

Review Article

Safe Guidelines for Autopsy Workers in Mortuary

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Abstract:

The mortuary may be a dangerous place. The most dangerous in this environment is the individual himself, who is unaware of its potential hazards. Such peoples are liable to themselves and to others who are working in the mortuary (like Forensic pathologist, Anatomist, Students and staffs). In Bangladesh such safety norms of the mortuary are much lagging behind than the expected international standard. This review focuses particularly on those hazards and risks encountered at the mortuary and to ensure a safe guideline for autopsy workers which seem to be needed to develop a modern mortuary in our country.

Key words: Autopsy, safety, risk, hazards, potential, preventive measure.

Introduction:

In many parts of the world, autopsy retains its value for determining the cause of death, detecting clinically unknown lesions as a quality assurance tool and providing accurate information for death certification.² Autopsy safety was not much concerned until early eighties, when the risk of contamination with HIV-AIDS appeared.³ According to a study by Morris in 1946, majority of medical undergraduates who attended mortuary for post-mortem demonstration classes became tuberculin positive.⁴ Nevertheless, autopsy surgeons or the forensic pathologists and other mortuary personnel are potentially exposed to the danger of unknown contagious and non-infectious threats associated with routine postmortem examination. The chances increase in multifold during mass casualties or during autopsies on undiagnosed or misdiagnosed cases. Currently, in many developing countries majority of mortuaries are woefully out of date and far away from the modern safety norms. Very few nations are equipped with world class autopsy facilities like BSL (Bio-Safety Level) 3 or 4. This may be due to cost constraints; these units are expensive to build, operate and maintain

appropriately. Most autopsy centre's are located in the native building sharing the ventilation and drainage with other spaces in the building, and often are old fashioned without fulfilling the criteria for a recommended safety design. Nevertheless, it is the responsibility of the employers to provide an adequately equipped and safe morgue facility.^{5,6,7} During mass casualties like terrorist attacks, bomb blasts, public stampedes, massacre or riots, loads of bodies are brought to the morgue and often very crude, hasty methods of autopsy are followed with a priority to fulfill the statutory or administrative needs.

General considerations for the development of a modern, biosafety compliant mortuary:

The entire autopsy area and its contents were be designated as a biohazard area and appropriate warning signs are to be labeled. It has been shown that vast majority of morgue accidents and hazards are due to human errors and ignorance. Therefore, safety awareness in the mortuary premises is an effective preventing step.⁸ In the autopsy room there is no place for fear or ignorance. If multiple autopsies are to be performed sequentially, those with the greatest infective risk should be done first, before the staff becomes fatigued. All injuries are not preventable, but they should not be the result of carelessness, mistake or negligence. Competent, experienced, and professional approach results in decrease of the injury rate.⁹ These risks can be substantially mitigated through

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proper assessment, personal protective equipment, appropriate autopsy procedures and facilities design.¹⁰ A retrospective study on the use of personal protective equipments (PPE) has demonstrated their effectiveness in significantly reducing the injuries.¹¹ The autopsies performed on bodies with contagious diseases requires a facility of effective decontamination. Hence, use of universal biosafety guidelines in the autopsy room e.g. adequate ventilation, air handling systems, controlled access etc can go a long way in preventing the occupational hazards.¹²

Building Concept of Modern Safe Mortuary Set-Up: This concept mixes up learning from sanitary engineering, chemical hygiene, odour control, architecture and safety. Nevertheless, it is the concept globally followed by industries and other fields of hazardous work environments.^{13,14} An ideally designed mortuary set-up should contain the following infrastructures:-

1. **Building Management Systems (BMS):** Contemplating a modern mortuary or any other such building development without BMS is likely to be a futile endeavor. Because, it has a pivotal role in maintaining the relevant aspects of each facility such as ventilation, sewage controls, safety, alarms and other security concerns. Before preparing to build a mortuary set-up, a consensus should be made by the appropriate authority or committee keeping international guidelines on background; and, than the bases for design and building improvement are outlined.
2. **Adequate Ventilation:** Continuous fresh air circulation within the work spaces is mandatory in terms of removal of contaminants. Constitutive elements and sealing technologies for the duct work or pipe lines, which could be able to prevent damage by corrosives, vapor phases, condensates that may form within the system. Ample number of exhaust units should be provided to remove aerosols created during a infectious autopsies.
3. **Flooring:** The floor should be designed to resist chemical adsorption. Because, routine chemicals used for viscera preservation, toxicological analysis, tissue fixing or other histopathology procedures may corrode or alter the floor. Cementations or synthetic seamless laminated flooring is preferred.

