



HAWASSA UNIVERSITY COLLEGE OF MEDICINE AND HEALTH
SCIENCES SCHOOL OF PUBLIC AND ENVIRONMENTAL
HEALTH ACADEMIC AND SERVICE DIRECTORATE

Clinical outcomes and associated factors of acute poisoning among
patients admitted to Hawassa University Comprehensive specialized
Hospital, Sidama Regional State, Ethiopia

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Title: Clinical outcomes and associated factors of acute poisoning among patients admitted to Hawassa University Comprehensive specialized Hospital, Sidama Regional State, Ethiopia, 2024

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A research thesis submitted to School of Public and Environmental Health Academic and Service Directorate at Hawassa University College of Medicine and Health Sciences for the partial fulfillment of Master's Degree in General Master of Public Health

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DECLARATION

I hereby declare that this MPH thesis result is my original work and has not been presented for a degree in any other university, and all sources of materials used for this result thesis have been duly acknowledged.

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Date_____

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We the undersigned, members of the board of examiners of the final open defense **by Kindalem Worku (MD)** have read and evaluated his thesis entitled “**Clinical outcomes and associated factors of acute poisoning among patients admitted to Hawassa University Comprehensive specialized Hospital, Sidama Regional State, Ethiopia, 2024**” and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirement for the degree of Masters of Public Health in General Public Health.

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Final and acceptance of the thesis is contingent upon the submission of the final copy of the thesis to the school of Graduate studies (SGS) through the Department/School of Graduate committee DGC/SGC of the candidate’s school.

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List of Abbreviation and Acronym

- ✚ CADD-Clinical and academic Directorate Director
- ✚ CMHS: College of Medicine and Health Sciences
- ✚ CNS: Central Nervous System
- ✚ CO: Carbon monoxide
- ✚ ED: Emergency Department
- ✚ GMPH: General Master of Public Health
- ✚ HMIS: Health Management Information System
- ✚ HUCSH: Hawassa University Comprehensive Specialized Hospital
- ✚ IV: Intravenous fluid
- ✚ SEPH ASD: School of Environmental and Public Health Academic and Service Directorate
- ✚ SoM ASD: School of Medicine academic and Service Directorate
- ✚ SPSS: Statistical Package for Social Sciences
- ✚ WHO: World Health Organization

Abstract

Background: Acute poisoning is a worldwide public health concern as well as a medical emergency that can arise from exposure to high concentrations of any substance that has toxic consequences and manifests within hours of exposure. It's a common reason for emergency room admission, which leads to mortality and morbidity. Ethiopia is among the countries that don't have a dedicated toxicology center which is important for treating poison cases.

Objective: The purpose of this study was to assess the Clinical outcomes and associated factors of acute poisoning among patients admitted to Hawassa University Comprehensive Specialized Hospital Emergency Department, Hawassa, Ethiopia from December 2018 to December 2023.

Methods: It was a retrospective cross-sectional hospital record-based study of acute poisoning cases admitted to HUCSH ED during the study period. The data were collected using a structured questionnaire, entered, coded and cleaned using Kobo data collection toolbox software and exported to SPSS version 25 software. The data were analyzed for descriptive statistics and statistical analysis was performed using bivariate for those variables having a P value of $< .25$ multivariable logistic regression analysis was done to identify factors associated with the death of acute poisoning cases. The result is presented in the form of tables, figures, and text using frequencies and summary statistics such as mean, SD, median and percentage. The statistical significance was declared at a P value less than 0.05.

Result: In this study, a total of 212 acute poisoning cases were retrospectively analyzed. From the total cases majority of the cases were males accounting for 110 (51.9%). With a median age of 22 years the number of deaths in this study was **20(9.4%) at 95% (CI: 6.15%, 14.20%)** and organophosphate being the common agent at 66(31.1%) as well as the common agent ascribed to death. Multivariable logistic regression analysis showed that the independent factors associated with death were hospital stay of more than two days [AOR: **1.009(.00, .18)**]; p-value of: **.002**].

Conclusion: Patients with acute poisoning had a high fatality rate in poisoning cases. A longer hospital stay of more than 48 hours, the presence of medical complications after admission and in patients who are more than 26 years old were found to be associated with death.

