



ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

THE AVAILABILITY OF ISOLATION ROOMS IN SELECTED GOVERNMENTAL HOSPITALS, ADDIS ABABA, ETHIOPIA

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Summary

Background: Isolation refers to separation of individuals having a particular disease or who have been exposed to an infectious agent from those who are not affected by that transmissible illness; includes the establishment of a separate area within a hospital ward and the restriction of the movement of the infected patients in order to minimize the spread of disease. Dedicated isolation wards maybe pre-built into hospitals, or isolation units maybe temporarily designated in facilities in the midst of epidemic emergency. Many hospitals in countries like Ethiopia lack these facilities.

Objective: The main aim of this research to explore about the availability of isolation rooms for highly contagious diseases in selected governmental hospitals in Addis Ababa, Ethiopia.

Method: A qualitative exploratory research design was conducted to execute this research. The study is conducted in four government-owned hospitals; one teaching hospital under Addis Ababa University (Tikur Anbessa Specialized Hospital), one hospital under AACAHB (Zewditu Memorial Hospital), one hospital under the FMOH (St. Paul's hospital millennium medical college) and one Army and Police Hospital (Armed Forces General Hospital). Purposeful sampling of one hospital from each category was taken. Data was collected using an in-depth interview with key informants of the hospitals and observation. Results were analyzed using thematic analysis.

Result: Results from this study have shown that all four hospitals studied have isolation rooms. These rooms are not available at all wards but mainly in medical and pediatric wards. Regarding the quality, none of these isolation rooms are specially designed. The most common disease that needs isolation is TB in all four hospitals followed by measles in the pediatric wards. Protective isolation rooms were only present in two of the four studied hospitals but lack proper design and instructions. Strict use of PPE by healthcare professionals and visitors was not seen.

Conclusion: Isolation practices suggested by the national as well as international guideline were not being adhered to in the governmental hospitals found in Addis Ababa. This is related to the economic status and infrastructure of hospitals in the country in general. It also showed lack of effective management in the application of the national and worldwide guidelines. Additionally, it showed the need for task specific education and standard policies to be developed by each hospitals.

List of acronyms or abbreviations

AIIR- Airborne Infection Isolation Room

CDC- Center for Disease Control and Prevention

EuroNHID- European Network for Highly Infectious Diseases

FMOH- Federal Ministry of Health

HCAI- Health Care Associated Infections

HAI- Hospital Acquired Infection

HEPA- High efficiency particulate

HIV- Human immune virus

IC-Infection Control

IPC- Infection Prevention and Control

MDR- Multi drug resistant

OPD- Outpatient Department

PICU- Pediatric Intensive Care Unit

PPE- Personal Protective Equipment

SPHMMC- St. Paul's Hospital Millennium Medical College

SSA- Sub Saharan Africa

TB- Tuberculosis

UoGH- University of Gondar Hospital

USAID- United States Agency for International Development

WHO- World Health Organization

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1. Introduction

1.1. Background

Isolation refers to separation of individuals having a particular disease or who have been exposed to an infectious agent from those who are healthy; this includes the establishment of a separate area within a hospital ward and the restriction of the movement of the infected patients in order to minimize the spread of disease [1].

The term “Isolation” is the use of infection prevention and control precautions aimed at controlling and preventing the spread of infection. There are two types of isolation – Source Isolation (barrier nursing) where the patient is the source of infection and Protective Isolation (reverse barrier nursing) where the patient requires protection i.e. they are immunocompromised [2].

Source isolation is designed to prevent the spread of pathogens from an infected patient to other patients, hospital personnel and visitors. This has previously been known as barrier nursing. The need for isolation is determined by the way the organism or disease is transmitted. Source isolation can be achieved by placing patients in Single rooms on general ward or Isolation units with isolation rooms with negative pressure ventilation with an anteroom and en-suite facilities. Examples of organisms requiring source isolation may include:

- Pulmonary Tuberculosis
- Chickenpox
- Extended Spectrum Beta Lactamase (E SBL) producing coliforms
- Meticillin Resistant Staphylococcus Aureus (MRSA)
- Viral diarrhea and vomiting
- Viral hemorrhagic fever
- Other multi resistant organisms
- H1N1 influenza
- Unexplained rash if it is considered to be of infectious cause

When single rooms or isolation rooms are not available and where several patients with the same confirmed organism have been identified these patients may be nursed together in a bay or ward. This is called Cohort nursing. Examples may include diarrhea and vomiting, *Clostridium difficile* diarrhea, norovirus and influenza [2].

