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“Practice of medical error detection and Incident handling in selected public hospitals, in Addis Ababa, Ethiopia.”

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Acronyms and Abbreviations

CCD	Chief Clinical Director
CED	Chief Executive Director
CSA	Central Statistical Agency
EFDA	Ethiopian Food and Drug Authority
EFMHACA	Ethiopian Food, Medicine, and Health Administration and Control Authority
EFY	Ethiopian Fiscal Year
FMOH	Federal Ministry of Health
GP	General Practitioner
IDI	In-Depth Interview
IOM	Institute Of Medicine
KII	Key Informant Interview
MD	Medical Doctor
PI	Principal Investigator
SOP	Standard Operating Procedure
TASH	Tikur Anbessa Specialized Hospital
US	United States
WHO	World Health Organization

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Abstract

Background: Medical error is an emerging global public health problem that poses a threat to patient safety. Health care providing institutions and the health care system should be competent enough to detect incidents of medical error. Patient safety efforts are increasing at global and national level. However, claims for medical errors are rising over time. In Ethiopia, the rate of medical error claims are increasing, and hospitals are where most error claims happen.

Objectives: To explore the practice of medical error detection and incident handling in the selected public hospitals in Addis Ababa, Ethiopia.

Method: Explorative qualitative study was conducted with a case study approach. The study was done in selected public Hospitals in Addis Ababa. Participants were selected using a purposive sampling method based on work experience and information richness. Data was then collected through an In-depth interviews and Key informant interviews. A total of eleven interviews were made with health care providers from the service delivery, office of the Chief Clinical Director, and office of Quality Management. Data was then, analyzed thematically using Open code software.

Results: A total of eleven health care professionals were recruited for this study. Majority of participants were physicians of whom half of them were specialists and subspecialists. Lack of common understanding about medical errors among health care providers, employment of methods incapable to detect medical errors, the blame culture, and lack of medical error specific reporting system were found to be system related factors that made medical errors far from detection while perceived fear of punishment being as individual related factor.

Conclusions: Medical errors are poorly detected and error incidents are reported haphazardly. The way medical errors were handled from the investigation to the corrective measures, found to have a counterproductive effect on care providers. Attention should be given for system factors to improve detection capacity, encourage incident reporting, and to learn from errors.

1. Introduction

1.1. Background

Healthcare is one of the primary necessities of human life. Provision of quality health care service starts with safety. Health services are expected to be benefiting and do no harm to patients. Unfortunately, due to medical errors, these services may cause harm to patients. There are different definitions for medical error. However, the definitions by themselves are subject to debate. Majority of medical experts give due emphasis to outcome-based definition or to process based definition. For these experts, medical error is an act of omission or commission in planning or execution that contributes or could contribute to an unintended result whether real or potential (1). Some experts on the other hand propound to avoid the term “error” for fear of portraying blame.

The application of medical ethics in health care delivery went back to the Mesopotamian and Greek (Hippocratic Oath) civilizations. However, concerns for medical errors are getting much more public attention in the recent decades. The report of institute of medicine (IOM), “to error is human”; building a safer system in 1999 opened the eyes regarding the magnitude of medical errors. According to the report, around 44,000 to 98,000 hospitalized patients die each year due to preventable error (2). Research studies have shown that an average of one in ten patients is subject to an adverse event while receiving hospital care in high income countries (3). The estimate for low and middle income countries suggests that up to one in four patients is harmed, with 134 million adverse events occurring annually due to unsafe care in hospitals, contributing to around 2.6 million deaths (4). Overall, 60% of deaths in low and middle income countries from conditions amenable to health care are due to unsafe health care (5).

The major contributing factors can be categorized in to individual factors and the system factors. Ultimately it is the individual human and the system that interacts and this interaction contributes for errors to happen. As competent system can prevent individual error, an incapacitated system may also be a reason for individual problems. Evidences show that “the majority of medical errors do not result from individual recklessness or the actions of a particular group. More commonly, errors are caused by faulty systems, processes, and conditions that lead people to make mistakes or fail to prevent them” (2).

Applications of advanced sciences and technologies in medical services, globalization, astonishing changes in communication technologies, rise of health insurance markets, and wide social and main stream media coverage increased public knowledge and awareness to medical errors. This in turn increases in the number of law suits issued against health professionals. However, studies has shown law suits counter affects the service delivery through defensive medicine. Defensive medicine can be defined as “ordering tests, procedures, and visits or referring and avoiding treatments for patients for fear of law suit and error claims” (6).

Countries have different rules and regulations to deal with medical errors. In the United States, malpractice law is a specific subset of tort law that deals with health professionals’ negligence. The Ethiopian federal ministry of health employed different tools like clinical audit, chart audit, death audit, and safety checklists together with supportive supervisions. Though no isolated court system to deal with medical errors, Health professionals’ Code of Ethics was developed under Regulation No. 299/2013 (6). Based on this regulation, Health Professionals Ethics Committee has a power and duty to investigate and propose necessary measures to the Ethiopian Food and Drug Authority (EFDA). The authority under proclamation No. 661/2009 has given mandate to regulate health professionals and health institution (7).

1.2. Statement of the problem

Patients’ safety is core for better health care delivery and is also central to countries’ efforts in working towards universal health coverage (4). Medical errors are threats to patient safety. Not having a standard definition of medical errors leads to having a different understanding for medical errors among professionals, healthcare leaders, and the public. Regardless of the nomenclature, it poses a threat to public health in general and patient safety in particular. A sentinel report from the United States found that 90% of deaths from medical errors happen because of problems associated with failed systems and procedures (2, 8).

Medical errors are difficult to detect, for they are very complicated, and challenging to identify their causes and find solutions. Only 3% of medical errors get reported in developed countries (9). In many African countries, there are no policies about safe medical care. Lack of money and not enough support systems are major problems in the area for safe health care practices (10). The burden extends

to the economy as well. According to WHO, safety problems account up to 15% of hospital expenditure in developed countries (11). Other studies has shown that the poor and middle income countries suffer from a loss of \$1. 4 trillion to \$1. 6 trillion worth of productivity every year due to the unsafe health care (4). In Ethiopia, though there a limited data describing the magnitude and burden of medical errors, the number of claims for medical errors is increasing in the last decade (12).

Detecting public health problems shouldn't rely on people choosing to report. Health care systems need to advance from the old system of detecting errors based on people reporting error claims. Instead they should find systematic ways to identify and prevent errors. Furthermore, these systems may not report accurately and can result in blaming others. This approach can also make people understand that medical errors are the fault of individuals. This puts further challenges on efforts to prevent medical errors. In Ethiopia, medical errors are often dealt with by blaming and punishing instead of fixing those (13).

Understanding the fact that humans' behavior is influenced by working environment, healthcare institutions need to improve their systems and processes which potentially lead to medical errors. Institutions should use a systematic approach and avoid the tradition of blame and punish people. Principles of ethical codes should always be followed when providing services when of medical errors are happened. Health professionals are also mandated to benefit and do no harm (Beneficence and no maleficence) for patients. Regardless of what the consequences are, it's not ethical for health care providers not to report incidents of medical errors. Error handling should also be in a way that encourages health care providers to report incidents of medical errors. Otherwise, health care leaders and providers will find it challenging to learn from their mistakes. It is also important to communicate patients who have been affected by medical errors and their right to be disclosed about what happened should be maintained.

Errors claims and public outrage are increasing in spite of increased patient safety and quality improvement initiatives at the national level. Not many studies have been done, but the majority of them dealt with awareness of medical errors and ethics of health professionals and a very few of them dealt with procedurals in the health regulatory bodies. There no available study done in Ethiopia that dealt with the practices of medical error detection and error handling. Hospitals are where the commonest institutions for medical

error claims unfortunately majority of errors were claimed by patients, family of patients, police, and the courts (12). This raises a concern whether hospitals are able to detect medical errors, and it also urges that we need to assess their practice of error detection. To mitigate the effect of medical errors, first we need to have a system able to detect medical errors. This begins by assessing the practice of error detection and how we handle them.

1.3. Rationale for the study

One of the main concern of every healthcare system is patient safety. Though it's a global public health threats, the issue of medical error needs grave concern in Ethiopia. Our systems should be capable enough to identify patient safety breaches. Error identification should also be accompanied with corrective and constructive measures. Poorly detected and improperly managed medical errors are the key attributes of unsafe healthcare services. Properly handled errors are also opportunities for improvement actions.

Healthcare institutions, managers, professionals, and the system in general must be in a position to identify errors and handle them in a constructive way. It's a fact that for the improvement we want to make, first we need to understand the position where we are, and the practice how we do. So, for the safer system we aspire, we need to assess the practices how we are detecting errors and the way we handle them. It's through improved detection of errors that we can learn from our mistakes. The aim of this study is to assess the existing medical error detection and handling mechanisms, identify the potential defects, and forward the possible solutions.

1.4. Significance of the study

We need to build a safer healthcare system that enable us to deliver safe health care services to our people. Safety measures need a meticulous effort and should take in to account the practices in hospitals, which are the commonest site for medical error claims in Ethiopia. Assessing medical error detection and event handling can provide an important insight to understand the existing practice and help to generate evidences to reveal existing defects for health institutions, policy makers, and managers to develop a safer healthcare system and a safe health care service, and to contribute a safety improvement measure for the country healthcare system in general.

2. Literature review

2.1. Definition

The problem with medical errors starts from the nomenclature. Different scholars, institutions, and the medical world in general have various understanding about medical error. Terms like malpractice, negligence, adverse events, and clinical errors are used in different institutions and countries. The IOM calls it a clinical error when “action failed to go as planned, or when the wrong plan is used to achieve a goal” (2).

Several studies have been conducted around the world regarding medical errors. A systematic review at the University of Birmingham reviewed similar studies in different parts of the world found that medical errors are defined as “errors that are made in planning or carrying out actions” (14). In Brazil, medical errors are described as “inappropriate conduct because of carelessness, recklessness, or malpractice that harms the patient” (15).

One of the most commonly used legal dictionaries in the United States, Black's Law Dictionary, defines medical error as “failure to exercise the proper skills and knowledge commonly applied by the average prudent professional when providing professional services, which can result in harm or loss to the person receiving the services or those who rely on them” (16).

Though consensus about the definition is not reached yet, all available definitions agree that it is a error that can be prevented when delivering medical care. Standing from this point of view, the term “medical error” is preferred to use for this study and believed to reflect spirit of the study.

2.2. Magnitude of medical errors

Nowadays, medical errors are considered as an emerging problem for the public health that put patients' safety at risk. Global reports and studies are showing that medical errors are increasing in alarming rate. In 2016, patient safety experts at Johns Hopkins analyzed medical death rate data in the United States of America (U.S) over eight years. They calculated that more than 250,000 people die

from medical errors each year. Their research found that death from medical errors surpassed strokes, Alzheimer's, and diabetes (17). A systematic review done at university of Birmingham found that among hospitalized patients worldwide, 3-16% are getting injured because of their medical care (14). In developed countries like the USA and Australia for example, 3.7% and 16.6% of patients experience medical errors, respectively (20, 21).

In developing countries, though there isn't a lot of information available, the prevalence is higher (2). A retrospective review of records from 25 hospitals in eight developing countries found that mortality from medical errors are very high (2, 18). In fact, WHO estimates that 1 in every 300 patients who are admitted in the hospital die because of errors that could have been prevented (19). According to a study done in Ethiopia in 2017, there has been an increase in the number of medical error claims over the past decade (12).