Keywords: clinical outcome, poison, southern Ethiopia

1. Introduction

1.1. Background

Any material that can be taken through any means that results in harm to the body or death is considered poison and poisoning that is acute is a medical emergency and a widespread issue around the globe (1, 2). Exposure to poison for a brief period (less than 24 hours) through any channel, whether on purpose or accidentally, is known as acute poisoning and is one of the most frequent reasons for emergency hospital admissions and hospital stays a common reason for morbidity and Mortality(2). Acute poisoning is becoming more common in East Africa as a result of alterations in social behavior, chemical accessibility, and lifestyle which also applies to Ethiopia(3).

The geographical location has an impact on the poisoning pattern. In contrast to industrialized nations, pesticides and home cleansers like sodium hypochlorite are frequently utilized in low and middle income countries(4). A study conducted in different geographical areas of Ethiopia shows considerable resemblance with types of poisonous agents with certain variations and pesticides being common across regions, in Addis Ababa Organophosphates account for (27.5%) and prescribed Drugs (16.3%)(4), in Gondar organophosphate (20.69%), aluminum phosphide (20.26%), and bleach (35%)(3), Nekemte Pesticides (32.7%) and food poisoning (20.9%)(5), Ambo Organophosphate (53%) and in a study at Jimma showed cleansing agents accounting for (41.7%) and organophosphates (27.2%) (6, 7).

1.2. Problem statement

Morbidity and mortality because of acute poisoning is a worldwide problem; nevertheless, its impact stands more on poor countries. It is estimated that some forms of poisons are directly or indirectly responsible for more than 1 million illnesses worldwide annually (25). Poisoning is a significant global public health problem and cases are increasing day to day due to changes in lifestyle and social behavior. Advances in technology and social development have resulted in the availability of most drugs and chemical substances in the community. And the exact number of occurrences can be higher because most cases of poisoning primarily go unreported (26).

More than 300,000 people die every year from pesticide poisoning all over the world and the commonest causes are organophosphates and aluminum phosphides (27).

Knowledge of the epidemiology of poisoning and its changes is important to both emergency physicians and public health experts, but the pattern of poisoning varies from country to country over time, sometimes rapidly (2, 8, 9). Therefore, regional epidemiological data on poisoning are very helpful in planning rational use of resources for the prevention and management of poisoning and in targeting research(8). Ethiopia, one of the low income Sub-Saharan African countries, shares a considerable burden of poisoning emergencies with significant morbidity and mortality. Two different studies in northwest Ethiopia and west found in hospital fatality rate of 17.6% and 7.1% respectively (3, 5). Since agriculture is the main occupation in the country, insecticides are used to a greater extent and poisonings with such products are becoming very common WHO estimates that about 20% of global suicides are due to pesticide self-poisoning, mostly in rural agricultural areas in low- and middle-income countries which applies in the Ethiopian context too(2).

1.3. Significance of the study

This study was conducted to assess the in hospital outcomes and associated factors of poisoning among admitted patients to Hawassa University Comprehensive Specialized Hospital (HUCSH). Information on the prevalence in terms of types of poison, associated factors, and in hospital outcomes can be helpful in the design of interventions geared at the reduction of morbidity and mortality by taking up appropriate planning, prevention, and management techniques in our region in particular and the country at large. As continuous surveillance of cases of acute poisoning is important for planning and evaluating public health interventions. It is important to know the nature and outcomes of poisoning to take appropriate preventive measures.

Even though there is a paucity of literature in the southern part of the country about the prevalence of acute poisoning. Thus, this study aims to determine the associated factors and in hospital outcomes of patients admitted with acute poisoning to our hospital. Comprehensive methods for lowering death rates are necessary due to the enormous number of poisoning cases. As a result, this study was carried out to determine the variables that affect the results in these situations and to recommend methods for lowering the morbidity and death that are linked to them.

Though there are a few studies on acute poisoning in Ethiopia, there are scarce statistics on acute poisoning in the study area. The researcher was certain that this study would set the stage for additional epidemiological research in the field, which could make it possible to develop and put into practice preventive measures. It is also wise for us to be aware of the frequency of acute poisoning cases in our hospital, particularly their clinical, etiological, and demographic features, as this will help us diagnose and treat these cases as soon as possible. Additionally, it will assist us in educating the public about ways to avoid unintentional poisonings. It will help hospital administrators make regulatory judgments on how to handle cases of acute poisoning at our facility.