4. **Furniture:** Chemicals, blood or other body fluid and water adsorption should be considered and furniture made up of wood or wood derivatives are avoided. Door handles, hinges and locks should also be corrosion resistant. Stainless steel furniture and accessories are preferred.
5. **Sewage Disposal:** The normal cleaning of the autopsy tables generate a high lipid content liquid waste. Hence, it possesses risk of clogging the piping and drains. It can be avoided by using chemical cleansers and thermal jacketing all the way down to the liquid waste treatment plant.
6. **Odour Control:** A very sensitive aspect for the conception of forensics buildings is odor control. This will impact directly on the community perception and the environment. This can be avoided by using odor control technologies like activated carbon particles.

Work practices guideline

- Appropriate work practice behaviors are best achieved by achieving consensus that these measures need protection of staff by means of vaccination. It is the view of these guidelines that where an immunization exists that provides substantial protection against infection by a potential biological hazard then it is mandatory that mortuary staffs are vaccinated before commencing work. Minimum standards of PPE (**Personal protective equipment**) for pathologist and mortuary technician as shown in table 01.
- Program which ensures that staffs are vaccinated, and that these vaccinations are maintained according to current clinical recommendations. This applies, at this stage, to Hepatitis B Virus (HBV) where almost complete protection can be offered. In the advent of a significant exposure to blood and body fluids, the employer would be expected to carry out post-incident evaluation of exposures and offer appropriate prophylaxis (e.g. HBV or HIV) if clinically recommended in these people. The use of the BCG vaccination, which offers some partial immunity against the tuberculosis, is recommended for mortuary staff.

Table-I

Minimum standards of PPE (Personal protective equipment) for forensic pathologist and technician :

Respiratory protection	These should be adequate design to prevent inhalation of any aerosols produced during bone sawing and any airborne spores, bacteria or viral particles. Consideration can be given to masks that absorb nuisance odors and the respiratory irritants used in the mortuary room, such as formaldehyde (e.g. 3M 1860, Moldex 2200, Gerson G1920).
Impervious aprons	To cover the trunk and extend below the boot line.
Gowns	These similarly can be impervious and cover from neck and wrist to boot line.
Latex gloves	Double gloving is the standard presently accepted although single gloving and the use of chain mail to index and thumb of the non-dominant hand may be acceptable.
Eye protection	Usually in the form of a visor, although splash-proof spectacles are acceptable.
Head gear	As in operating theatre standards.
Rubber boots	As in operating theatre standards.

Personal protective equipment (PPE)

The concept of universal precautions is well known to all workers in the health arena. Evidence exists of inconsistent observance of the doctrine by

healthcare workers.¹⁵ PPE is the final barrier to prevent hazards, known or unknown, from causing personal injury. A minimum standard of PPE is as shown in table 1 and 02 below.

Table-II

Minimum standards of PPE (Personal protective equipment) for mortuary captain and all visitors.

Respiratory protection	Need for visitors at high-risk autopsies must be questioned. Any people present during an high-risk autopsy should use the same level of respiratory protection as the pathologist.
Gowns	Over gowns to boot line.
Eye protection	Only during the potentially splash-producing procedures. Standard safety glasses should be sufficient unless the captain or visitor is in close proximity to the case. Whereupon they should wear the same level of protection as the pathologist.
Head gear	Optional.
Rubber boots	Optional. Should have separate footwear to street wear or utilize overshoes.

Conclusion:

Mortuaries in Bangladesh now need to have standards that are stringent enough to cope with the advent of the new or re-emerging infections which pathologists are increasingly confronted with. Of particular concern is the development of the multi-drug resistant strains of tuberculosis and the recognition of the major transmissible viral illnesses. Mortuaries and autopsy rooms across Bangladesh lie neglected not only by the concerned administration but also by the government (both central & state) with little or no attempt to uplift them; the workers are exposed to the hazardous environment of mortuary. Ministry of labour and employment, Govt. of Bangladesh and labour department of states who are responsible for the safety and health should notify mortuary environment as hazardous and prepare safe working guidelines as per international standards on OSH (occupational safety and health).

Conflict of Interest: None.

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