2.3. Medical error detection capability

The quality of healthcare delivery is related with the countries level of economic development, the better the economy of a country, the better its healthcare is thought to be. However, detecting medical error is a challenge for most healthcare systems, if not all. Medical errors are not always detected in both rich and poor countries because their inherent nature of complexity and involvement of many different areas of expertise. A study at University of Birmingham reviewed studies on medical errors around the world. It found that 21% of medication errors were undetected by pharmacists when dispensing medication, and 23.5% of those undetected errors could cause adverse drug effects (24).

While different ways are used to detect medical errors, error claims are universally used to detect and report incidents. Unfortunately, studies have showed that error claims and actual errors are poorly correlated. In the Harvard study, the largest study to assess the rate of medical errors and error claims, they examined more than 30,000 hospital records patients from New York in 1984. They found that 3.7% of patients had experienced an error during their hospital stay (22, 25). However, errors were claimed in only 0.13% of the cases

(26). The vast majority of errors didn't result a claim for error. A similar study examined at the hospital records of 15,000 patients in Utah and Colorado and found comparable results (27).

The capability of detecting medical errors get worse in hospitals of developing countries. A study done in Uganda revealed that there is no existing formal error reporting system in all hospitals the study carried out (23). In Ethiopia, hospitals are the commonest facilities for medical error claims but the least to file error claims and this needs grave attention. According to a study done in Ethiopia in 2017 that assessed the seven years trend of medical error claims revealed that among the complaints that reached to the federal health professionals' ethics committee, 71.2% of claims were filed by patients, their families, polices, and the courts. Health facilities and health bureaus filed only 8% of the cases (12). The study further added, from the cases in which actual error was found, 51.9% of them took place in hospitals and 37% in clinics. From these cases, 40.7% were occur in government facilities and 59.3% were in private (12). The condition needs grave attention in developing countries.

2.4. Error prone areas

Medical errors happen while delivering care. Therefore, anywhere we get health care services could be a potential place where errors can happen. However, because of the nature of services provided and the types of cases dealt with, some areas are more prone than other. A systematic review at the University of Birmingham found that intensive care units, operating rooms, and emergency departments were where errors happen the most (14). The research also found that medication error is the most common reason patients get harm, but it can be prevented. From 2005 to 2009, a research in Santa Catarina, Brazil found that gynecology, anesthesiology, and general surgery were specialties with the most lawsuits for medical errors (22).

A study reviewed at records of patients in hospitals in Uganda. Among the 618 records that were reviewed, they found that the most common errors were in making the right diagnosis, giving the right medication, and doing surgery (22). A study in Ethiopia in 2017 revealed that over seven years, most complaints to the federal health professionals' ethical committee were about surgeries, with the

majority coming from the Operating Room (12). Though there are variations from country to county, surgical areas are the commonest places where prone to medical errors.

2.5. Error reporting and handling

When medical errors are happen, they should be reported and we must be able to figure out how to avoid them in the future. There are different reasons that let health care providers not to report incidents of medical errors. Blaming others, being afraid of being punished, media criticism, and not getting helpful feedbacks are some of the most common problems. In avoidance of this, health care providers try to follow very strict rules and be over careful.

A study done in Southwestern Medical Center, University of Texas revealed that fear of retribution, and belief that nothing will change if they report the error impede health professionals from reporting incidents (28). A study done in Iran also revealed that “Fear of a malpractice lawsuit” precludes physicians from reporting medical errors (40). A study in Uganda found that health care providers are afraid of getting in trouble or being sued if they admit a mistake. This stops them from reporting medical errors (25).

A study at Mizan Tepi University revealed that health care providers are afraid of getting in trouble or being punished if they report medical errors. This makes it challenging for them to admit when they make a mistake (29). The study also found that care providers abstain to report medical errors because they are afraid of the media reporting on it before it's confirmed, which could harm their hospital's reputation. Another research study conducted in Ethiopia in 2017 that reviewed error claims over a ten year period. The study revealed that the media had had declared medical error to the public before any investigation had been completed in fifteen cases. Twelve health professionals had been also arrested by the police before any official incident review or decision had been made by the legitimate office (12).

In 2005, a study surveyed physicians in Pennsylvania, who were in specialties that often get litigation, about their experiences with rising malpractice insurance costs. The survey found that 93% of the physicians were practicing defensive medicine and 42% were

limiting the scope of their practice for fear of being sued (30). Another study surveyed Italian physicians if they had ever engaged in defensive medicine. It found that 37% of general practitioners and 83% of specialists had done at least one thing to protect themselves from litigation (31). A research study found that 63. 2% of surgeons in different parts of Ethiopia practiced defensive medicine when dealing with a case that they considered challenging (29).

3. Objectives

3.1. General objective

To explore the practice of medical error detection and incident handling in selected public hospitals in Addis Ababa, Ethiopia.

3.2. Specific objectives

1. To explore methods employed to identify medical errors in the selected hospitals.
2. To identify measures being taken to handle incidents of medical errors in the selected hospitals.
3. To explore effects of error handling measures in the detection of medical errors in the selected hospitals.

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4. Methods

4.1. Study setting:

The study was conducted in Addis Ababa, Ethiopia. It's the capital and the largest city. Based on 2012 Ethiopian Fiscal Year (EFY) figures from the Central Statistical Agency (CSA) of Ethiopia, Addis Ababa has an estimated total population of 3,686,068 consisting of 1,389,817 male and 1,527,478 female. 100% of the populations are urban dwellers (CSA 2017). According to the 2012 (EFY) Health and Health Related Indicators published by Federal ministry of health (FMOH), Addis Ababa has 13 public hospitals, 98 Health Centers (33). Out of the 13 hospitals, the Federal government administers six of them, two are under the Army and Police, and five are under the city government of Addis Ababa. The study was conducted in Tikur Anbessa Specialized Hospital (TASH), Yekatit 12, and Saint Peter hospitals. These Hospitals run under different government structures and provides multi-dimensional services. Besides, they accept referrals from all over the country. The study was conducted from April - August, 2023.

4.2. Study approach:

An explorative qualitative study with a case study approach was conducted. The qualitative study allowed the investigator to go deep to understand the practices how hospitals detect medical errors and handle incidents. Existing practices of medical error detection and incident handling was assessed and effects of handling were explored. The case study approach was selected because it's more appropriate to help better understand the organizational practices how hospitals detect medical errors and handle incidents. The approach also helps in gathering thick data that eventually provided rich description (18, 19).

4.3. Study population:

Public Hospitals in Addis Ababa run under various government structures. Primarily, under the federal government and the Addis Ababa city administration. Hospitals selected for this study were TASH, Yekatit 12 hospital, and Saint Peter hospital. Hospitals were selected from each administration based on their tier level, hospitals at the tertiary level are included. Besides, these hospitals provides multi-dimensional services for they accept referrals from all over the country.

Inclusion Criteria: Health care providers working on direct patient care and/or in offices in the selected hospitals, who were willing to participate in the study, and who have agreed to the terms of the informed consent were included.

Exclusion Criteria: Health care providers who were not willing to participate are excluded.

4.4. Study participants:

The study included a total of eleven interviews with health professionals working on direct patient care and administration offices, and the information saturation had determined the number of participants. Participants for this study were selected from TASH, Yekatit 12 hospital, and Saint Peter hospital. Health care providers working in these hospitals were selected for an In-Depth Interview (IDI) and participants for Key Informant interviews (KII) were selected from offices of the Chief clinical director (CCD) formerly called medical director, and Director of clinical governance and quality improvement.

4.5. Recruitment of participants:

Participants were recruited using a purposive sampling method with mix of sampling techniques for an in depth interview with health care providers. Health care providers working on direct patient care and administrators working in the selected hospitals based on their experience, working area, and position participated in the study. This allowed diverse participants to be included in the study and helped to gather information about practices of medical error detection and handling, and identify its effects. Snow-ball purposive sampling was used to select participants for KII. This helped for triangulation of the study. The researcher invited participants using the cooperation letters from the university and from each hospital where the study carried out.

4.6. Data collection method:

After permissions were obtained from the relevant department in each hospital, data was collected through an In-depth and key informant interviews, and tools and guidelines used for monitoring clinical services. A total of eleven participants were interviewed. Seven study participants were involved for an in-depth interviews to generate evidences on their understanding, experience, and for effects they encountered from the practices of medical error detection and handling. Four Key informant interviews were done with

study participants from offices of Chief Clinical Director and Director of Clinical governance and Quality Management for shared information on current practices of medical error detection and handling in their hospital.

The researcher developed interview guide prepared in English and translated to Amharic with open-ended questions that covers topics related to medical error detection, incident handling, and effects of handling. The interview guide was adopted from a study done on the challenges of medical error reporting (29). Conversations were begun with informal dialogue to create a friendly environment and gain the participants' trust so that they could explain their ideas freely and in detail. Purpose of the study and discussion topics were elaborated to the study participants. Informed consent for participation and recording participants' voice were guaranteed through taking individual verbal and written consent before conducting an interview.

Interviews were take place in a separate place in the respected hospital where participants work and a location of their choice where they felt comfortable. A face to face interviews were conducted by the principal investigator and probing questions were used as needed. The duration of interview took on average 20 minutes, 73% of interviews were tape recorded and the remaining 37% were recorded on papers. Interviews had ended by summarizing and asking for further points and thanking participants. Following each interviews, field notes were taken and guidelines used for monitoring service deliveries were also reviewed with prolonged engagement for these documents were rich in information to understand how hospitals govern clinical activities. Tools (clinical audit, chart audit, death audit) and guidelines (Ethiopian hospitals clinical audit guideline, System Bottleneck Focused Reforms) that used for monitoring clinical services were reviewed using document review guide developed by the researcher.

4.7. Data analysis procedures:

The audio recorded interviews were translated and transcribed on paper initially. The transcripts were then verified against the audio record to ensure accuracy and consistency. The transcripts, on paper, were typed and converted to text format amenable for the analysis software and aligned with field notes and organized to ensure confidentiality and anonymity of the participants. The researcher read the data repeatedly to extract important points from the description and a codebook was developed inductively. Data

was analyzed thematically using Open Code 4.0 software. The data analysis had also occurred iteratively with the data collection and focused to triangulate the results from the different data collection techniques. The narrative was organized and integrated according to emerging themes and concepts conforming to the research objectives. The framework was structured based on the steps and patterns in the practice of medical error detection and handling. The result was reported according to Addis Ababa University's Standards for reporting qualitative researches.

4.8. Trustworthiness:

Lincoln and Guba in 1985 outlined the criteria for evaluating the qualitative research often referred to as “standards of trustworthiness of qualitative research”. The four components of the criteria are credibility, transferability, dependability, and conformability. Leading the interviews by the researcher himself and establishing an audit trail of the whole process of the study including field notes, analytical notes, and coding by the research advisors enhance trustworthiness of the study.

Credibility

To achieve credibility the investigator stayed for a persistent and prolonged time in the study area. Data was triangulated by method, place and the individual participant's profile through conducting interviews with key informants, revising documents that hospitals used to govern clinical activities, and face-to-face interviews. Mixed qualitative data collection methods enhanced credibility of the findings. Data saturation was assured by repetition and overflow of comments.

Transferability

In order to assure transferability data was collected from different hospitals that run under different administrations. Moreover, there is a rich description that can help reader to understand that the practices related to medical error detection and handling found in the study could be applied and verified in other similar contexts.

