



Original Article

Autopsy Suit Design and Layout-an Overview

Shafi Muhammad Nizamani¹, Anshoo Agarwal², Mohammed Nasimul Islam³

¹Faculty of Medicine, MAHSA University Bandar Saujana Putra, Selangor, Malaysia, ²Faculty of Medicine, Northern Border University, Arar, Saudi Arabia, ³Faculty of Medicine, University Technology MARA (UiTM), Sg. Buloh Campus, Jalan Hospital, 47000, Selangor, Malaysia.

Abstract

The autopsy suits are the most neglected and ignored places all over the hospitals of the developing countries. It is a well-established truth that the autopsy facility accounts for a very small portion of a hospital's overall expenses; as such, the facility is viewed as an unnecessary burden. A mortuary's general atmosphere is gloomy and sad, which is made worse by administrative indifference to forensic work in general. Now a days due to emerging infectious diseases such as Covid 19. It is necessary to build a modern autopsy suit which has facilities to cater all types of autopsies.

Article Information:

Received Date: Mar 02, 2024

Revised Date: Mar 31, 2024

Accepted Date: May 22, 2024

Published Date: June 27, 2024

Key words:

Autopsy suits, Forensic services, Post-mortem examination

Introduction

The construction of new facilities rarely has a high priority in hospital building programs so most pathologists will not have the opportunity to commission a new autopsy suite, but knowledge of autopsy suite design is still required to ensure that existing facilities comply with international standards¹. Mortuary Complex requires facilities for receiving bodies from the hospital and outside the hospital, storing these bodies, performing autopsies on some of the bodies and releasing bodies to the undertakers².

There should be facilities for trainees, judges, magistrates, police officials, lawyers and students to view the deceased and autopsy procedures³. The general layout of the mortuary must be such that each of these functions may occur without hindrance to the other functions⁴. There should be entrance to the body storage area from the hospital buildings which contain patients and an external entrance. These entrance should be concealed from the public view, if possible⁵. There should be a transitional area between the body storage area

Address for Correspondence:

Faculty of Medicine, MAHSA University Bandar Saujana Putra, Selangor, Malaysia

E-mail: shafinizamani@hotmail.com

and the dissection area, so that the body storage may be kept as clean area away from any contamination which may occur during dissection⁶.

The office area, where the mortuary technicians and undertakers deal with the paperwork involved in the movement of the bodies, is conveniently situated between the body storage area and external entrance⁷. The changing rooms should be directly adjacent to the dissection area without intervening corridors but should have another entrance from the clean area. The boundaries between the clean and dirty areas should be marked by signs or physical barriers⁸. Annexure 1 shows blue print of Mortuary area and Figure 2 and 3 shows

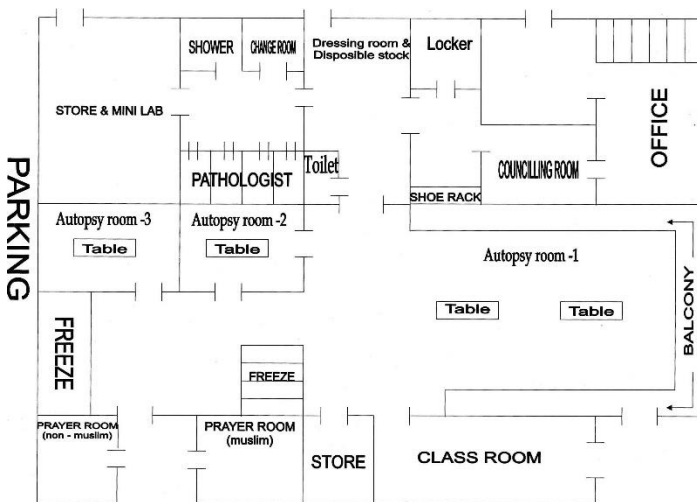


Figure-1: Autopsy Table

The mortuary should provide facilities for: i. Conducting postmortem examinations. ii. Holding the body of deceased in cold storage prior to being claimed by the family. iii. Religious and final rites prior removal for burial or cremation. iv Training of related officials, staff, police personnel and students in forensic medicine. v. Maintenance of death registers of the hospital.



Figure-2: Postgraduate Workstations, Integrated Laboratory & Discussion

Materials and Methods

Metanalysis of various articles had been done to study the ideal autopsy suits and its requirements.

Discussion

Autopsy has an indispensable role in the identification of the role of drugs in deaths, whether intentional or accidental and requires an ideal auspices suit with all modern facilities with the following operational procedures which includes

1. Reception of dead bodies

- I. Dead bodies are received from the hospital wards
- II. Dead bodies are received from the emergency wards
- III. Dead bodies are received from the Police
- IV. Dead bodies are received from the private parties as Amanatan.