The purpose of isolating patients is to prevent the transmission of micro-organisms from infected or colonized patients to other patients, hospital visitors, and health care workers (who may subsequently transmit to other patients or become infected or colonized themselves). Two-tier approach is currently employed. This includes standard precautions and transmission-based precautions [3].

Standard Precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where healthcare is delivered. These practices are designed to both protect healthcare personnel (HCPs) and prevent HCPs from spreading infections among patients, especially those due to blood-borne pathogens. These Standard Precautions include hand hygiene, use of personal protective equipment (e.g. gloves, gowns, masks), safe injection practices, safe handling of potentially contaminated equipment or surfaces in the patient environment, and respiratory hygiene/cough etiquette [4].

Additional (transmission-based) precautions are taken while ensuring standard precautions are maintained. Additional precautions include: Airborne precautions; Droplet precautions; and Contact precautions. If there is any question of an infectious process in a patient without a known diagnosis, implementing Transmission-Based Precautions should be considered based on the patient's signs and symptoms until a definitive diagnosis is made. For contact and droplet infection if private room not available, place patient in room with patient having active infection with the same micro-organism, but with no other infection [4,5].

The airborne precautions are designed to reduce the nosocomial transmission of particles 5 µm or less in size that can remain in the air for several hours and be widely dispersed. They are effective in preventing infections like Tuberculosis, Chicken pox and measles. They are recommended for patients with either known or suspected infections that could be transmitted by airborne route. The precautions include: Patient Placement in Private room, Door closed, Room air is exhausted to the outside (Negative air pressure) using fan. If private room not available, place patients in room with patient having active infection with the same disease, but with no

other infection. The staff on duty should check all visitors for susceptibility before allowing them to visit. Respiratory protection to the HCW wearing surgical masks, limitation of patient transport for essential purpose only and patient must wear surgical mask during transportation [4].

High isolation is used to prevent the spread of unusually highly contagious or high consequence, infectious diseases (e.g., smallpox, Ebola virus). It stipulates mandatory use of: (1) gloves (or double gloves if appropriate), (2) protective eyewear (goggles or face shield), (3) a waterproof gown (or total body Tyvek suit, if appropriate), and (4) a respirator (at least FFP2 or N95 NIOSH equivalent), not simply a surgical mask. Sometimes negative pressure rooms or powered air-purifying respirators (PAPRs) are also used [6].

All patient rooms in hospitals should provide an acceptable environment for patients to re-cover and a good working environment for health care professionals who attend to them. The special purpose of an isolation room is to protect health care workers, other patients and visitors in a hospital from exposure to an airborne infectious agent in the event that an infectious patient is staying in the room. A principal design goal for an isolation room, then, should be to achieve and maintain an adequate level of airborne infection protection in the environment surrounding an infectious patient. In other words, to contain the airborne infectious material in such a way that the threat of exposure to health care personnel within the isolation room and others outside of the room is minimized [7].

Isolation facilities include the following types:

- Neutral or standard room air pressure, for example standard air conditioning, also known as, Class S
- Positive room air pressure where an immune-compromised patient is protected from airborne transmission of any infection, Class P
- Negative room air pressure, where others are protected from any airborne transmission from a patient who may be an infection risk, Class N
- Negative room air pressure with additional barriers including an Anteroom, also known as Class Q for quarantine isolation [8].

According to the WHO, 'of every 100 hospitalized patients at any given time, 7 in developed and 10 in developing countries will acquire at least one of the infections acquired in health care

settings'. Tuberculosis is one of these infections. Authors worldwide warn that the risk of becoming infected with TB in healthcare settings is increasing daily. Lin et al. indicated that infections acquired in healthcare settings represent an important indicator of healthcare quality and patient safety, which makes it an important health issue for research. The WHO acknowledges that infections acquired in healthcare settings are a recognized public health problem and a global public threat for both patients and healthcare professionals. Mixing infectious TB patients with patients who do not have TB, especially those with HIV or other immune-compromised conditions, fuels TB transmission risks [5].

'Healthcare-associated infection' is the term used to refer to infections acquired during contact with any part of the healthcare system, including those acquired occupationally by staff at work. Health professionals may transfer infection to and between patients, but they are also at risk of acquiring infections within their workplace. Health Care Workers in SSA are at considerable risk of occupational infection due to the high general prevalence of biological hazards (e.g. hepatitis B, C, HIV, tuberculosis, measles and rubella) in combination with a lack of personal protective equipment, suitable facilities and organizational support [9].