Dependability

To assure dependability data was collected and transcribed by the investigator for a prolonged stay. Besides, all responses were documented in text form and supported by evidence from tape recorder. The thick description of data collection, analysis, and interpretation methods are documented to ensure dependability. So, that if data was collected and transcribed by another individual it would have the same outcome.

Conformability

To assure conformability an interview guide was based only on the objectives of the study that it avoided questions that were out of the objectives. Moreover, conformability was ensured through presenting findings to participants at the end of every interview to ensure their ideas were rightly interpreted.

Other declarations

1. **Reflexivity:** The researcher made every effort to keep the data and findings were not influenced. All of the investigator's actions were driven solely by objectives of the study, not by the investigator's preferences.
2. **Positionality:** The investigator declares positionality with respect to the study as against the practices that hinder medical error detection. The researcher's stance is strictly based on intention to explore the practices of medical error detection and handling, and to identify effects of the practice but not prejudice or exposing public hospitals or health care providers.

4.9. Ethical Considerations

The study was conducted after getting ethical clearance from Addis Ababa University, College of Health Sciences and School of Public Health. An official and formal letter of cooperation were taken from the School of Public Health to Tikur Anbessa, Yekatit 12, and St. Peter hospitals. Then letter of support were written from TASH, Yekatit 12, and St. Peter hospitals. After giving information for each study participants about the objectives, contents of the study, and expected benefits and risks, participants were requested first

for informed consent orally and then written consent forms were read to obtain their agreement before starting the interview. Permission were obtained from the relevant department in the hospitals for the review of relevant documents.

Participants were allowed to refuse or discontinue participation at any time they want. All the information collected from the study participants were handled confidentially and the information that enable their identification were not taken on the form rather code number were assigned to ensure anonymity. Special attention were given to participants' privacy and confidentiality. Furthermore, any attempt to cause participants psychological or physical harm were avoided at all times.

4.10. Dissemination of findings

The results of the study will be disseminated to the responsible institutions; to the offices of chief clinical directors of TASH, Yekatit 12, and St. Peter hospitals, to the office of School of Public Health at Addis Ababa University. Findings will also be presented for different seminar, conference, and work-shops and will also be published in a peer reviewed journal.

5. Results

5.1. Description of participants

5.1.1. Socio demography

A total of eleven health care professionals were recruited for this study. Age of participants ranged from 30 - 40 years, out of which males were 6 (54.5%) and females were 5 (45.5%). Majority of participants were physicians 7 (63.6 %) of whom 5 (45.5 %) are specialists and subspecialists. Participants work experience ranges from 4 - 11 years, of which majority 7 (57.1 %) had experience of more than 8 years. As to the department, majority of participants 7 (63.6) work at departments who undergo surgical operations.

Table 1: Socio demography of participants

Characteristics		Frequency			Percent (%)	
		Male	Female	Total	Male	Female
Age	30 – 40 years	6	5	11	54.5	45.5
Profession	Physician	5	2	7	71.4	28.6
	Nurse	1	3	4	25	75
Specialty	Sub specialist	2	1	3	66.7	33.3
	Specialist	1	1	2	50	50
	Gp and Nurse	3	3	6	50	50
Department	Operation room	3	4	7	42.9	57.1
	Office	2	2	4	50	50
Experience	4 -6 years	3	1	4	75	25
	8 – 11 years	3	4	7	42.9	57.7

Findings of the study

Using Open code software, findings of the study were first organized in to codes. After adding and reduction of codes, finally a total of 47 different codes were obtained from the data. Subsequently, the codes were grouped in to 11 categories in a manner relevant to the study objectives. Then, the categories were arranged in to 4 themes in a way that could describe the practice of medical error

detection, incident handling, and their effects. These were; Practice of Medical error detection, Practice of Medical error handling, Effects of the practice on subsequent incidents, and Challenges and Area of improvements.

5.2. Practice of medical error detection

5.2.1. Understanding of medical error

Nearly half of participants, of whom majority are physicians, understand medical error as any harm to a patient as a result of delivering care below the acceptable standard for a particular set up. Health care providers who practice below their professional competences were mentioned as a reason for medical error. They stated this can happen due to lack of knowledge or skills, or from the substandard set up in the facility. Some participants consider care providers' negligence rather than their knowledge or skill, or the set up in the facility, is the reason for medical error. Participants with this perception understand medical error as any harm to a patient primarily attributed to health care providers' behavior. It includes harm to a patient that a prudent care provider could avoid it.

All the nurses who work in the office understand medical error as any kind of harm to a patient by the health care providers. Whether it happened knowingly or unknowingly as far as the patient gets harm, they consider it as medical error. On the other hand, some physicians looked medical error from professional ethics angle and gave medical error a wider scope. They understand medical error as any practice by health care providers in violation of the "Hippocrates Oath". From their perspective, medical error is considered whenever a breach of oaths is made whether it results harm or not.

"I believe medical error should be considered when one practice below the scope for which he/she was entitled. Every professional has his scope of practice so doing below that would be an error."

P4, A general surgeon

"It's an error as a result of practicing below the accepted standards. For every hospital, country or for specific profession, there are acceptable practices & standards. So any act below this, for me, is an error."

P11, A nurse

“For me, medical error is harm that occur due to negligence of professionals. That means when a professional practices in a way that harms a patient that he could avoid & was not beyond his control.”

P10, An orthopedic surgeon

“Medical error, for us, is any harm to a patient that happened by care givers knowingly or unknowingly. It’s undesired health outcome due to a known reasons like the set up or from the unknown reasons.”

P6, Nurse (KII)

“Medical error, for me, is that violation Hippocrates oath that we made before starting a job or not maintaining them. Like neglecting or discriminating patients for color and doing activities like these. The oath has detail so if we can’t maintain the oath or not giving service according to the oath.”

P3, A Gynecologist and Obstetrician

5.2.2. Perception for medical error detection mechanisms

5.2.2.1. Perceived detection capability

All female physicians and majority of participants perceived that even though detecting medical error is a challenging process, it’s not impossible to detect errors if thorough investigation are done, clinical activity monitoring tools are applied, and through a day to day communications. On the other hand, the most experienced participants with work experience of more than 10 years, perceived that the complex nature of patients’ treatment can make medical error detection difficult and errors can be hidden even with the application of existing monitoring tools.

“If meticulous investigation is done I don’t think it will be missed.”

P7, A Neurosurgery resident

“ ... Yes if clinical activity monitoring tools are applied properly but technically we are not doing in that way.”

P2, A general practitioner (KII)

“There is difficulty because everything written in the patient document is done by professionals & if they intend to hide it will make difficult to detect and error can be hidden”

P10, an orthopedic surgeon

5.2.2.2. Perceived purpose

Majority of participants perceived that the purpose of employing different tools and mechanisms in hospitals are to improve the quality of care delivery, meeting the set standards of care, and learning from experiences. However, some of participants of whom all are senior physicians perceived that these tools are also used inappropriately as a means to take measures on health care providers regardless of the condition they work under. The key informants, on the other hand, stated that health care providers wrongly perceived these tools as methods to monitor their activities.

“... For better care delivery, creates communication platform for client & workers, and also creates satisfaction for both clients & workers.”

P3, A Gynecologist and Obstetrician

“One of the main purpose is to make sure patients are treated according to the national standard.”

P2, A General practitioner (KII)

“I think the primary purpose is to assign some body to take all the punishments regardless of the poor equipment & resource shortages we are working on.”

P4, General surgeon

“Honestly speaking, they have no good attitude for a reason that they took it as a monitoring activities of their presence or activities only.”

P6, Nurse (KII)

5.3. Employed mechanisms of medical error detection and reporting

In the existing practice, Medical errors are detected and reported mainly through Error claims, Patients’ document reviews, Supervision, Medical team discussions, and Patient monitoring. Error detection: Process of identification of medical errors through any method, tool or system employed in hospital. A means through which hospitals can identify medical errors.

5.3.1. Error claims and reporting

The study identifies that Error claims made by patients and their families, informing immediate manager, and informal communications are the existing methods used to report incidents of medical error in the hospitals where the study was carried out. All key informants mentioned that there is an established formal incident reporting system in their respected hospitals. However, the reported incidents are incidents which are considered to be to non-medical. Error Reporting: Refers to announcing incident of medical error that occurred in a hospital through any means available. It can be done by health care providers, leaders, patients, families of patients, or by through any method, tool or processes.

“In our hospital medical error claims usually reported after the patient brings the error issue to the medical director.”

P7, A Neurosurgery Resident

“Patients usually complain for the undesired outcome. But once a patient brought a complaint, it can be investigated to reach what happened on the patient.”

P11, A Nurse

“I will inform to the immediate manager & through that incidents will be handled accordingly.”

P3, A gynecologist and Obstetrician

“We usually get incidents of error informally through other discussions.”

P9, A General practitioner (KII)

“We have incident officer & incidents are reported to him. He inform us & to other respected bodies through paper. But reported incidents are not medical errors.”

P1, A nurse (KII)

“There is incident management. Incidents of any kind are reported to the incident officer then he will manage accordingly. But I have never seen him managing medical error incidents.”

P2, A General practitioner (KII)

5.3.2. Patients’ document review

The activity involves three types of audits of patient records; the clinical audit, chart audit and death audits. Hospitals implement a regular audit program in each service area through the participation of all clinical staffs. In clinical audit selected cases are reviewed against the standard treatment guideline by members of the department. The chart review involves review of patient documents for their completeness of the necessary information to be documented. This is done by office of clinical governance and Quality management. The death audit is supposed to review the patient care since admission to the hospital, and critically review causes and

circumstances that leads to death. All deaths are expected to be audited based on to a set score. Maternal and perinatal deaths are reviewed monthly by Maternal and Perinatal Death Surveillance and Response Committee (MPDSR).

“Audit means according to national standard, whether evidence based care management was delivered. So based on this chart will be audited for alive & death audit for deceased, both types of audits are done monthly.”

P2, A General Practitioner (KII)

5.3.3. Patient monitoring

Hospitals monitor patients’ experience with the care through patient interviews, visits, and patient satisfaction surveys on a regular basis. The Office of the clinical governance and Quality management receives patients’ and attendants’ complaints, and opinions regarding the care they are receiving. Hospitals also use this these platforms as a means to detect error practices. Hospitals also implements Community forums which involves patients and the public in service delivery which supposed to make patients informed and help to detect errors practices which arise from poor communication.

“We regularly asks patients about the care & they tell us any complain if they have. We also had put log books at the gate of every service areas through which patients can put their complaint.”

P9, A General Practitioner (KII)

“We have also community forum by which we engage different stake holders in the hospital activities.”

P6, A Nurse (KII)

5.3.4. Supervisions

A multi-disciplinary team involving case team leaders and health care providers supervise all the service areas, manage disagreements, and assure responsible and accountable practices. The team supports the leadership on the day to day service provision process and

report to the head managers and supposed to create accountability and transparency. The team also manages incidents during duty hours including weekends and holidays, and address poor practices in service provision.

“... For example supportive supervision, in which a team of multi- discipline supervises the clinical activities every day.”

P6, A Nurse (KII)

5.3.5. Medical team discussions

A medical team within a given service area manages care delivery based on accepted guidelines through essential clinical processes like the morning session, the round sessions and, a weekly meetings. The team involves Physicians, Nurses, and other staffs and the senior physicians lead the sessions. Clinical practices like the patient evaluation and nursing care, and information provisions are addressed through this team. Findings on this session are supposed to be linked with quality improvement and accountabilities.