2. Storage of dead bodies

- I. Dead bodies should be kept in cold storage for an

autopsy if cannot be performed early or pending release for burial / cremation.

- II. There should be a separate compartment to store limbs before being handed over to relatives.

3. Postmortem Services

- I. Post-mortem examinations should be performed in the autopsy room by the authorized medical officer/ Medical Board^{2,9}
- II. All the specimen requiring histopathology /biochemical/toxicological analysis should be sent to the respective department maintain the chain of the custody procedure¹⁰.
- III. Provision of facilities for the religious rites should be there (according to the religion)
- IV. Disposal of Bodies, unclaimed bodies should be kept in the cold store for the certain period as Amanatan
- V. All other bodies should be released through Police with Death certificate copy to the next of the kin and information to the registrar of death.

4. Training

- I. Staff/students, police officers, lawyers, magistrates, judges etc. undergoing training and tutorials in forensic medicine can view or observe postmortem procedures through a viewing panel as a part of training¹¹.

Important factors need to be taken into the consideration:

- a. The mortuary should be located away from patient's areas, catering department and staff accommodation area.
- b. It should be accessible from the ward via patient hospital street and service lift which should be

away from other service lines.

- c. Forensic unit to be located at the posterior corner of the hospital building with separate road and attached earmarked parking.
- d. It should close to Emergency Department and easy access to Pathology and Radiology Departments.



Postgraduate workstations

General Layout & Design Concepts

- a. The planning and design of the facility should consider the discreet flow of the cadaver /deceased to the storage area either from the hospital or directly from the outside.
- b. Individual design layout of the autopsy rooms should consider the viewing requirement for students.
- c. Drainage system should adhere to the infection control guidelines, i.e. treat at source before discharge.
- d. The mortuary should be design with pleasant calming environment as the last respect to the dead.

- e. There must be sufficient and continuous water and electricity supply round the clock.

Workflow

- a. Dead bodies usually may be brought from emergency department, hospital wards or police hearse along the least used corridors so that there is minimum exposure to the public.
- b. Bodies should be taken for the last rites in the facilities in the mortuary before being handed over the relatives.
- c. Staff flow

The staff should use a separate entrance. They will change into the attire provided and appropriate footwear before performing post-mortems¹¹.

- d. Relatives/Visitors flow

Accompanying relatives should follow the deceased from the ward to the mortuary and deal with the release of the dead body along with the death certificate. Relatives attending to identify the deceased should be ushered into a special room where they will be allowed to view the deceased.

Functional Spaces need to include

A. Entrance & public areas

- I. Lobby, reception and waiting area
- II. Vehicle entrance with areas for receiving dead bodies
- III. Muslim lobby with facilities for Quran Reading
- IV. Muslim bath and preparation area
- V. Non-Muslim lobby
- VI. Death certificate issuance Counter and office

VII. Public toilet male and female & disable.

B. Body storage & post-mortem area

- I. Body storage space for fresh bodies on two tier freezers and separate space for the foul body.
- II. Two to three autopsy tables in one room for the fresh cases and separate room for the decompose bodies.
- III. Viewing area for the students with full glass wall.
- IV. Changing room with toilet and shower.
- V. Anatomical study, adjacent to the post-mortem areas and fitted with a fume cupboard.
- VI. Room for tissue grossing, processing and skeleton measurement (Anthropology). Equipped with fume cupboard.
- VII. Separate rooms for each material i.e. Chemicals, Instruments, linen and disposal hold room.
- VIII. Mobile x-ray room.



Integrated Laboratory

Staff Area

- I. Interview and inquest area for police personnel.

- II. Head of the department room with waiting area and single rooms for specialists and medical officers.
- III. General office for 8 people with staff toilets i.e. separates for male and female
- IV. Record room and Guard room.

Space Provision & Engineering & Environmental Requirements include

Design consultants are to propose the required space of each department according to space available, functional requirements work load¹². Size and configuration of propose space should be able to support the functional, operational and the environmental performances of the services for current and future needs¹³. The minimum space required should be in accordance to the Provincial Building control Authority considering the international guidelines and standards. (A typical sketch is attached ANX A just for guidance¹⁴.

Air Conditioning and Ventilation need to be required to prevent the level of formalin vapour from exceeding the maximum permissible exposure level is 2 parts per million^{1,15}.

Procedural Areas includes

- Flooring should be impervious, non-slip, easily cleaned, resistant to cleaning agents and gravity drain via waste trap^{3,16}.
- The mortuary (slab). This may be porcelain or stainless steel. It needs to have a gravity drain system to a waste trap, a continuous water supply.
- 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^{4,17}.



Discussion Room

Storage such as Electrical Supply, Lighting, communications, Water Supply system, Drainage System and Firefighting and Protection¹⁸⁻²⁰.