2. LITERATURE REVIEW

2.1. Socio Demographic characteristics and type of poison

The population segment affected by either intentional or unintentional poison is majorly productive age group of the population many literatures across the globe depicts this point a study conducted in one of Pakistan tertiary hospital shows total of 364 cases with an average age of the patients as 31.67 ± 12.92 were the common poison agent was agricultural chemicals, there were 132 (36%) males and 232 (64%) females(10), a study Saudi Arabia shows different figure it shows With a male to female ratio of 1.2:1, men made up more than half of the cases (54.6%) with common poisons being prescribed drugs and Children under the age of five accounted for almost half of the cases (56.6%)(11). The reasons behind this two studies were in the Pakistan study the common agents were agricultural chemicals which are relatively similar in terms of access for both sex and due to the high tendency of females in suicide attempt females out number but in the Saudi Arabia study the agents were physician prescribed drugs and recreational drugs (narcotics) which shows children to be more at exposure from family medical cabinet either intentionally or unintentional and in the adult age group males have more access for the narcotics than females which is why males out number females. Another study from Kenya which comprised 434 patients the majority were male ($n = 283$, 65.2%), aged between 20 and 29 ($n = 135$, 31.1%) and under 5 years of age ($n = 124$, 28.6%) and similarly a study in Zambia shows majority of patients to be in the age category of 20-29(49.6%) of which intentional ingestion of pesticides were common (12, 13).

As per study in South West Taiwan People between the ages of 19 and 50 made up the majority of cases (66.8%), especially those between the ages of 19 and 30 (29.4%) and 38.8 years was the mean age (SD = 18.8, median = 35). Among the 1548 poisoning agents linked to the research period, pharmaceuticals predominated across all age categories (49.9%), with pesticides coming in second (14.5%)(8). A study in one of Indian tertiary hospital the prevalence was higher in men (75.4%) than in women (24.3%), with a 3:1 ratio and the age group between 20 and 29 years old accounted for 31.2 percent of cases of acute poisoning, with the 12- to 19-year-old age group coming in second (30.2%) and Organophosphates accounted for 36.0% of the poisoning cases, with snake bites (16.2%), medicines (11.0%), rat poison (7.3%), and other causes coming in second and third(14). Another study from Egypt there were 55.9% females and 44.1% males.

Children, teenagers, and young adults made up the majority of patients (29.7%, 24.3%, and 36.1%, respectively) and the most common cause of poisoning is rodenticides (28.7%), which is followed by pharmaceuticals that are abused in the central nervous system (22.2%) and other pharmaceuticals (21.3%) and Zinc and aluminum phosphide poisoning accounted for 80% of cases of rodenticide poisoning in this study antidepressant, anti-epileptic, and antipsychotic medication poisoning accounted for two thirds of CNS misused pharmaceutical poisoning cases(15).

In one study in West Africa comprising of (51.7%) females and (48.3%) males, with a mean age of 28.53 ± 13.47 years (32.8%) were under the age of twenty, while (34.5%) were in the 21–30 age range and most common poisons were organophosphates in (53.4%), detergent and disinfectants in (12.1%)(16). And a hospital based cross sectional study in India shows 80% patients with poisoning admission were below the age of 40 years and in other hospital similarly the age group of 21 to 30 years comprises 32% of poisoning cases. And in one a teaching hospital in the north western part of Ethiopia majority 63.7% of the cases were females, giving male to female ratio of 1: 1.75 with prevalence rate of 1% and the age group cases were from the of 21-40 years (17-19). In study conducted at University of Gondar hospital Women made up a larger percentage of the acutely poisoned patients—148, or 63.52%. Patients with acute poisoning had a median age of 23 years (IQR: 18, 60), with young adults (18–25 years old) accounting for the largest percentage (55.36% with most common categories of poisoning agents implicated were organophosphate (20.69%), aluminum phosphide (20.26%), and bleach (18.10%)(3) and other study at Debreabor University hospital showed Ingestion of organophosphate pesticides and bleach accounted for 35% and 25% of cases, respectively as common causes (20) and a study in Wollega University hospital shows the highest proportion (45.97%) of the poisoning cases was in the age category of 16–30 years about two-thirds (59.20%) of them were females(5).

One systematic review of observational studies which includes a total of 9 studies were included in this review, 6 of which retrospective, 2 cross-sectional and 1 case series showed those under 30 years old had the highest frequency of poisoning accordingly 78% of the research included in this evaluation, women are more likely than men to have acute poisoning(21). And another study from Jimma University hospital revealed that there were (52.4%) more women than men (47.6%). People between the ages of 12 and 20 had the highest rate of poisoning (79.96%), followed by those under the age of (15.5%). Household cleaning products (41.7%), organophosphates (27.2%),

pharmaceuticals (phenobarbitone and antidepressants) (12.6%), alcohol (8.7%), and hydrocarbons (benzene, kerosene) were the most often involved hazardous agents(7).