“In morning session selected cases will be discussed & errors can be figured out by seniors.”

P10, An Orthopedic Surgeon

5.4. Practice of medical error handling

5.4.1. Error Disclosure

Majority of participants mentioned that patients’ level of understanding, degree of severity, level of communication prior to the incident, the possible consequences that may follow, and degree of severity were conditions to disclose errors to patients. Patients and their families who are assumed to have a good level of understanding, patients with prior good communication, and incidents that could be reversible are mentioned to be disclosed. On the other hand, a quarter of participants who associated error disclosure as part of ethical practice, mentioned that they disclose errors to patients regardless of any condition or what may follow.

“If I thought the patient or their families will understand then I will inform them otherwise it will be futile.”

P4, A General Surgeon

“Regarding the patient, if we have good communication earlier I will inform the families because this can make them understand the situation.”

P5, A Gynecologist and Obstetrician

“I will tell the patient if the error can be reversed or something benefiting the patient is there to be done.”

P8, A Nurse

“It depends. Though we are supposed to be ethical but we also think the consequences of being ethical. So, we may not fulfill ethical duties.”

P9, A General Practitioner (KII)

“I will also tell to the patient or the family frankly. This is because this is one of our professional ethics. Whatever their response I will tell them.”

P7, A Neurosurgery resident

5.4.2. Measures being taken to handle incidents of error

In all hospitals where the research is carried out, error incidents are initially investigated at the department level by a team of professionals and those incidents considered to be error will be reported to the hospital’s ethical committee for further investigation and possible measures. Disciplinary measures, academic measures, and referring incidents to the health regulatory body for further investigation and possible legal accountability are actions being taken following the decision of ethical committee. Incident handling: Any action done in response to the incident of medical error. It’s an action by the administrator following incident of medical errors.

“Such claim are first investigated by the department. What usually we do is that we review the care delivered. We have a discipline committee to further investigate & if it is necessary will be reported to the regulatory body.”

P1, A Nurse (KII)

“We investigate the issue with the department & take necessary measures. The measures could range from oral warning, written letters, or even suspending the salary.”

P6, A nurse (KII)

“The department will suspend from any academic activities even you may get academic dismissal.”

P7, A Neurosurgery Resident

“... The surgeon’s working license was suspended for a year though he was not in control of the error.”

P10, An Orthopedic Surgeon

5.5. Effects of the practice on the subsequent incidents

Majority of Participants mentioned that following incident of error they face blaming and dishonoring, loss of trust from patients, discouraged to report future incidents, and engaged in defensive medicine. All participants affirm that defensive medicine practiced in their respected hospitals. Health care providers engage in these activities through making unnecessary referrals or requesting investigation beyond what a patient needs. The study revealed that patients who are famous, families of authorities, patients supposed to have poor outcome, and the blame culture were reasons for engaging in defensive practice. Defensive Medicine: any action done by health care providers that are not aimed to help patients but to prevent themselves from perceived litigation.

“Because the patient’s family were told about the issue, they brought the case to the court & spread the rumor that ruins status of those involved. I have no such experience but this demoralizes the one who tried his best.”

P5, A Gynecologist and Obstetrician

“It was embarrassing & disrespect to the professional because they can call him to come to the police office.”

A Nurse

“My friend had such experience & on the next visit the patient hesitate to be treated by her.”

P4, A General Surgeon

“Yes, this is the common practice. We fear the blame culture, media & in appropriate measures that follows. We even know what kind of patients are suit phone. They are usually relatives of authorities, media personnel, famous & those who are nagging frequently with unnecessary questions. For such patients either you have to refer or request thorough investigation.”

P10, An Orthopedic Surgeon

5.6. Raised Challenges

5.6.1. Challenges to error detection and handling

The study identifies that challenges encountered by health care providers differs across the service area. Participants who are working in the offices stated that perceived fear of punitive measures and the blame culture are challenges to the detection and reporting of medical errors. They stated that health care providers are not willing to report and disclose error incidents they encountered while delivering care. They further add information asymmetry, poor documentations, and document manipulation are also challenges for medical error detection. Participants who are working primarily on clinical services, on the other hand stated that complexity of medical care, and ambiguous concept of medical error are challenges of medical error detection and reporting. Even though there a difference in experiences across participants, lack of functional formal medical reporting mechanism was mentioned by all participants as a challenge for the detection and reporting of error incidents.

“... This might be from their fear of punishment. Unfortunately, the blame culture that existed also prevents professionals to report.”

A General Practitioner (KII)

“What we face during investigation of such issues are changing patients’ records usually in the delivery rooms. Most of the time when they supposed it error, they try to change the information. In such case it’s difficult to trace.”

A General Practitioner (KII)

“Patient pass through different departments & professionals. Because the nature of the error is sophisticated, identifying medical error is very tough with the existing system.”

A General Surgeon

“There are issues that are not accepted as medical errors while they are errors. So, the more challenge reside on the detection.”

P4, A Gynecologist and Obstetrician

“We have established ways to monitor any injuries happening in the service areas both on patients and workers. But due to lack of human power it was not functional.”

P1, A Nurse (KII)

5.6.2. Suggested improvements

Participants mentioned that empowering health care providers through education, trainings, and sharing experiences from other countries can change professionals’ awareness about medical error and improve detection and handling practices. Besides, establishing good communication with patients, creating conducive working and academic environment, and proper investigation of error incidents will enhance error detection and reporting by health workers and help patient to understand medical error incidents.

“Orientation for all workers & students that error is human & occurs all over the world , and reporting error will increase chance of learning & reduce chance of next similar error. Possibly add this to the curriculum and training.”

P1, A nurse (KII)

“From my experience, if there had been a good communication with patients earlier, they will likely understood the incident.”

P10, An Orthopedic Surgeon

“... Otherwise, the harsh academic & working environment will worsen the situation. Administrators should take in consideration of the condition we are doing to smooth the working activities.”

P7, A Neurosurgery Resident

“The complexity of cases should also be considered since we are working under a resource constraint. Better to consider the setup while dealing errors because there are obvious resource constraints & workloads. Improving this will improve error reporting thereby error detection & in the longer help reduce error.”

P2, A General Practitioner (KII)

6. Theoretical framework for the practice of medical error detection and handling

Based on the findings of the study along with the objectives, the following theoretical frame work was developed that help understand the existing practices of medical error detections and incident handling. Both the system related factors and individual related factors play their significant role in the practice of error detection and handling. The system related factors such as lack of common understanding about what constitutes medical error among health care providers, and employment of methods that are incapable to detect medical errors are related with under detection of medical errors. Lack of medical error specific reporting system in hospitals is related with under reporting of medical errors. On the other hand, the blame culture together with the individual related factor like fear of punishment are related with counterproductive effects of incident handling.

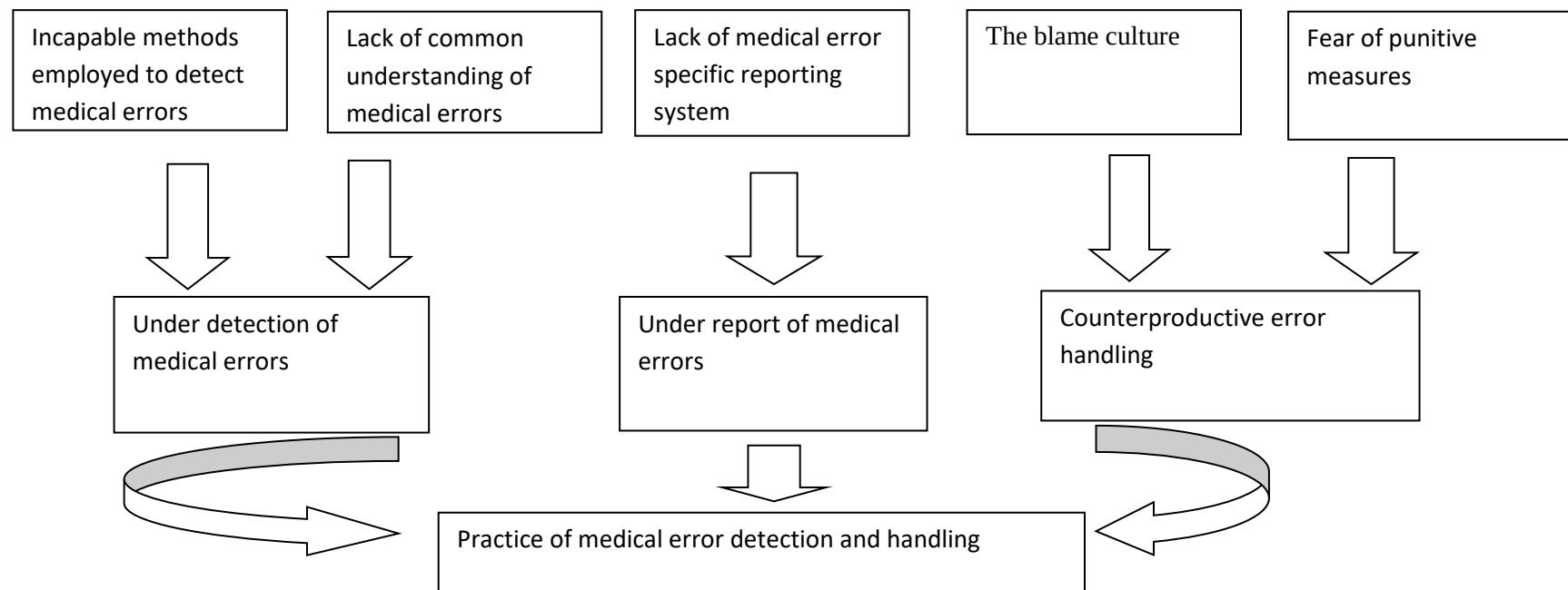


Figure 1: Theroretical framework for the medical error detection and incident handling

7. Discussion

Patient safety is the main concern of every healthcare system and Medical errors are threats to patient safety. The study was aimed to assess the practice of medical error detection and handling in selected public hospitals in Addis Ababa. The study found that medical errors are far from detection and error incidents weren't reported systematically. On top of complex nature of medical errors, system related and individual related factors contribute for the under detection of medical errors. Studies shows that medical errors are under detected both in the developed (24) and underdeveloped countries (23). According to a study done in Ethiopia, only 8% of medical errors are reported by health institutions (12). This is attributable to the similar factors that contributes to the under detection of medical errors across countries. Lack of common understanding of medical errors among health care providers, employment of methods incapable to detect medical errors, and lack of medical error specific error reporting system were found to be system related factors for poor detection of medical errors while perceived fear of punishment was individual related factor. This is in line with a study that showed system related factors contribute for the vast majority of under detection of medical errors (2). It's the systems and procedures the play the significant role in the detection and handling of medical errors.

Absence of common understanding about medical error among health professionals was found to be contributing factor for poor detection of medical errors. The difference of understanding also extends to professionals within the same profession. This wide different perspectives brought an accepted practice in somewhere might be an error elsewhere. On the other hand an error for one, might not be an error for another in the same set up. This is supported by studies that showed various definitions of medical error and this variation is the major limitation to the understanding of medical error which in turn made the true rate of medical error difficult to be appreciated (28). Defining medical error is majorly role of the law process than the medical science, so health care providers within the country and across the country might have a different understanding of what constitutes medical error.