Conclusion

In practically every hospital and medical school, the autopsy suite is the most despised and underappreciated area. Basic amenities are virtually nonexistent for both the dead and the public and medical/paramedical personnel who work there. It is a well-known reality that, of all the expenses incurred by a hospital or medical facility, funding for a morgue receives the lowest priority. Even with these mistakes, raising awareness of them can lead to some changes. Consequently, for the reasons outlined above, this blueprint for the typical autopsy suite is published with the only goal of illuminating some insights regarding the improvement of this despised and neglected activity.

Acknowledgement:

We would like to express our sincere gratitude to all those who contributed to the development of this manuscript. Our heartfelt thanks go to the Faculty of Medicine at MAHSA University, Northern Border University, and University Technology MARA (UiTM) for their invaluable support and resources. We are especially grateful to our colleagues and mentors for their insightful feedback and encouragement throughout this project. Additionally, we acknowledge the medical professionals and administrative staff whose dedication to improving autopsy facilities in developing countries has inspired this work.

References:

1. Cotton, D.W. and S.S. Cross, The hospital autopsy. 1993: Butterworth-Heinemann.
2. Shafi M Nizamani, H.A., Pitfalls of law related to Qisas & diyat act Medical channel 2000. 6(2): p. 3.
3. Walls, C., et al., Managing Health and Safety Risks in New Zealand Mortuaries: A Guideline to Promote Safe Working Conditions. 2000: Occupational Safety and Health Service of the Department of Labour.
4. Jeffe, D.B., et al., Healthcare Workers' Attitudes and Compliance With Universal Precautions Gender, Occupation, and Specialty Differences. *Infection Control & Hospital Epidemiology*, 1997. 18(10): p. 710-712.
5. Li L. Biosafety level 3 laboratory for autopsies of patients with severe acute respiratory syndrome: principles practices, and prospects. *Clin Infect Dis*. 2005; 41:815–821.
6. Nolte KB. Medical examiners, coroners, and biologic terrorism. A guidebook for surveillance and case management. *MMWR Recomm Rep*. 2004; 53:1–27.
7. Marty AM. Anatomic laboratory and forensic aspects of biological threat agents. *Clin Lab Med*. 2006; 26:515–540.
8. Miller JM. Guidelines for safe work practices in human and animal medical diagnostic laboratories. Recommendations of a CDC-convened, Biosafety Blue-Ribbon Panel. *Morb Mortal Wkly Rep Surveill Summ*. 2012;61(suppl):1–102.
9. Fritzsche FR, Dietel M, Weichert W, Buckendahl A-C. Cut-resistant protective gloves in pathology—effective and cost-effective. *Virshows Arch*. 2008; 452:313–318.
10. O'Briain DS. Patterns of occupational hand injury in pathology. The interaction of blades, needles and the dissector's digits. *Arch Pathol Lab Med*. 1991;115:610–613.
11. Nolte KB. Survival of Mycobacterium tuberculosis organisms for 8 days in fresh lung tissue from an exhumed body. *Hum Pathol*. 2005;36:915–916.
12. Gerston KF, Blumberg L, Tshabalala VA, Murray J. Viability of mycobacteria in formalin-fixed lungs. *Hum Pathol*. 2004;35:571–575.
13. Ruef C. Immunization for hospital staff. *Curr Opin Infect Dis*. 2004;17:335–339.
14. Nolte KB, Taylor DG, Richmond JY. Biosafety considerations for autopsy. *Am J Forensic Med Pathol*. 2002;23:107–122.
15. Conolly RB, Kimbell J, Janszen D. Human respiratory tract cancer risks of inhaled formaldehyde. *Toxicol Sci*. 2004;82:279–296.
16. Singleton M, Start RD, Richardson C, Conway M. The radioactive autopsy: safe working practices. *Histopathology*. 2007;51:289–304.
17. Rader SB, Zeijlemaker V, Pehrson S, Svendsen JH. Making post-mortem implantable cardioverter defibrillator explantation safe. *Europace*. 2009;11:1317–1322. doi: 10.1093/europace/eup249.
18. Burton JL. Health and safety at necropsy. *J Clin Pathol*. 2003;56:254–260.
19. Collins KA, Hutchins GM. College of American Pathologists; Northfield, IL: 2003. Autopsy Performance and Reporting.
20. Hutchins KD, Williams AW, Natarajan GA. Neck needle foreign bodies: an added risk for autopsy pathologists. *Arch Pathol Lab Med*. 2001;125:790–792.

Access this article online



Website:

<https://feabd.com>

Copyright (c) 2024 International Journal of Forensic Expert Alliance (IJFEA). Volume 01, Issue 01, January- June 2024. This work is licensed under a Creative Commons Attribution 4.0 International License