Isolation is most commonly used when a patient is known to have a contagious (transmissible person-to-person) viral or bacterial illness. Special equipment is used in the management of patients in the various forms of isolation. These most commonly include items of personal protective equipment and engineering controls (positive pressure rooms, negative pressure rooms, laminar air flow equipment, and various mechanical and structural barriers). Dedicated isolation wards maybe pre-built into hospitals, or isolation units maybe temporarily designated in facilities in the midst of epidemic emergency [10].

1.2. Statement of the Problem

This topic needs priority and due attention because Ethiopia has poor health status relative to other low income countries, even within sub-Saharan Africa. Infectious diseases account for about 60-80% of the health problems in the country. Standard and transmission-based precautions are used to interrupt pathogen transmission in healthcare settings. Patient isolation is a key component of these precautions, targeting pathogens such as *M. tuberculosis* (TB), antibiotic-resistant bacteria and certain viruses. Despite widespread implementation of these precautions in high-income countries, the resources to effectively apply patient isolation and transmission-based precaution recommendations are lacking in many low and middle income

countries. In Ethiopia, lack of these isolation rooms leads to increased healthcare associated infections and development of drug resistant microorganisms which has an even higher social and economic burden. Studying the availability of these isolation rooms and knowing the main reason behind the lack helps in decreasing this burden [11,12,13].

1.3. Significance of the Study

Isolation of patients with infectious diseases is one of the major principles of modern medicine, as well as a globally accepted standard of care. The resources used for proper patient isolation and application of standard and transmission based precautions are lacking in many of the hospitals in SSA and Ethiopia. The importance of this study is to evaluate the availability of isolation rooms in governmental hospitals found in Ethiopia, the current practices undertaken in keeping contagious patients and the main reasons for lack of personal protection of the hospital staff. This information may be used in the hospitals in proper patient placement and also to bring the need of building standard isolation units with proper design, construction, operation and maintenance of facilities to the attention of the medical directors and architects in future hospital designs. It should also be helpful in preparedness of hospitals for highly contagious diseases in cases of epidemics. Knowing the reasons for lack of these isolation units may also serve as solutions for the future. This research could be a base for further researches.

3. Literature Review

3.1. Overview of Isolation Room Availability in the World

The first published recommendations for isolation precautions in the United States appeared as early as 1877, when a hospital handbook recommended placing patients with infectious diseases in separate facilities, which ultimately became known as infectious disease hospitals. Although this practice segregated infected patients from non-infected patients, nosocomial transmission continued to occur because infected patients were not separated from each other according to their disease, and few, if any, aseptic procedures were practiced. Personnel in infectious disease hospitals began to combat problems of nosocomial transmission by setting aside a floor or ward

for patients with similar diseases and by practicing aseptic procedures recommended in nursing textbooks published from 1890 to 1900 [14].

The 2007 minimum design standards for Health care facilities in Michigan suggests that at least one airborne infection isolation room shall be provided. The number of airborne infection isolation rooms for individual patient units shall be increased based upon an "infection control risk assessment" prepared by a multidisciplinary group designated for that purpose. These rooms may be located within individual nursing units and used for normal acute care when not required for isolation cases or they may be grouped as a separate isolation unit. Each room shall contain only one bed and shall comply with the acute-care patient room section of this document, as well as an area for hand washing, gowning, and storage of clean and soiled materials located directly outside or immediately inside the entry door to the room. Airborne infection isolation room perimeter walls, ceiling, and floors, including penetrations, shall be sealed tightly so that air does not ex-filtrate from the room into the surrounding environment or other spaces. Airborne infection isolation room(s) shall have self-closing devices on all room exit doors. Separate water closet, bathtub (or shower), and hand washing facilities are required for each airborne infection isolation room. And also, facilities with protective environment rooms should include at least one immunosuppressed host airborne infection isolation room [10].

The Euro NHID project team presents and discusses the collected data from 47 isolation facilities in 15 European countries. The majority of surveyed centers (85%) are part of a general/university hospital, considered because a broad range of consultants in other specialties may be easily available. The majority of facilities evaluated are fully operating and able to admit a patient within 5 hours of notification (71.74%). Negative pressure, presence of an anteroom, HEPA (High Efficiency Particulate Air), filtration of exhausting air, sealing of doors and windows, and use of material easy to decontaminate inside the room, have been considered as the fundamental technical requirements for effective infection control. Adequate infrastructure-related technical equipment (≥ 4 explored issues) to ensure infection control is found in the majority of centers evaluated (70.2%). Among centers with 4 explored issues, the most lacking is adequate sealing of doors and windows. The remaining 14 isolation facilities (29.7%) have only 3 or less among explored technical issues, and among them 5 (10.6%) are not equipped with negative pressure [15].