It was assessed that there are tools and systems employed to detect medical errors but they are not directly related to medical error and also they are not employed primarily for the purpose of medical error detection. Tools and procedures established to monitor the regular clinical practices were employed to detect medical errors. Mainly the Patients' document reviews, Supervision, Medical team

discussions, and Patient monitoring which were found to be incapable to detect medical errors. Without application of tools and systems that can detect medical errors, it would be difficult to reduce risks of patients harm and prevent medical errors. Studies had showed unavailability of systems, guidelines, and tools remain major concerns of patient safety in the African region (10). Hospital where the research was carried out share similar problems associated with the application of systems and tools that help to detect medical errors.

Patients' document review are a retrospective analysis of the practice against the set standards and accepted qualities. Using records on the patient information document is supposed to detect mismatches between the written standards and the actual practices. Document review can be a good method for detection of errors and learn from mistakes. However, the quality of documentation in the face poor documentations and document manipulations are more likely to result under detection of errors. Besides, ability of reviewers to detect medical errors is also an issue. Studies showed that the results of patients' document review depend on the quality of documentation and reviewers' abilities to capture errors (37).

Doing chart audits, the death audits and clinical audits, of a given department by members of the same department also raise a reliability issue on the reporting of accurate audit results and errors are more likely to be under reported. This is supported by a study done in Ethiopia that showed health care providers cover-up each other's errors in order to maintain the relationships and to avoid conflict with their colleagues (29). Detection of medical errors through supervision, patient observations, and medical team discussions might be good methods to follow patient care in general but when it comes to medical error, lack of standardized tool, lack of clinical data, and excuses given for academic purpose potentially hinder medical error detection and reporting. (L)

Though incident reporting system was mentioned as one of the reporting mechanism for medical errors. However, the study revealed that the system was not functional for incidents of medical error. Besides, there is no alternative formal and functional medical error reporting system in the hospitals. Lack of error reporting system is a common problem in underdeveloped countries. A study done in Uganda had revealed no existing formal error reporting system in all hospitals the study were carried out (23). Error incidents were

reported through informal communications. Lack of formal functional error reporting system can result under detection of medical errors. According to a study done in Mizan Tepi University, lack of reporting system for medical errors was mentioned as one of the challenge of error reporting and organizational learning (29).

Error claims made by patient and their families were found to be the commonest methods to report incidents of medical errors. This is supported by a study done Ethiopia showed that 71.2% medical error suits were filed after Patients and their families made error claims (12). While having such method as a means to bring complaints was good, given the fact that patients' lack of awareness, level of understanding, and the information asymmetry between patients and care providers make error incidents less likely to be claimed as compared to their magnitudes. This is in line with the Harvard study that showed error claims and actual errors are poorly correlated. The Harvard medical practice study showed that error was found in 3.7% of records but claim was made in only 0.13% of the records (22). Under such practices where patients were not sufficiently informed of their clinical conditions and what's done to their body, it would be difficult for them to claim for error which they are unaware of.

Once incident of medical error were reported through either of the aforementioned mechanisms, investigation of error incidents found to be carried out at different levels in the hospitals. Disciplinary measures, academic measures, and reporting incidents to the health regulatory body for possible legal accountability were actions taken following the decision of ethical committee. However, a study done in Ethiopia affirms that 90% of error claims were happened at hospitals but only 8% of the claims were made by health institutions in total (12). According to Regulation No. 299/2013 (6), the Ethiopian Food and Drug Authority (EFDA) and regional regulatory bodies have the mandate to investigate error claims, regulate health professionals and institutions, and take the necessary measures. Therefore, handling medical error incidents at hospital level raises issue of justice and impartiality. Reporting incidents to the respected health regulatory body will also help generate evidences to convey the national burden of medical errors and influence policy makers to give due attention for the issue. However, the practice of handling errors at hospital levels has a chance of reduce number of cases that should be reported and seen by the higher level.

Health care providers found to hide medical errors for fear of punishment, blame, defamation, and premature media coverage. This is in line with studies done in Ethiopia and Ugandan hospitals that showed health professionals refrain from reporting medical errors for fear of punishment and litigations (29, 25). Actions that were taken following incidents of error were supposed to be constructive and reduce future incidents. However, the way medical errors were being handled, from the investigation of incidents to actions, found to have a counterproductive effect on care providers, on the patient care, and on the detections and reporting of future medical error incidents.

The study also found that there were difference with regard to challenges of medical error detection and reporting between the clinicians and the hospital managers. For clinicians, challenges of medical error detection and reporting were factors that are beyond their controls. They mentioned complexity of medical error and ambiguous definitions of medical error as major challenges. Health managers, on the other hand, mentioned that challenges of medical error detection and reporting were emerged from health professionals' poor documentation, document manipulation, and hiding of errors. This is supported by study done in Ethiopia that showed blaming as one of the challenge of error reporting and organizational learning (29). This clearly shows the existing tradition of pointing of fingers between clinicians and those working in office. Pointing fingers can spoil the organizational sprit, reduce the opportunity of learning from mistakes, and increase chance of hiding errors.

The study also found that health care providers engaged in defensive medicine for fear of punishment and litigations. This is supported by studies done in Ethiopia and Italy that revealed 63.2% and 83% of health care providers engaged in at least one defensive practice (29, 30). The existing error handling practice not only discouraged health care providers from reporting error incidents, but also brought the trend of defensive medicine in the hospitals practice. Although it's arguable that some studies stated that defensive medicine can be positive when additional investigations and procedures are performed without proven necessity, and can be negative when high risk patients and methods are involved (15). However, practicing defensive medicine in a poorest country like Ethiopia where resources are scarce can potentially raise medical, legal, and moral issues.

8. Conclusion and Recommendation

8.1. Conclusion

Medical errors have important implications for patient safety, and their detection is a main target for improvement of clinical practices and to learn from errors. Patients' information document review, supervisions, direct observations, and medical team discussions were regular clinical activity monitoring methods employed to detect medical errors. However, they are incapable to detect medical errors in accordance with their magnitude. Error claims made by patients and their families were the commonest way of reporting errors. However, the poor communication made claims less likely to show the magnitude of errors.

Error incidents were handled at different levels in the hospitals. Disciplinary and academic measures were taken following incidents of medical error. However, the practices of handling discouraged health care providers from reporting subsequent errors and also reduces number of cases that should be reported to the regulatory body. Fear of penalties and litigations, perceived loss of acceptance, and the blame culture brought a culture of defensive medicine in the clinical practices, which are unethical and endangers patients' safety.

Both system and individual related factors contributes to the under detection of medical errors. Lack of common understanding of medical errors among health care providers, employment of methods incapable to detect medical errors, lack of medical error specific reporting system, and the blame culture are the major system related contributing factors for poor detection of medical errors.

Though medical error are under detected globally, the capability of detecting medical errors needs grave concern in public hospitals in Ethiopia. Errors are far from detection due to failure of systems to identify errors and processes that lead to health care providers making under reports. Therefore, the health care system in public hospitals are not in a position to detect medical errors and they are missing opportunities to build safer system.

8.2. Recommendation

The investigator recommend hospitals' management to regard the issue of medical error detection and handling inseparable with patient safety and due attention should be given to system related factors and work towards improving hospitals' patient safety culture. The culture should also shift away from the blaming mentality in order to improve detection capacity and encourage reporting incidents. Healthcare providers should establish good communication with patients, and practice ethically and maintain code of ethics. Incident of error should also be investigated by and reported to the legitimate regulatory body.

Finally, the investigator recommends the national regulatory body for health including the ministry to set a standard clinical definitions of medical error and harmonize the terminology. Fear of litigations are leading health care providers to engage in defensive practice. Therefore, introduction of malpractice insurance in the healthcare system can alleviate this problem. Moreover, introduction of medical error specific tools (like the trigger tools in some countries) and reporting system based on knowledge of scientific evidence and ethical principles of medicine with the proper use of technology that can monitor the clinical practice and prevent unintended harm reaching to patients.

8.3. Strength of the study

This study came up with findings which assessed the practice of medical error detection and handling, and explored effects of the practice. In the era of rising public and media outrage towards medical errors and as being an emerging public health issue, it's a new study that dealt with the process of medical error detection and incident handling.

8.4. Limitation of study

The limitations of the study were lack of literature review on the practice of medical error detection and handling. Therefore, the investigator was obligated to use literatures on medical error in general. The other limitations were unwillingness of some key informants for interview, and Interviewee bias due to sensitivity of the topic causing participants not to freely express their thoughts. The investigator, therefore, further revised documents on the practice. Since this is a qualitative study, it was difficult to quantify depth of medical errors and contribution of each factor for the under detection of medical errors. So, the investigator limited to assess

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the practice of detection and handling. So, further study is recommended to be conducted on the magnitude of medical errors along with the association of contributing factors.

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10. Annexes

Annex 1: Participant information sheet

Research title: Practice of medical error detection and event handling in selected government hospitals, in Addis Ababa, Ethiopia.

Name of Researcher: Sadiq Muzeyen Mohammed

Outline: Greetings! My name is Sadiq Muzeyen, I'm a student of master of public health at Addis Ababa University. I am here to interview you for a study I am conducting on the practice of medical error detection and event handling in selected public hospitals, in Addis Ababa, for the partial fulfillment of my master's degree. You are selected to participate in this study because you have relevant information related to the study. Before you decide whether to participate or not in this study, I would like to explain to you aim of the study, benefits, any risks, benefits, procedure and what is expected from you.

Aim of the study: The purpose of this study is to assess the practice of medical error detection and event handling in Black lion, Yekatit 12, and St. Paul hospitals. The research is supposed to contribute its part for patient safety. I'm conducting the research together with Addis Ababa University.

Benefit: There will be no direct benefit you get. However, the information you provide will have great importance to conduct this research and the results of the study will be disseminated to concerned bodies working on this area and hopefully can be used to help you, your institution, the community, and the country in general.

Risk: There is no risk or harm for participating in the study apart from your time (Average of 30 minutes) that will be consumed to answer the questions.

Procedure: The research will have interviews and reviewing of necessary documents. This interview will take place in private and take on average 30 minutes. During the interview your responses will be audio recorded and written on notebook as well. Therefore, certain questions which are thought to be important for the research will be asked. You are kindly required to respond to these questions.

Confidentiality: Your answers will be kept strictly confidential and your responses will be kept anonymous so no one will know what you have told me. The data will be used only for the purposes of this study. Your responses to any of the questions will not be shared with anyone else, and no study reports will ever identify you. If the report of results is published, only information about the entire group will be presented.

Right of participant: Taking part is voluntary and if you do not want to answer some of the questions, you do not have to. You have full right right for withdrawal and partial non-participation at any time, without giving any reason. Refusal to answer questions will have no effect now or in the future on services that you or any member of your family may receive from health facilities.

Contact: If you have any concern or question please contact me with tell phone number +251913583047 or with email address Siddiq1712@gmail.com.

[Type here]

Annex 2: Consent form

I, the undersigned have been informed about the purpose and use of this study and the information I am going to provide will only be used for the purpose of this research. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. I was also informed that my identity as well as the information I provide will be kept confidential.

Therefore, I agree to participate in the research voluntarily.