Associated factors, incident of poisoning and out come

A hospital based cross sectional study in western part of India revealed as majority of cases were male (59.2%), with the age group being 11–20 years (36.7%), followed by 21–30 years (35.7%), 31–40 years (16.3%), and older than 40 years (11.2%) and incidents of poisoning were intentional ingestion of poison agents with aim of suicidal attempt the common reason for suicidal attempt in this study the most common reasons for suicide among cases of suicidal poisoning were "family quarrel or family unhappiness" (29.6%), "failure in examination, interview, or business" (23.5%), "ill treatment by spouse or in laws" (16.3%), "unemployment" (9.2%), "failure in love affair" (8.2%), "poverty" (6.1%), "loneliness" (3.1%), "incurable disease" (1%) and "any other causes" (3.1%) and as an outcome, out of 98 cases, (89.7%) cases survived, and (10.2%) cases died a study at University of Gondar hospital also shows that (92.70%) patients were acutely poisoned intentionally (deliberate self-harm), while (7.3%) of the cases accounted for unintentional, of which 5.58% was accidental acute poisoning with case fatality rate of 17.6% and the most common reasons for acute poisoning were quarrels with family (33.8%) followed by marital bitterness (25.93%) (1, 3).

Another retrospective study from India shows Suicidal considerations were present in 75.3% of the patients. The majority of patients (92.7%) only ingested one toxic substance, and oral poisoning was the mode of poisoning in every case. After being exposed to the poison, the majority of patients (56.7%) arrived at the hospital within two hours, with a median hospital stay lasting two days and a 2.9% death rate. In contrast to accidental poisonings, which were predominantly caused by domestic agents (79.1%), suicidal poisonings were primarily linked to misuse of pesticides (39.4%), rodenticides (19.7%), and plant seeds (14.4%) the reason behind suicidal considerations amid the patients (40.1%) experienced a crisis in interpersonal relationships (7.7%) had financial stress(1.9%) had chronic alcoholism, and (5.3%) had psychiatric disorders(19).

The study at Debreabor hospital displays most frequent cause of poisoning (77.5%) was suicide by poisoning, with accidental poisoning accounting for 8.8% of cases 64.5% of suicide cases include females 9.8% of instances have mental health issues and about 49% of suicide instances

had an unidentified cause conflict is the cause of 11.8% and 13.7% of the reasons are undocumented. In most of the instances in this study, the cause of the poisoning is unknown. However, family conflict accounts for roughly 12% of the cases, and psychiatric problems for about 5%, and the mortality among poisoned males is higher than females (21.6% Vs16.9% which is nearly similar to other studies in our country (18, 22, 23).

A study in southeast Asia shows only a minimum of (6.6%) victims had a psychiatric disorder prior to poisoning, while the majority of patients experienced poisoning due to suicide accounting for (71.66%) and domestic dispute (43.33%) followed by financial problems (16.66%) with in hospital mortality of 1.66% which is close to study conducted in Ambo, Ethiopia(6, 24). Similarly study from Jimma shows reason for poisonings were quarrel (family, marital) (75.9%), psychiatric problem (14.8%) and substance abuse (9.3%) were frequently mentioned with overall case fatality rate of 5.8%(7).

The study from Haramaya also identifies mode of poisoning and drug poisoning were significantly associated with poor treatment outcomes of acute poisoning. Participants who were poisoned by themselves were 2.4 times more likely to have poor treatment outcomes than those who were poisoned accidentally and age ≥ 61 years, male gender, attempted suicide, history of chronic or major disease were also listed in other studies(8, 23). Chronic medical comorbidities and hospital stay of <48 hours were also identified in the Gondar study(3).