3.2. Overview of Isolation Room Availability in Africa

The Tygerberg Children's Hospital (TCH) in Cape Town, South Africa has 300 pediatric beds within the 1384-bed academic hospital complex. Five pediatric wards have 18 single rooms available for patient isolation (9 under negative pressure; only 3 with en-suite bathrooms; none have ante-rooms). This represents 14 % of the available beds on the five wards: 1 room in acute admissions, 3 in pediatric surgery, 2 in general pediatrics, 2 in pulmonology/neurology and 10 in the infectious diseases/gastroenterology ward. The pediatric intensive care unit (PICU) has 10 beds in 2 cohort rooms with no single room or isolation facilities available. PICU patients were eligible for study inclusion if transferred to any of the specified wards. Each ward's medical and nursing personnel determine which patients are placed in isolation. Although there is no formal policy guiding isolation room utilization, preference is given to patients requiring airborne precautions e.g. pulmonary TB, measles and varicella. Where possible, children are accompanied by a caregiver (who may also require isolation e.g. for pulmonary TB). Syndromic isolation for suspected viral diseases is infrequently implemented, owing to clinician unfamiliarity with the practice and limited isolation space. In contrast, syndromic isolation for suspected TB is actively practiced, based on compatible symptoms and signs, history of TB contact and/or a suggestive chest radiograph appearance. The hospital's Unit for Infection Prevention and Control (IPC) conducts laboratory surveillance for selected bacterial "alert" pathogens and makes recommendations for patient isolation on an ad-hoc basis. Infectious patients are usually isolated until discharge (with the exception of meningococcal disease with de-isolation after 24 h of therapy) [12].

The impact of absent or limited pediatric isolation facilities in low-middle income settings is unquantified, but undoubtedly promotes infection transmission, along with adverse health system factors like overcrowding and lack of IPC provisions. Data on rates of patient isolation, indications for and utilization patterns of pediatric isolation facilities in Africa is lacking [12].

3.3. Overview of Isolation Room Availability in Ethiopia

There is a scarcity of published evidence on nosocomial infection in Sub Saharan Africa. A 2011 meta-analysis found that 66% of developing countries worldwide had no published data on the endemic burden of HCAI. Most studies are from single centers often large, referral hospitals in urban areas and will therefore be a poor representation of the wider healthcare systems in the

region. Furthermore, there is a predominance of studies originating from the middle-income countries of the region. Yet, the available evidence is sufficient to raise concern that nosocomial infections are significantly adding to the already high burden of infection in Sub Saharan Africa [9].

Infections in the health care facilities are major public health problems and often a source of great concern to clients, family, staff and community at large. The problem has global distribution but it is more palpable in the developing world, including Ethiopia, where hygiene and sanitation standards are low. These infections are significant because:

- 1) They affect patients who are already sick due to other diseases and with little capacity to resist such additional infections and hence have poor outcomes.
- 2) They affect staff (health or auxiliary) who move from one room to another and remain in close contact with many other patients consequently infecting themselves and enhancing the chances of proliferation.
- 3) The manifestation of infection is obscured (overshadowed) by the initial illness which delays early detection and treatment.
- 4) They are in many cases resistant to the commonly used antibiotics and some, such as HIV, are not curable.
- 5) Some infections in health care facilities are difficult to eradicate.

For these reasons focusing on the prevention and control of these infections is much better. It is more cost-effective than the treatment of individual cases or the control of epidemics [13].

The U.S. Government, through the U.S. Agency for International Development (USAID) TB CARE project, implemented by the KNCV Tuberculosis Foundation, handed over a newly renovated facility for treatment of Multi-Drug Resistant TB (MDR-TB) to Oromia Regional Health Bureau, Bishoftu Hospital September, 2014. The renovated MDR-TB facility has in-patient and outpatient wings. The inpatient sections has a total of six rooms for up to 12 patients at one time: two isolation rooms (for male and female) with self-contained showers and rest rooms, two wards (male and female), and a capacious verandah. The outpatient wing has a total of 13 rooms including examination rooms, laboratory and dispensary room, and two duty rooms with showers. The two wings are connected and adjoin the hospital and has a garden setting to enhance the healing environment. USAID is supporting the Federal Ministry of Health and regional health bureaus in Oromia, Amhara, SNNP, Tigray and two Addis Ababa hospitals

(ALERT and St. Peter's) through several different USAID projects and implementing partners: TB CARE, HEAL-TB, and the Private Health Sector Support Program, to raise awareness of Tuberculosis and MDR-TB, as well as to detect and treat this life-threatening disease [16].