Participant's signature _____ Date _____

Investigator name _____ Signature _____

Annex 3: Study tools

A. In-depth interview guide for health professionals

ID:	Profession:
Age:	Department:
Sex:	Years of experience:

1. Please tell me what you understand about medical error?
2. Do you think all medical errors are detected?
 - Probe: Would you please explain me why?
3. Is there any mechanism you know employed in your hospital through which errors can be detected?
 - Probe: How do they function?
 - Would you please tell me in relation with your work activity? Is it comfortable/ challenging? How
4. For what purpose do you think these detection mechanisms are applied?
5. What do you do if a supposed medical error has occurred in your working area?
 - Probe: to whom will you notify first? Can you explain me why?
 - Probe: What will you do to the patient to whom an error has occurred?
 - What's the reason to decide that?
 - How do you think the patient will approach it?
6. Can you please tell me any error reporting mechanism you know employed in your hospital?
 - Probe: can you tell me how they work?
 - How do you take them?

7. Have you ever experience an error happened to you or your colleague?
 - Probe: Have you reported or not?
 - What makes you decide to report/ not to report?
 - What was the feedback you got? How do you take that for next?
 - How do you take that for next?
8. Can you please tell me types of measures you know taken in your hospital following a medical error?
 - Probe: How do you take them? Encouraging/ discouraging?
 - Probe: what measures have you experienced?
 - How do you take that?
9. Do you think health professionals avoid patients by referring or will engage in conducting unnecessary investigations to patients whom they perceive high risk of litigation?
 - Probe: Can you explain me in detail?
 - Have you ever engage in such activities?
10. What is your opinion for being ethical in times of error incidents?
 - Probe: Can you please tell me your reason why?

B. Key-informant interview guide for head administrators

ID:	Department/office:
Age:	Position:
Sex:	Years of experience:

1. What does medical error mean to you?
2. What are the mechanisms employed in your hospital through which errors can be detected?
3. How do you get informed of error incidents?
 - Probe: Does your office have any regular process to monitor that?
 - Can you tell me how?
4. What do you think health professionals will perceive about error detection methods?
 - Probe: How it looks their cooperativeness?
 - What do you think is the reason behind?
5. Are there any efforts you are doing in your hospital to improve error detection?
6. What are the challenges you think with medical error detection?
7. What do you suggest to improve error detection?
8. How do you approach a supposed medical error?
 - Probe: Who will reaffirm?
9. What are the measures you take for incidents of medical error?
 - Probe: Do you think it will have an impact in future detections of errors?
 - Can you tell me how?
10. Can you please tell me how professionals try to avoid errors?
 - Probe: do they engage in defensive approach?
11. How do health professionals manage incidents of error?
 - Probe: Do they report?
 - Do you think they will hide? If so,

- Do you then have tracing mechanism able to detect errors?

➤ Why do you think the reason behind their approach?

12. Who will disclose errors to patients in your hospital?

➤ Probe: How do patients approach that?

➤ Can you tell me your experience?

➤ Do you think that had impact on health professionals?

- Can you please tell me more

13. Is there any mechanism employed in your hospital that will encourage professionals to admit their mistakes and take lesson?

➤ Probe: How do health professionals perceive that?

- Does that brought change?

14. What are the challenges of error reporting in your hospital?

15. What do you think will improve error reporting?

16. How is your hospital's relation with the respected regulatory body?

➤ Probe: do you report incidents?

➤ What are the challenges?

➤ What can be improved?

C. Document review guide

The document review will start after identifying relevant records and tools through which hospitals detect medical errors and handle events.

[Type here]

1. Review each document for contents
2. Review each document for the stakeholders assigned for it
3. Review each document for its timeliness in accordance with the set standard (where applicable)
4. Review each document for how findings shall managed

Annex 4: Information sheet Amharic version

የመረጃውረቀት

የምርምር ሰራተኛዎች፡ በአዲስ አበባ፣ ኢትዮጵያ በተመረጡ የመንግስት ሆስፒታሎች ውስጥ የሕክምና ስህተት የማወቅ እና የክስተት አያያዝ ልምድ።

የተመራማሪው ስም፡ ሳዲቅ ሙዝየን መሀመድ

አጭር መግለጫ፡ ሰላም!

ስሜ ሳዲቅ ሙዝየን አባላለሁ፡ በአዲስ አበባ ዩኒቨርሲቲ የፕብሊክ ጤና ማስተርስ ትምህርት ማሪኒን።

እኔ የማስተርስ ዲግሪዬን በከፊል መጨረስ በአዲስ አበባ በተመረጡ የመንግስት ሆስፒታሎች ውስጥ በህክምና ስህተት የማወቅ እና የክስተት አያያዝ ላይ እያደረግሁት ላለው ጥናት ቃለመጠይቅ ልሰጥህነው። በዚህ ጥናት ላይ ለመሳተፍ ተመርጠዋል ምክንያቱም ከጥናቱ ጋር የተያያዘ ጠቃሚ መረጃ ስላለሁት ነው።

በዚህ ጥናት ለመሳተፍ ወይም ላለመሳተፍ ከመወሰን ያለፈው ጥናቱ አላማ፣ ጥቅማ ጥቅሞች፣ ማንኛቸውም አደጋዎች፣ ጥቅማ ጥቅሞች፣

አሰራር እና ከእርስዎ የሚጠበቀውን ላስረዳዎ እፈልጋለሁ።

የጥናቱ ዓላማ፡- የዚህ ጥናት ዓላማ በጥቁር አንባባ፣ በየካቲት 12 እና በቅዱስ ጳውሎስ ሆስፒታሎች ያለውን የህክምና ስህተት የማወቅ እና የክስተት አያያዝ ልምድ ለመገምገም ነው። ጥናቱ ለታካሚ ደህንነት የበኩሉን አስተዋጽኦ ያደርጋል ብሎ መጠበቅ ይገባል። ጥናቱን ከአዲስ አበባ ዩኒቨርሲቲ ጋር በጋራ እየሰራሁ ነው።

ጥቅማ ጥቅሞች፡ የሚያገኙት ቀጥተኛ ጥቅም አይኖርም።

ነገር ግን የምታቀርቡት መረጃ ይህንን ጥናት ለማካሄድ ትልቅ ጠቀሜታ ይኖረዋል እና የጥናቱ ጤነኛነት በዚህ ዙሪያ ለሚሰሩ አካላት ይሰራጫል እና ምእርስዎን ተቋማችሁን፤

ሀብረተሰቡን እና በአጠቃላይ አገሪቱን ለመርዳት ጥቅም ላይ ሊውል ይችላል። .

ስጋት፡- በጥናቱ ላይ ለመሳተፍ ጊዜያችሁ (በአማካኝ 30 ደቂቃ) ለጥያቄዎች መልስ ከሚውልው ጨምሮ ምንም አይነት አደጋ ወይም ጉዳት የለም።

ሂደት፡ ጥናቱ ቃለመጠይቅ እና አስፈላጊ ሰነዶችን መገምገም ይኖረዋል። ይህ ቃለመጠይቅ በሚስጥር የሚካሄድ ሲሆን በአማካይ 30 ደቂቃ ይወስዳል። በቃለመጠይቁ ወቅት ምላሾችዎ በድምጽ ይቀረጻሉ እና በማስታወሻ ደብዳቤ ላይም ይጻፉ። ስለዚህ ለምርምር አስፈላጊናቸው ተብለው የሚታሰቡ አንዳንድ ጥያቄዎች ይጠየቃሉ። ለእነዚህ ጥያቄዎች ምላሽ እንድትሰጡ በአክብሮት ይጠበቅብሃል።

ምስጢራዊነት፡ የአንተ መልሶች በጥብቅ ሚስጥራዊ ይሆናሉ እና ምላሾችህ በስውር ይጠበቃሉ ስለዚህ የነገር ከኝን ማንም አያውቅም።

መረጃው ለዚህ ጥናት ዓላማዎች በቻ ጥቅም ላይ ይውላል። ለማንኛቸውም ጥያቄዎች የሰጡት ምላሾች ለሌላ ሰው አይጋሩም፤ እና የትኛውም የጥናት ሪፖርት እርስዎን አይለዩም።

የውጤቶች ሪፖርት ከታተመ፣ ስለአጠቃላይ ቡድኑ መረጃ ብቻ ይቀርባል።

[Type here]

የመሳተፍ ሙብት፡ መሳተፍ በፈቃደኝነትነው እና አንዳንድ ጥያቄዎችን መመለስ ካልፈለግክ የግድግዳ ረግጥ ለብህም።

ምንምምክንያት ሳይሰጥ በማንኛውም ጊዜ የመውጣት እና በከፊል ያለ መሳተፍ ሙብት አለዎት።

ለጥያቄዎች መልስ አለመስጠት አሁንም ሆነ ወደፊት እርስዎ ወይም ማንኛውም የቤተሰብዎ አባል ከጤናተቋማት ሊያገኙቸው በሚችሉ አገልግሎቶች ላይ ምንም ተጽእኖ አይኖረውም።

ያግኙኝ፡ ማንኛውም አይነት ስጋት ወይም ጥያቄ ካሎት እባክዎን በስልክ ቁጥር +251913583047 ወይም በኢሜል አድራሻ Siddiq1712@gmail.com ያግኙኝ።

[Type here]

Annex 5: Consent form Amharic version

በመረጃየተደገፈስምምነት

እኔ፣ከዚህበታችየተፈረሙትየዚህጥናትአላማእናአጠቃቀምመረጃተሰጥቶኛልእናየማቀርበውመረጃለዚህጥናትዓላማብቻጥቅምላይይውላል።

የእኔተሳትፎበፈቃደኝነትእንደሆነእናምንምምከንዶትሳልገልጽበማንኛውምጊዜለመልቀቅነፃመሆኔንተረድቻለሁ።

ማንነቴምሆነየማቀርበውመረጃበሚስጥርእንደሚጠበቅምተነግሮኛል።

ስለዚህ, በፈቃደኝነትበምርምርለመሳተፍተስማምቻለሁ.

የተሳታፊፊርማ _____ ቀን _____

የመርማሪስም _____ ፊርማ _____

Annex 6: Study tools Amharic version

ሀ. ጥልቅ የቃለ መጠይቅ መመሪያ ለጤና ባለሙያዎች

ስም:	ሙያ:
ጾታ:	የስራ ክፍል:
ዕድሜ:	የስራ ልምድ:

1. እባክዎን ስለ የሕክምና ስህተት ምን እንደሚረዱ እባክዎን ንገሩኝ?

2. ሁሉም የህክምና ስህተቶች ተገኝተዋል ብለው ያስባሉ?

☐ ምርመራ: እባክዎን ለምን ያብራሩኛል?

3. በሆስፒታል ዎው ስጥ የሚሠራው ማንኛውም አሠራር አለ?

☐ ምርመራ: እንዴት ይሠሩ?

Some እባክዎን ከስራ እንቅስቃሴዎ ጋር በተያያዘ ይንገሩኝ? ምቹት / ፈታኝነው? እንዴት

4. እነዚህ የማጠራቀሚያ ዘዴዎች የተተገበሩ መስልዎታል?

5. በተሰራ አካባቢው ስጥ የታሰበ ዓይነት የሕክምና ስህተት ከተከሰተ ምን ያደርጋሉ?

☐ ምርመራ: - መጀመሪያ ማንን ያሳውቃሉ? ለምን እንደሆነ ሊያስረዱኝ ይችላሉ?

ሙከራ: ስህተት ለተከሰተው በሽተኛ ምን ታደርጋለህ?

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Poss ዚሁለመወስንምክንያቱምንድነው?

ታካሚውወደእሱየሚቀርበውእንዴትይመስልዎታል?

6. እባክዎንእርስዎበሆስፒታልዎውስጥተቀጥረውየሚሠሩትንየማረጋገጫዘዴንማንኛውንምየስርዓትሪፖርትማድረግይችላሉ?