2.2. Conceptual Framework

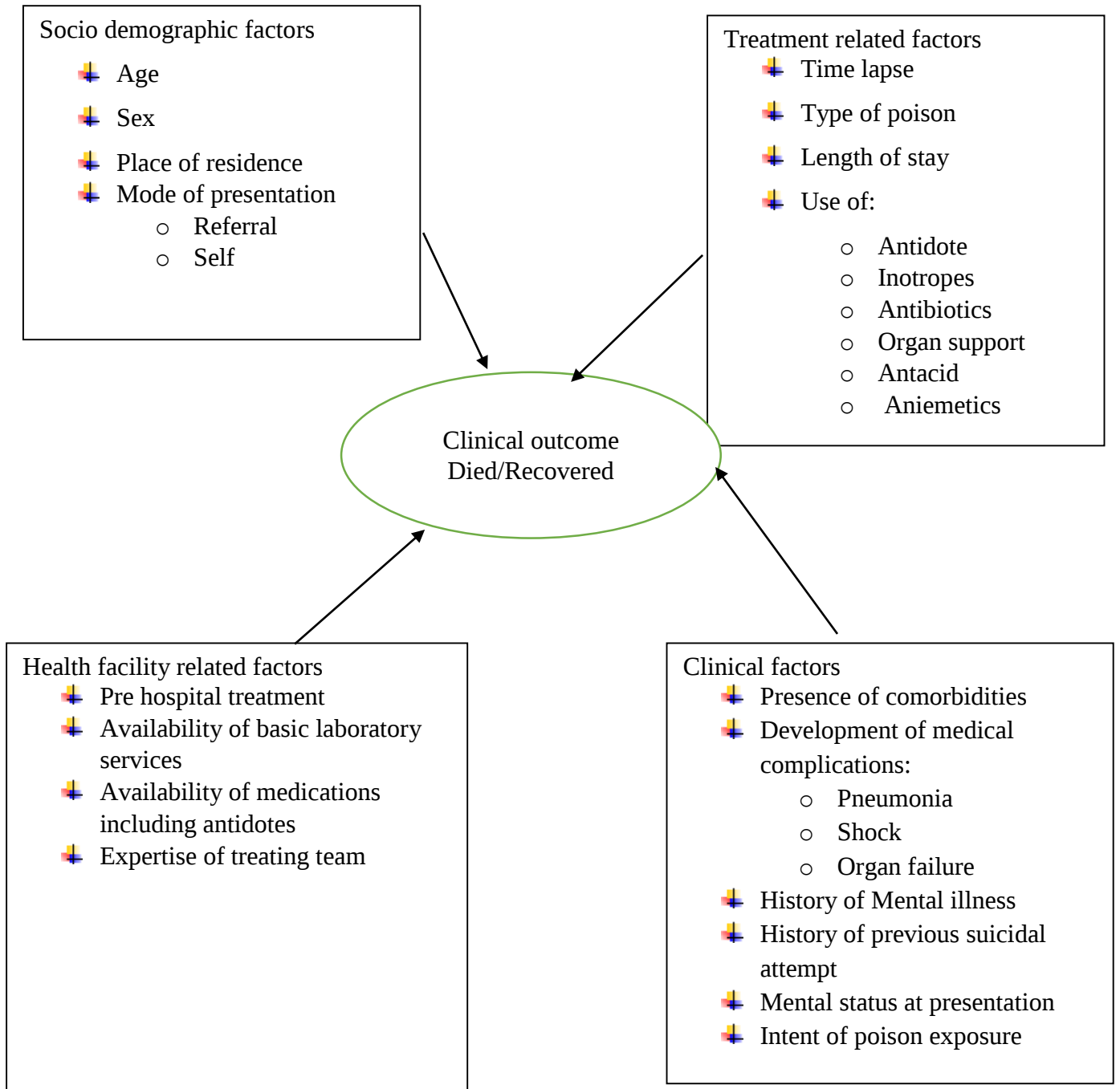


Figure 1: Schematic presentation of conceptual frame work developed by reviewing related literatures (3, 5, 8, 18, 23).

3. OBJECTIVES

3.1. General Objectives

- ✚ To assess the Clinical outcomes and associated factors of acute poisoning among patients admitted to Hawassa University Comprehensive specialized Hospital, Sidama Regional State, Ethiopia from December 2018 to December 2023.