A U.S. Government supported Tuberculosis (TB) Ward with a Multi-Drug Resistant (MDR) unit was inaugurated on April, 2013 at the Mekele Hospital in the Tigray region. The renovated TB ward allows TB patients to be isolated and treated in a state-of-art facility that was previously unavailable in the region, which will significantly reduce the risk of cross-infection. The Mekele Hospital TB ward, the third of its kind in Ethiopia after St. Peter and Gondar University hospitals, was renovated based on the standard airborne infection control design principles which maximize natural ventilation and workflow to prevent transmission of TB at the facility. The facility promotes first-rate TB case management, provides TB treatment, and establishes support and community follow-up systems [17].

The current UoGH buildings were constructed in the 1930s, and were not meant for use as hospital facilities. The usual practice at UoGH was to admit clients with TB to two open medical wards, with 30 beds each. Each of these wards had a "TB corner," where several TB clients would be placed; the other parts of the ward were used for other clients. These wards were crowded, and poorly ventilated, with windows often kept closed; neither clients nor staff observed respiratory precautions. Most of the clients in the medical wards were immunosuppressed—many had AIDS—and thus highly susceptible to TB. It was fertile ground for TB transmission. Isolating patients with TB was not considered—not even by senior clinicians. This practice of admitting TB patients to the general medical wards was so entrenched that clinicians accepted it as normal procedure. This was partly due to lack of training/awareness, and low perception of risk, as well as to hospital infrastructure. The most important step was to address the structural barriers to creating a TB ward that meets standards of care. Thereafter, with the goal of bringing the importance of TB IC to the attention of clients, health workers, students, and managers, I-TECH Ethiopia, at significant cost, renovated, equipped, and furnished a TB/MDR-TB isolation ward that would meet international TB IC standards. The renovated TB ward has 28 beds with good illumination, and excellent ventilation and air circulation. Client rooms were designed to have good cross-ventilation: the bottom parts of all exterior doors are louvered or fenestrated, to ensure flow of air into the rooms at night, when the doors are closed. There are large screened windows (with a window-to-wall ratio of > 20%) front and back to ensure cross ventilation, as well as a veranda wide enough for adequate natural ventilation [18].

Researches done on isolation room availability in hospital wards other than TB isolation couldn't be accessed.

3. Objectives

3.1. General Objective

- To explore about the availability of isolation rooms for highly contagious diseases in selected governmental hospitals in Addis Ababa, Ethiopia.

3.2. Specific Objectives

- To assess the quality of the isolation rooms where infectious patients are placed when they present to any of the wards in these hospitals.
- Explore and describe the management of visitation in the isolation ward.
- To assess the use of personal protective equipment in these ward.

4. Research Methods

4.1. Study Area

This study is carried out in Addis Ababa, Ethiopia. Addis Ababa is the capital city of Ethiopia. Estimated population of Addis Ababa is 3,122,000 from 2013 inter-census report. There are a total of 14 government owned hospitals in Addis Ababa of which four are under the Federal Ministry of Health (FMOH), one is a university hospital under Addis Ababa University, six are general hospitals under the Addis Ababa City Administration Health Bureau (AACAHB) and the other three are Army and Police Hospitals. With the exception of Army and Police hospitals, the remaining government owned hospitals are public hospitals. [19,20].

4.2. Study Design

. A cross-sectional qualitative design of an explorative nature was used to conduct the study.

4.3. Source Population

All governmental hospitals in Addis Ababa were the source population.

4.4. Study population

The participants for the interview were varied in each hospital depending on who was suggested to be the key informant by the medical director. For SPHMMC the medical director, vice matron and infection prevention and quality focal person were interviewed. In black lion hospital, the liaison office head and the ward head nurse were included for the interview. In armed force general hospital, the representative of the medical director and the customer service satisfaction and quality officer were interviewed after communicating with the medical director who suggested the above two can give the information needed. In Zewditu memorial hospital the interview was conducted with the head nurse of the medical ward and the head liaison officer.

4.5. Sampling Technique

Non probability sampling was used to select the four hospitals out of the 14 hospitals so that one hospital was represented from under each administration (Federal ministry of health, Addis Ababa City administration health bureau, Addis Ababa University and Army and Police Hospital). Purposeful sampling was also used to select the in-depth interview participants. The participants are health professionals at different posts who were believed to have the necessary information about standard and transmission based precautions practicability in the selected hospitals.