☐ ምርመራ: እንዴትእንደሚሰሩሊነግሩኝይችላሉ?

እንዴትይወስቋቸዋል?

7. በአንተወይምበስራባልደረባዎላይስህተትኢጋጥሞዎትያውቃሉ?

☐ ምርመራ: - ሪፖርትተደርጓልአላስፈላጊነዎት?

ሪፖርትለማድረግእንዲወስኑየሚያደርጋቸውምንድንነው?

ያገኙትግብረመልስምንነበር? ለሚቀጥሉትእንዴትነውየሚወስዱት?

ለሚቀጥሉትእንዴትይወስዳሉ?

8. የህክምናስህተትተከትሎበሆስፒታልዎውስጥየተያዙትንየመውቀዴዎችዓይነቶችይንገሩኝ?

☐ ምርመራ: - እንዴትይወስቋቸዋል? ማበረታቻ / ተስፋአስቆራጭ?

☐ ምርመራ: ምንእርምጃዎችኢጋጥመውዎትያውቃሉ?

▪ ይህንየሚወስዱትእንዴትነው?

9. የጤናባለሙያዎችለመጥቀምላልተጠቀሙበትህመምተኞችከፍተኛየመግዛትአደጋዎችንለሚመለከቱበሽተኞችአላስፈላጊምርመራዎችንበማካሄድላይነዎትብለውያስባሉ?

☐ ምርመራ: በዝርዝርማስረዳትይችላሉ?

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Do በእንደዚህዓይነትእንቅስቃሴዎችመቼምተካፈሉ?

10. በስህተትከስተቶችጊዜያትሥነምግባርየጎደለውአመለካከትዎምንድነው?

☐ ምርመራ: - እባክዎንምከንያታዊነትዎንይንገሩኝ?

ለ. የዋናአስተዳዳሪዎችቁልፍመረጃስጨቃለመጠይቅመመሪያ

ስም:	የስራ ክፍል:
ጾታ:	ሃላፊነት:
ዕድሜ:	የስራ ልምድ:

1. የሕክምናስህተትለእርስዎምንትርጉምአለው?

2. ስህተቶችበሚገኙበትሆስፒታልውስጥየሚሠሩስልቶችምንድናቸው?

3. ስለስህተትአደጋዎችእንዴትይነገራችሁ?

☐ ምርመራ: - ቢሮዎይህንንመደበኛሂደትያካሂዳል?

መቼእንዴትሊነግሩኝይችላሉ?

4. የስህተትባለሙያዎችስለስህተትመለዋወጫዘዴዎችምንይመስልዎታል?

Prace ምርመራ: - የእርሱንሥራመዳበሪያምንይመስላል?

To በስተጀርባምንይመስልዎታል?

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5. የስህተትመለየትለማሻሻልበሆስፒታልዎውስጥየሚያደርጉትጥረቶችአሉ?

6. በሕክምናስህተትመለየትረገድየሚያስቡትተፈታታኝሁኔታዎችምንድንናቸው?

7. የስህተትመለየትለማሻሻልምንይጠቁማሉ?

8. የታሰበየሕክምናስህተትእንዴትትቀርባላችሁ?

☐ ምርመራ: እንደገናማንያረጋግጡ?

9. ለሕክምናስህተትከስተቶችየሚወስዱትእርምጃዎችምንይባላል?

☐ ምርመራ: ለወደፊቱስህተቶችመፈለጊያዎችተፅእኖይኖረዋልብለውያስባሉ?

መቼእንዴትሊነግሩኝይችላሉ?

10. ባለሙያዎችስህተቶችንለማስወገድእንዴትእንደሚሞከሩእባክዎንንገረኝ?

ተፈታታኝሁኔታ: - በተከላካይአቀራረብውስጥይሳተፋሉ?

11. የጤናባለሙያዎችየስህተትከስተቶችእንዴትይቋቋማሉ?

☐ ምርመራ: ሪፖርትያደርጋሉ?

☐ የሚደበቁይመስላቸዋል? ከሆነ,

Too ከዚያስህተቶችንለመለየትየሚያስችልዘዴንሊኖርዎትይችላል?

The አካሄዱንበስተጀርባያለውምክንያትለምንያስባሉ?

12. በሆስፒታልዎውስጥላሉትህመምተኞችስህተቶችንየሚያጋልጥማንነው?

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☐ ምርመራ፡ - ህመምተኞች እንዴት ይቀርባሉ?

☐ ተሞክሮዎን ሊነግሩኝ ይችላሉ?

The በጤና ባለሙያዎች ላይ ተጽዕኖ የነበረውን ይመስልዎታል?

Move እባክዎን የበለጠ ይጎብኙ

13. ስህተቶች ስህተቶቻቸውን እንዲያምኑ እናት ምህርት እንዲወስዱ የሚያደርግ ሆስፒታል ዎን ለሚያበረታታ አሠራር አለ?

ተፈታታኝ ሁኔታ፡ - የጤና ባለሙያዎች ይህን የሚያስተውሉት እንዴት ነው?

Phose ለውጥ አመጣ?

14. በሆስፒታል ዎው ስፕሪንግ ሮት የማድረግ ችግር ምን ድንኳን ነው?

15. የስህተት ሪፖርት ማድረጉን ምን ይመስልዎታል?

16. የሆስፒታል ዎን ግንኙነት ከተከበረ የቁጥጥር አካል ጋር እንዴት ነው?

☐ ምርመራ፡ - ከስተቶችን ሪፖርት ያደርጋሉ?

The ተፈታታኝ ሁኔታዎች ምን ድንኳን ናቸው?

To የተሻሻለው ምን ድንኳን ነው?

ሐ. የሰነድ ግምገማ መመሪያ

የሰነድ ክለሳው የሚጀምረው ሆስፒታሎች የህክምና ስህተቶችን የሚያገኙበት እና ከስተቶችን የሚቆጣጠሩበት ተዛማጅ መዝገቦች እና መሳሪያዎችን ከለየበኋላ ነው።

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1. ለይዘት እያንዳንዱን ሰነድ ይገምግሙ።
2. ለተሟላነት እያንዳንዱን ሰነድ ይገምግሙ።
3. እያንዳንዱን ሰነድ በተቀመጠው ስታንዳርድ መሰረት ወቅታዊነቱን ይከልሱ (የሚመለከተው ከሆነ)
4. ግኝቶች እንዴት እንደሚተዳደሩ እያንዳንዱን ሰነድ ይገምግሙ።

Annex 7: Codebook

List of codes	Description
Age	Age of participant
Sex	The gender identification of participants. It includes either of Male (M) or Female (F) but not both or none.
Profession	The academic field that participants are entitled for while working on the hospital.
Department	The service area in the hospital where participants are working.
Experience	The time spent working on the profession in years.
Negligence	In reference to a description of medical error as a harm primarily attributed to the health professional's behavior. It includes harms that a prudent professional could avoid it. It can also include like carelessness, negligent. It excludes harms that occur as a result of lack of knowledge or skills. E.g. "medical error for me is harm to a patient due to professionals' carelessness."
Substandard care	In reference to a description of medical error as harms that occur as a result of delivering care below the standard set for the particular set up. It includes harms for lack of knowledge or skills by professionals for which they are entitled for. It excludes other than this. E.g. "medical error occurs due to lack of knowledge or

	skill by professionals.”
Harm knowingly or unknowingly	In reference to a description of medical error as any kind of harm to a patient by health professionals. It includes a description of medical error as harm to a patient knowingly or unknowingly. E.g. “medical error is harm to a patient that can occur knowingly or unknowingly by health professionals while delivering care.”
Violation of oath	In reference to description of medical error as a breach of oaths that health professionals made. It includes breach of oath that may or not result in harm to a patient. E.g. “medical error is when we breach the Hippocrates oath which we made before starting a job.”
Chart review	In reference to activities done using patient record as a reference as to review the care delivered. It explained as in phrases like chart audit, death audit, clinical audit. E.g. “We made clinical audit on charts when a patient discharged.”
Patient monitoring	In reference to platforms in the hospital through which patients and attendants can give their complaints, opinions, ideas regarding the care they are receiving. E.g. “we made patient interview to listen their complaints.” It also includes discussions with administrators and community members about the hospital service. It excludes other discussions.
Supervisions	It activities carried out to supervise hospital services through direct observation. It excludes platforms through which patients or their families put their say. E.g. “Hospital managers made supervisions regularly.”
Medical team discussions	In reference to an activity made by health professionals of different level in which practitioners explain how they are managing patients to their seniors. E.g. “In a morning session, selected cases will be discussed.”

Difficult to detect	In reference to a perception that detecting medical error is difficult. It includes perceptions from any reasons that make the detection process difficult. It excludes perceptions that even though it's difficult to detect medical errors but possible. E.g. "Identifying medical error is very tough because the nature of medical error is sophisticated."
Not impossible	In a reference to a perception that it is possible to detect medical errors. Could also refers perceptions that the detecting process might be challenging but possible if some procedures are followed or fulfilled. E.g. "yes there are different mechanisms to detect incidents of medical errors."
Quality care	In reference to perceived reason of error detection mechanisms as for delivering a better care service. It excludes any other perceived reason. E.g. "This mechanism are applied to deliver a better care service."
Learning experience	In reference to perceived reason of error detection mechanisms as to learn from mistakes. It includes perceived reason as for academic purpose. It can also include perceived reason of taking corrective measures. It excludes any other perceived reasons. E.g. "This methods help us to learn from mistakes."
Meet the standard	In reference to perceived reason for the application of error detection mechanisms as to keep the service according to the standard set. It excludes any other perceived reasons.
For punishment	In reference to perceived reason for the application of error detection mechanisms as for taking measure on the responsible person. It includes perceived reason as for taking any kind of measure on the individuals. It excludes any perceived reasons that are not applied on professionals.
Control professionals	In reference to perceived reason for the application of error detection mechanisms as for monitoring the activities of professionals. It includes monitoring professionals in the absence of error committed. It excludes

	the perceived reason as to take any kind of measure or punishment when something wrong happen.
Incident reporting	In reference to formal methods employed to report incidents of injury of any kind. It includes any formal method that can apply to report incidents of harm happen to a patient or a health worker. It excludes complaint made by patients when they perceive error happened to them.
Inform immediate manager	In reference to informing the manager, of a particular service area where incident of error happen, about the incident of error by the professionals whom assumed to be involved in the incident.
Error claims	In reference to complaints, to any office or any level of manager, made by patients who perceived error had happen to them. It includes complaints made by families of a patient. It excludes complaint or reports done by people other than patients, or their families and attendants.
Informal communication	In reference to means of getting reports of error incident through informal communications. It includes reports made by other health professionals who are not involved in the error incident. It excludes reports made by professionals involved in the incident and reports made through formal procedures.
Reporting system	
It depends	In reference to personal judgment as a condition to disclose or not disclose error incidents. It includes a description of being conditional to be an ethical. It excludes putting severity or prior communications as a condition to disclose. It also excludes disclosing for no reason.
Being ethical regardless	In reference to putting no condition to disclose incidents of error. It excludes any conditions put as a reason to disclose or not to disclose. It includes disclosing error incidents to the patient or their families by the professionals whom assumed to be involved in the incident. It also includes description of being ethical

	regardless of what may happen.
Severity matters	In reference to putting the degree of severity as a condition to disclose or not disclose error incidents to the patient.
Communication matters	In reference to putting degree of established communication as a condition to disclose or not disclose incidents of error.
Disciplinary measure	Any kind of measures made at the hospital that applied on the professionals who engaged in the error incident. It includes activities done at the hospital levels to handle incidents of error. It excludes any kind of academic measures.
Regulatory measure/ Legal	In reference to actions taken by the health regulatory body at regional or Federal level to regulate professionals' practice. It includes actions of law enforcement. It excludes punishments made by hospital administration to prevent from practicing in that specific hospital.
Academic measures	Any kind of measures made by hospitals that affects students' academic activities. It includes suspension from practicing in that particular hospital.
Blaming	In reference to any kind of perceived personal threat for engaging in the incident of error. It includes blasphemy, dishonor by patients or anyone else. It excludes the need to avoid receiving care from this professionals by patients.
Loss of trust	In reference to perceived patients' lack of interest to receive a care from professionals whom supposed committed medical error.

