tuberculosis was one of the biggest killers among the infectious diseases in the past. The annual number of the tuberculosis cases continuous to increase due to its emergence in HIV infection. It was reported that the incidence of tuberculosis among pathologist engaged in post mortem practice (10%) was greater than in general physicians (1%) and specialist in respiratory medicine (4%) [12]. Even very brief exposure during an autopsy carries a very high risk of infection. Patient of tuberculosis may be more infectious at autopsy than during life. Transmission of tuberculosis is thought to occur primarily by exposure to aerosolized infectious bacilli. It has been shown that bacilli remain viable and therefore infectious for at least 24-48 hours after an infected cadaver has been embalmed [13].

**Viral hepatitis:** It is caused by hepatitis virus A, B, C, D, E and F types. Hepatitis can also be seen in many viral diseases such as yellow fever, CMV, EBV and congenital rubella. Hepatitis A is transmitted by the oral route. Hepatitis B is extremely infectious, transmitted by blood or blood product, sexual transmission and skin penetration through contact with infected material. However, the risk of occupational acquisition of HBV is extremely low, because of routine pre-exposure vaccination among health workers. Hepatitis C is less infectious and transmitted by same route as of HBV, but no vaccine exists [14].

**AIDS:** Human Immuno-deficiency Virus (HIV), the cause of AIDS is one of the most intensively investigated viruses. The cytopathic effect of HIV on T4 helper lymphocytes causes the failure of immune system and results on AIDS. It is a RNA virus with typical retrovirus structure and is transmitted by similar routes as HBV [14]. The person who died of AIDS is infectious. Viable HIV has been reported in pleural fluid, pericardial fluid and blood of such deceased patients after storage at 2 degree centigrade for up to 16.5 days after death [15]. Viable HIV was also isolated from bone fragments, spleen, brain, bone marrow and lymph nodes from a patient with AIDS at autopsy 6<sup>th</sup> day post mortem [16]. On the other end, cadavers infected with HIV are often infected with opportunistic infections such as tuberculosis, which may be more infectious than a HIV infection itself. HIV sero-phobia has been documented, although there is no evidence that HIV is readily acquired in the mortuary. The risk of sero conversion after occupational exposure will depend on the viral load in the patient, the volume of fluid inoculated and the susceptibility of health care worker.

**Prions diseases and transmissible spongiform encephalopathy:** The transmissible spongiform encephalopathies are degenerative diseases of the central nervous system. CJD and GSS are found in humans. CJD is characterized by loss of motor control, dementia, paralysis and death secondary to pneumonia. The infectious agent that causes CJD has been called a prion. Prion is a lethal proteinaceous infectious particle resistant to inactivation by procedures that modify nucleic acids. Prion is highly resistant to conventional methods of sterilization and disinfection [17]. The CJD agent has been shown to survive well in formalin fixed tissue.

**Miscellaneous infections:** A cadaver is potential source of infection with other organism notably Streptococcal infection, gastrointestinal organisms etc. Such pathogens give rise to potentially curable disease but none the less may result in considerable morbidity [18].

## Conclusion

The potential infection hazard during autopsy is one of the risks involved in the mortuary room. Special care must be taken to reduce risks to minimum. Safe working conditions can be provided through proper education, use of protective clothing and practice of hygienic measures. All mortuary staff should be vaccinated against HBV and Tuberculosis. Autopsies on patients with hazard group - 4 pathogens should only be performed where absolutely necessary. This becomes less worrisome if all staff in the mortuary regards every autopsy as a potential source of these pathogens, regardless of whether or not an infection has been documented in the medical notes, and irrespective of whether the patient is known to belong to a high risk group. This is especially prudent in medico-legal cases, where the pathologist often has to rely on the brief non medical notes in the police records.

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