4.4. Data Collection

The data utilized in this research was obtained from in-depth interviews conducted with the selected participants. The semi-structured interview was developed by reviewing different references, taking the objectives of the study into account and by consulting the advisors. There was only one researcher who carried out all interviews. Audio recordings and interview notes were taken. Persistent observation of the hospitals which lasted for minimum of two days helped the researcher to gather further information. A checklist was developed related to the central question that asked; “Is there an isolation room in the wards of the hospital?” followed by questions that were related to the quality of the isolation rooms, the use of standard and transmission based precautions by health professionals and current practices if infection prevention and control.

4.5. Operational Definitions

Isolation room available- any separate room within hospital wards which has restricted movement of the infected patient even if it has no special design.

Proper isolation room – a room designed different from the rest of the ward rooms which was built to meet the transmission based precautions that should be practiced for a specific type of route of transmission.

Proper isolation practice- if a hospital meets the practices suggested in the CDC, WHO or Ethiopian isolation precaution guideline.

4.6. Data analysis and quality

In order to ensure the credibility of the study findings, two data collection instruments (in depth interview and observation) were used. Initially the data obtained from the interview notes and tape recorders were gathered. The audio recordings were transcribed. Thematic analysis was used where familiarization with the data was initially made. Then systematically grouping of similar kinds of information together in categories (coding) and relating different ideas and themes to one another was done meticulously. Data collected through observation using the checklist were analyzed using quasi statistics where the number of hospitals with or without an isolation room, the use of PPE or not were counted. The results from the quasi statistics and framework analysis were combined to give the conclusions of the study.

4.7. Ethical Considerations

Ethical clearance was obtained from St. Paul's Hospital Millennium Medical College, department of public health and permission to conduct the study in the selected hospitals was obtained from the respective concerned bodies. The hospitals and the interviewees were informed about the research and were asked to participate with their good will and for which they will agree with a verbal consent. The participants were also allowed to leave the research whenever they want to quit.

4.8. Dissemination of Findings

The findings will be presented to the St. Paul's Hospital Millennium Medical College, department of public health. Copies of the final will also be distributed to the libraries of the hospitals upon which the research was made. Publication in national journals and websites will also be considered.

5. Results and discussion

5.1. Results

This study has showed that there is isolation ward in at least one of the wards of all studied hospitals. One of the studied hospitals had no isolation room in the medical ward. None of these are proper isolation rooms. There are problems faced when in need of isolating a patient in most of the studied hospitals. Personal protective equipment was not used consistently by patients, staff or visitors. These findings were arranged into categories, which are discussed in detail hereunder.

Availability of isolation room in the wards and the quality of these rooms

All four hospitals have rooms dedicated for isolation. Two of the hospitals have isolation room in both medical and pediatric ward. One hospital has no adult medical isolation room. According to the participant from this hospital, “We don’t have rooms dedicated to isolation room currently and the main reason was the need to use to the limited number of wards for another purpose. It has always been a major concern but construction delay was the hindering factor” He continued “but starting from November 1, there will be 2 isolation rooms, one in the ward and one in the ICU. There are also buildings under construction which have a proper isolation rooms in the plan.”

Patients in other wards of all four hospitals with concomitant infectious diseases face difficulty in getting isolation bed because the beds at the medical and pediatric ER are occupied mostly. At times of lack of bed, infectious patients were sometimes seen mixed with non-infectious patients in two of the studied hospitals and urgent referral to specialized centers was mentioned as the main solution. According to the liaison officer of one hospital when asked about mixing infectious patients, “It is a very risky practice which concerns the other patients and us, the health professionals too.”

Only one hospital had single bed isolation rooms. The most common disease that needs isolation is TB in all four hospitals followed by measles in the pediatric wards. Both have airborne based transmission. None of the isolation rooms in all hospitals are built to meet the airborne transmission based precaution requirements of an isolation room like ventilation, negative pressure difference, tight sealing, self-closing or doors closed at all times. All participants mentioned the fact that these isolation rooms were not prebuilt as reasons. One participant said “I

believe the whole isolation practice is below the standard in this hospital, regarding the rooms, the buildings are old and there were no rooms built for this purpose at that time.” A quality officer from another hospital said, “Even if the rooms are not specially designed, they are found at the corners of the corridors and have windows and doors always open so I believe it’s a relatively well ventilated room.” None of these rooms were provided with separate fully occupied sanitary service; separate and labeled waste and soiled material disposal system. An emergency isolation room observed in one hospital didn’t fulfill criteria of a standard ward where the place is a verandah and patients were exposed to cold weather and patients were seen neglected.