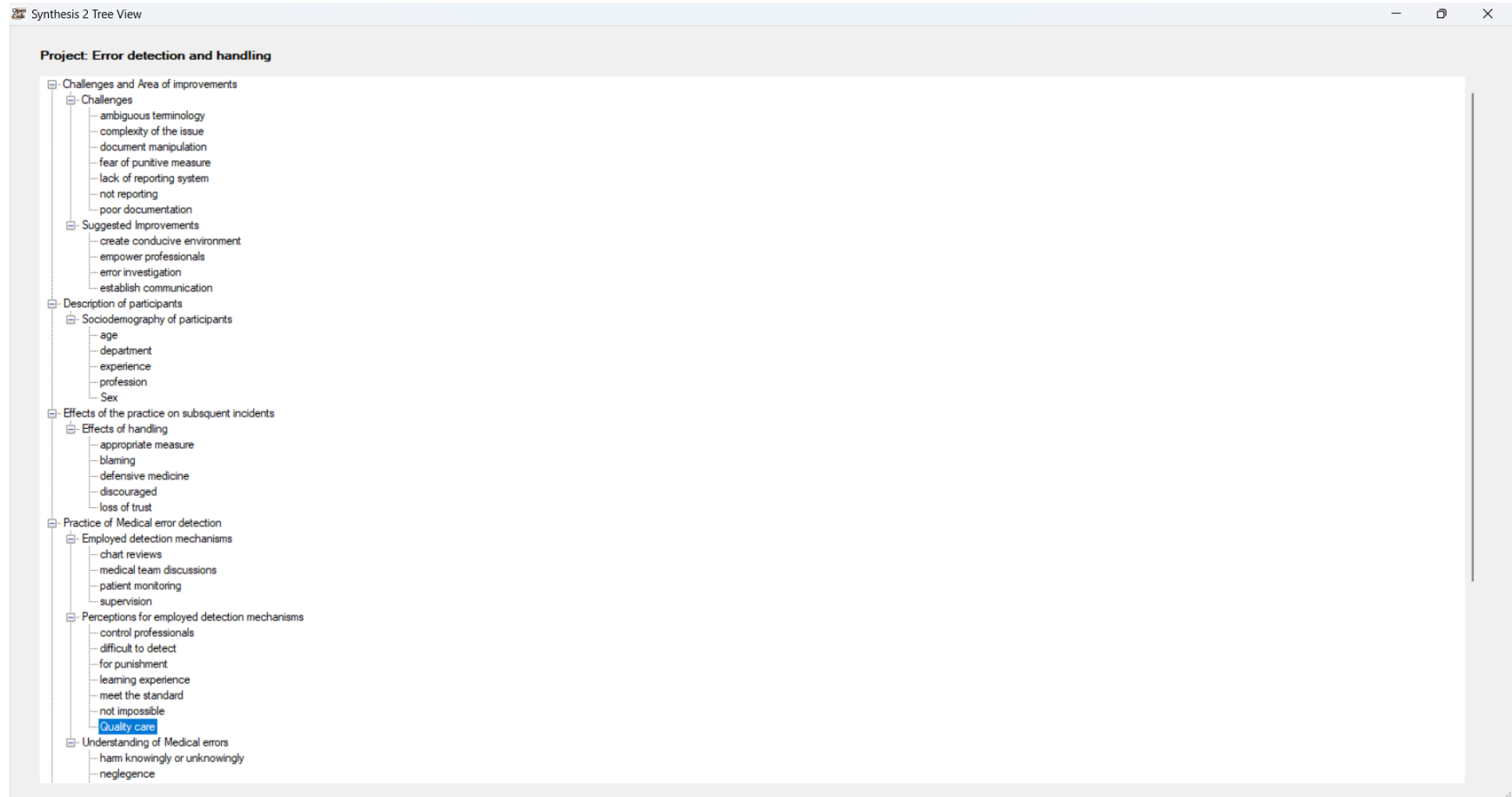
Discouraged	In reference a feeling of not willing to report or disclose errors because of perceived experience from previous incidents they involved. It includes a feeling of not willing to report or disclose because of measures taken on other professionals in the previous incidents. It excludes perceived fear of any measure that may be taken.
Defensive medicine	In reference to engaging in unnecessary referral of patients or requesting extra investigations for perceived fear of suit. It includes participants' engagement or participants' affirmation of such activities in the hospitals.
Appropriate measure	In reference to accepting measures taken by the respected bodies following incident of medical error. it also includes a description of measures taken following error incidents as an appropriate or right measures.
Fear of punitive measures	In reference to not reporting or not disclosing error incidents for a perceived fear of measures that may be taken. It includes not reporting or not disclosing error incidents for perceived fear of punishment of any kind that may follow.
Complexity of the issue	In reference to the nature of medical care as an obstacle to the detection and handling of error incidents. It includes any attributes of health care that pose challenge for the detection and handling of error incidents. It excludes obstacles from manipulations made on the patient information document.
Document manipulation/ information asymmetry	In reference to changing the right information in the patient information document that puts error detection difficult. It includes documenting wrong information. It excludes not documenting the right information.
Ambiguous terminology	In reference to ambiguous conception related with the term "medical error" as an obstacle to have common understanding. It includes suggestions to put a clear terminology for medical error.

Lack of reporting system	In reference to the description of lack of formal reporting mechanism as an obstacle for the detection of error incidents. It includes nonfunctional reporting systems for medical error incidents as an obstacle for the detection of error incidents. It also includes description of absence of formal reporting mechanism.
Poor documentation	In reference to lack of necessary information in the patient information document. It excludes documenting wrong information or changing the right information.
Not reporting	In reference to a practice that imply health professionals are not reporting or not disclosing error incidents. It includes not reporting error incidents when professionals are not even aware of. It excludes not disclosing or not reporting for fear of measures. E.g. “The system couldn’t get any response from reporting plat form because professionals may not aware of doing error or even knowing the error no one will report.”
Empower professionals	To refer activities made to increase knowledge and skills, and awareness of health professionals about medical error. It includes educations, trainings.
Create conducive environment	In reference to activities or efforts that make better work and educational environment that help to detect and report errors. It includes activities to avoid harsh working environments. It excludes activities to increase knowledge of skills of health professionals.
Error investigation	To refer activities to be followed while investigating error incidents. It includes activities to be followed once the supposed error was detected or reported. It also refers to a description of participants involved in the investigation of incidents. It excludes activities to be followed once error was declared.
Establish communication	In reference to the description having good communication will help patients understand and accept incident of error. It includes suggestions regard to establishing communication between with patients.

[Type here]

Annex: Outputs of Opencode 4.0

The codes, categories, and themes their networks



[Type here]

Synthesis 2 Tree View

Project: Error detection and handling

- department
- experience
- profession
- Sex
- Effects of the practice on subsequent incidents
 - Effects of handling
 - appropriate measure
 - blaming
 - defensive medicine
 - discouraged
 - loss of trust
- Practice of Medical error detection
 - Employed detection mechanisms
 - chart reviews
 - medical team discussions
 - patient monitoring
 - supervision
 - Perceptions for employed detection mechanisms
 - control professionals
 - difficult to detect
 - for punishment
 - learning experience
 - meet the standard
 - not impossible
 - Quality care
 - Understanding of Medical errors
 - ham knowingly or unknowingly
 - negligence
 - Substandard care
 - violation of Oaths
- Practice of Medical error handling
 - Error Disclosure
 - being ethical regardless
 - communication matters
 - it depends
 - severity matters
 - Error reporting
 - error claim
 - Incident reporting
 - inform immediate manager
 - informal communication
 - Measures to handle Incidents of error
 - academic measures
 - Disciplinary measures
 - regulatory measure

[Type here]

Synthesis 2 List



Project: Error detection and handling

Synthesis 2	Synthesis 1	Code
Challenges and Area of improvements	Challenges	ambiguous terminology complexity of the issue document manipulation fear of punitive measure lack of reporting system not reporting poor documentation
	Suggested Improvements	create conducive environment
	Suggested Improvements	empower professionals
	Suggested Improvements	error investigation
	Suggested Improvements	establish communication
Description of participants	Sociodemography of participants	age department experience profession Sex
		appropriate measure
Effects of the practice on subsequent incidents	Effects of handling	blaming defensive medicine discouraged loss of trust
Practice of Medical error detection	Employed detection mechanisms	chart reviews medical team discussions patient monitoring supervision
	Perceptions for employed detection mechanisms	control professionals
	Perceptions for employed detection mechanisms	difficult to detect
	Perceptions for employed detection mechanisms	for punishment
	Perceptions for employed detection mechanisms	learning experience
	Perceptions for employed detection mechanisms	meet the standard
	Perceptions for employed detection mechanisms	not impossible
	Perceptions for employed detection mechanisms	Quality care
	Understanding of Medical errors	ham knowingly or unknowingly
	Understanding of Medical errors	negligence
	Understanding of Medical errors	Substandard care
Practice of Medical error handling	Understanding of Medical errors	violation of Oaths
	Error Disclosure	being ethical regardless communication matters it depends causality matters

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Synthesis 2 List



Project: Error detection and handling

Synthesis 2	Synthesis 1	Code
	Suggested Improvements	empower professionals
	Suggested Improvements	error investigation
	Suggested Improvements	establish communication
Description of participants	Sociodemography of participants	age
		department
		experience
		profession
		Sex
Effects of the practice on subsequent incidents	Effects of handling	appropriate measure
		blaming
		defensive medicine
		discouraged
		loss of trust
Practice of Medical error detection	Employed detection mechanisms	chart reviews
		medical team discussions
		patient monitoring
		supervision
	Perceptions for employed detection mechanisms	control professionals
	Perceptions for employed detection mechanisms	difficult to detect
	Perceptions for employed detection mechanisms	for punishment
	Perceptions for employed detection mechanisms	learning experience
	Perceptions for employed detection mechanisms	meet the standard
	Perceptions for employed detection mechanisms	not impossible
	Perceptions for employed detection mechanisms	Quality care
	Understanding of Medical errors	ham knowingly or unknowingly
	Understanding of Medical errors	negligence
	Understanding of Medical errors	Substandard care
	Understanding of Medical errors	violation of Oaths
Practice of Medical error handling	Error Disclosure	being ethical regardless
		communication matters
		it depends
		severity matters
	Error reporting	error claim
	Error reporting	Incident reporting
	Error reporting	inform immediate manager
	Error reporting	informal communication
	Measures to handle Incidents of error	academic measures
	Measures to handle Incidents of error	Disciplinary measures
	Measures to handle Incidents of error	regulatory measure

inform immediate manager

Practice of medical error detection and Incident handling in selected public hospitals, in Addis Ababa, Ethiopia.

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