The protective isolation rooms were present in two of the studied hospitals but lack special design like positive pressure rooms, increased air change per hour, minimizing dust and well-sealed outlets and other standards. The protective isolation rooms of one hospital are provided with separate sanitary systems.

Isolation room available	All
Special designed isolation room	None
Total number of isolation room with respective beds	
Tikur Anbessa Specialized Hospital	3/6
Armed force General Hospital	4/12
Zewditu Memorial Hospital	3/3
St. Paul’s Hospital Millennium Medical College	2/5
Total number of beds for protective isolation	
Tikur Anbessa Specialized Hospital	23
Armed force General Hospital	None
Zewditu Memorial Hospital	None
St. Paul’s Hospital Millennium Medical College	3

Table 1.0 availability of isolation room in the studied hospitals

Personal protective equipment use by staff and visitors

Regarding use of personal protective equipment by the staff of the hospital, consistent use by all was not seen in all four hospitals. Two participants from respective two hospitals mentioned shortage of the equipment as a reason for not wearing them all time. The head nurse from one hospital stated, “We know it is necessary, but we are only healthy because of God’s will.” Gloves are available almost 100% of the time but shortage in masks, goggles, face shields and gowns were seen in both hospitals. On the other hand, majority of the participants (six of the participants) believed lack of attitude and negligence to be the main factors. The vice nurse director of one hospital stated, “Those staff who don’t use regularly believe there is not much harm that will come from not using PPE.” Another participant mentioned “We are all educated to use the PPE but only those with personal concern wear it.” Provision of education and training on preventing transmission of infectious diseases associated with healthcare during orientation to the healthcare facility and updating information periodically during ongoing education programs was the solution offered by most participants. According to the quality officer at one hospital “There is no shortage of PPE at the hospital, but for changing the adherence infection prevention training which includes both standard and transmission based precautions is given to around one third of the hospital staff and there is a plan to give similar training to all.”

With regard to the use of PPE by visitors at isolation wards, only two of the hospitals provided masks to visitors of patients staying in the isolation room. There is no restriction of number of visitors to these rooms in three of the hospitals. A head nurse of one hospital said “Visitors see the patients when they are in their rooms, we don’t have visitor restriction even if it’s not advised. Masks are sometimes used by the visitors.” Patients were also observed ambulating without masks in two of the studied hospitals. Only one hospital was seen to have a strict control of consistent use of masks in ambulating patients. Strict supervision of all practices by concerned bodies lacks according to most participants. All participants agreed that there needs a lot of work to be done in order to improve isolation practice in Hospitals in Ethiopia.

5.2. Discussion

As science has documented till this date, transmission of infection within a hospital requires three elements: a source of infecting microorganisms, a susceptible host, and a means of transmission for the microorganism.. The availability of an isolation room tackles the connection of these three elements.

This study discovered that there are shortage of proper isolation rooms, gap in application of transmission based precautions by patients, visitors and health care workers. These findings concur with a study done in South Africa where results showed TB cubicles were not reserved for patients with infectious TB and that many TB inpatients at hospitals of Vhembe district were not isolated; masks were not used consistently or appropriately by patients, staff or visitors. Furthermore, the movement of TB inpatients in isolation was not restricted [1].

Nevertheless, according to the national infection prevention guideline and worldwide guidelines variety of procedures are used as part of isolation. These include the specific requirements in construction of the rooms, how to implement both standard and transmission based precaution, how to enter and leave the room, how to place and transport patients and procedures to care for equipment and supplies in the isolation room and many more. [4,7,13,21]

In 2011, the Food Medicine and Health Care Administration and Control Authority (FMHACA) released minimum standards for all levels of health-care facilities in Ethiopia. One requirement to prevent and control airborne infection for specified area includes Airborne Infection Isolation Room. All studied hospitals lack this infrastructure in the already old pre-built hospital buildings to fulfill those requirements. CDC recommends involving infection prevention and control personnel in decisions on facility construction and design, determination of AIIR and protective Environment capacity needs and environmental assessments. Future planning and renovation of hospitals should include these [21,22].

One of the studied hospital's isolation room was below standard ward rooms. While isolation rooms must meet the general requirements for a standard medical-surgical patient room, they also have specific requirements [20].

Administrative gaps in adherence to the guideline include those seen in the monitoring practices of use of PPE by the health personnel and provision of instructional materials for patients and visitors on recommended application of Transmission-Based Precautions. Consistent use of PPE by staff was not seen with lack of awareness being the main factor followed by shortage. Patient's attendants should also be provided with personal protective equipment. Policies are not developed and implemented to limit patient visitation to isolation rooms and even more to the high risk patient care areas i.e. protective isolation rooms. Warning signs also need to be posted at these sites.

In accordance to the CDC recommendations, Hospitals should also provide job- or task-specific education and training on preventing transmission of infectious agents targeted to all medical, nursing, clinical technicians, laboratory staff, janitors, laundry, maintenance workers, students, contract staff and volunteers [21]

In a research made on health care associated infections in SSA, Hospital factors that contribute to the transmission of tuberculosis include crowded, congregated wards with poor ventilation, an absence of isolation facilities and infection control policies, all of which are often found in SSA. Drug-resistant tuberculosis has been associated with HIV in SSA, which further complicates the management of co-infected patients in a region experiencing epidemics of both HIV and tuberculosis. Similarly, the shortage and unavailability of isolation rooms in the studied governmental hospitals in Addis Ababa has multiple negative effects. The most practiced solution is referring a patient to another hospital where the rooms are available, but since most hospitals have very few beds referral could take time. Patient could be kept in an emergency OPD with no isolation for days and in a country like ours where HIV epidemiology is high, infectious disease transmission mainly tuberculosis will be there. The risk of transmission of multi-drug resistant microorganisms is also there. Additionally, it is inconvenient to the already troubled patients and attendants who in large proportion are from low income society and can't afford other than a governmental hospital. [7]

6. Strengths and limitations of the study

This research has tried to see a different topic which hasn't been studied upon previously. It tried to include and analyze the issues of governmental hospitals which are under different administration. It has also compared our practices with worldwide manuals and guidelines.

The lack of resources, mainly time and also financial resource, limits the scope of the study to only four hospitals. The researcher involved in this study is only one could have limitation on the validation and analysis of the data but external views were obtained as much as possible. The

lack of previous similar researches about the topic made it difficult for comparison. Infrequent use of qualitative study designs was also one.

Despite the above limitations, the findings are important to have an insight on isolation room availability in governmental hospitals.

7. Conclusion and Recommendation

7.1. Conclusion

Isolation practices suggested by the national as well as international guideline were not being adhered to in the governmental hospitals found in Addis Ababa. The results of this study has showed that all hospitals in the study have at least one isolation rooms despite lack of a proper room design, shortage of beds compared to the need, lack of transmission based precaution education to visitors and strict use of PPE by all. This is related to the economic status and infrastructure of hospitals in the country in general. It also showed lack of effective management in the application of the national and worldwide guidelines. Additionally, it showed the need for task specific education and standard policies to be developed in hospitals.

7.2. Recommendation

It is recommended that hospitals should have strict adherence to the national and worldwide infection prevention guidelines. Education regarding improvements in putting these guidelines into action which is directed to the administration of the hospitals can be one of the interventions that could be done. . Adequacy of available PPE should always be ensured by responsible body. Task specific education for all staff in the hospitals should be provided. Future planning and renovation of hospitals should consider the need for infection prevention and control and be built according to the minimum requirements. Hospital based protocols should be devised including but not limited to the above mentioned points, patient visitation, transportation, referral etc.

Even if this study can give an insight regarding isolation rooms in hospitals in Addis Abeba, further research needs to be done with larger sample size to provide more comprehensive information about the status of hospitals throughout the country. A quantitative research can also be done using this base as a hypothesis.

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9. Annexes

Interview template

Name of the hospital-

Interviewee's authority in the hospital-

1. How do you describe the process of isolating patients in your hospital?
2. Is there an isolation ward at your hospital? YES/ NO

If yes

- a. Which wards at your hospital have these isolation units?
- b. Are these units temporary or permanent?
- c. Were they specially designed?
- d. Is there a separate toilet and sink?
- d. How many isolation units are there at each wards?
- e. Which type of patient is placed at the isolation unit?
- f. Is there risk assessment undertaken when placing the patients and who makes the decision?
- g. How many patients can be admitted to an isolation ward at a time?

h. Do you think it is adequate?

If no

- i. What is the main reason for not having an isolation room?
 - j. Are there any near future plans of building isolation rooms?
3. Does the hospital staff strictly use Personal protective equipment when entering into these rooms? If no, why?
4. Is there any rule regarding visitors in these wards?