3.2. Specific objective

- ✚ To determine the clinical outcomes of acute poisoning cases admitted at HUCSH
- ✚ To identify associated factors of clinical outcomes with acute poisoning cases admitted at HUCSH

4. METHODS AND MATERIALS

4.1. Study area and period

This study were conducted at Hawassa city which is located on the shores of Lake Hawassa in the Great Rift Valley. It is the capital city of the Sidama Regional state and is situated approximately 273 kilometers (170 miles) south of Addis Ababa, capital city of Ethiopia. Hawassa is home to Hawassa University, a major university in the country with Hawassa University Comprehensive Specialized Hospital in it and serving for an estimated 20 million population in Sidama and neighboring regions including for people in the surrounding Oromia region with a bed capacity of 400 beds delivering specialty and sub-specialty services. Emergency service is one of the services, Emergency department is staffed with five specialists, fifteen residents, thirty eight nurses and twenty five interns with annual patient visit ranging from ten to thirteen thousands in the past five fiscal years as per data from Hospital Health management information system (HMIS). This study was conducted from December 2018 to December 2023 on patients admitted to Hawassa University Comprehensive Specialized Hospital Emergency Department with a diagnosis of acute poisoning.

4.2. Study design

Institutional based retrospective cross sectional study design was used

4.3. Population

4.3.1. Source population

The source population for the study were all acute poisoning cases who got admitted to Hawassa University Comprehensive Specialized Hospital (HUCSH) Adult Emergency Department (ED) in the study period (December 2018 to December 2023).

4.3.2. Study population

The study population for this study were all acute poisoning cases who were admitted to HUCSH, ED in the study period (December 2018 to December 2023) and fulfill inclusion criteria.

4.4. Inclusion and Exclusion criteria

4.4.1. Inclusion criteria

All acutely poisoned patients who were admitted to the adult emergency department during the study period (December 2018 to December 2023) had been included.

4.4.2. Exclusion criteria

Acute poisoning cases with incomplete information on the medical record were excluded, including those who left against medical advice or referred out as outcome cannot be determined.

4.5. Sample size

4.5.1. Sample size for objective one

The sample size were calculated using single population proportion formula, $n = (z (\alpha/2))^2 p (1-p)/d^2$, by considering the following assumptions: n= sample size, z = standard normal deviate set at 1.96 (for 95% confidence level), d = desired degree of accuracy (0.05) and p= proportion of mortality (17.6%) in a study conducted at Gondar Hospital(3).

$$n = \frac{Z^2 pq}{d^2} ;$$

$n = (1.96)^2 * 0.176 (0.824) / 0.05^2$: $n=222$ in consideration of non-respondent rate of 10%, the final sample size will be 242.

4.5.2. Sample size determination for objective two

The sample size determination for second objective that is identifying factors affecting mortality among patients with acute poisoning, calculated based on double population proportion formula using Epi info version 7.

Table1. Sample size determination to identify factors affecting mortality

No	Factors	CI	Power	AOR	Outcome in un-exposed (%)	Sample size	Non response rate	Design effect	Total sample size
1	Presence of comorbidities (3)	95%	80	2	40.5	99	10%	1.5	163
2	Length of Hospital stay(6)	95%	80	2	28.9	142	10%	1.5	234

Since calculated sample size for second objective is less than the sample size calculated for first objective, 242 taken as final sample. However, to maximize the reliability of the study, all study population that fulfilled the inclusion criteria admitted from December 2018 to December 2023 were included in this study. But the total number of patients admitted with acute poisoning during the study period were 227 for whom medical records were retrieved from the record room, each with a tracking number derived from the registration log book. However, six of the records revealed that the patient had left against doctor's orders, and nine of the documents were missing, leaving 212 medical data that could be used for the study.

4.6. Sampling technique and procedures

Since it was retrospective hospital based cross sectional study, all patients who were admitted with a diagnosis of acute poisoning to HUCSH adult Emergency department and met inclusion criteria during the study period (December 2018 to December 2023) are included in this study

4.7. Study Variables

4.7.1. Dependent variables

 Poisoning outcome (Death, Recovery)

4.7.2. Independent variables

- ✚ Socio demographic factor: age, sex and place of residence
- ✚ Medical complication on admission: Pneumonia, Shock and respiratory failure
- ✚ Medical condition: Presence of comorbid illness, Known history of psychiatric illness, Previous history of suicide attempt
- ✚ Treatments given: antidote, oxygen, mechanical ventilation support, IV fluids, antacids, antiemetics, antibiotics, hemodialysis, inotropes.

4.8. Data collection procedures (Instrument and personnel)

Medical record number of all patients presenting with acute poisoning to the hospital emergency Department from December 2018 to December 2023 was collected from log book. The case records then was retrieved from the record room with their Medical record number. Available records those who met inclusion criteria are included in the study. The data were collected using structured questionnaire which was adapted from previous study (3, 5, 6) and a panel of expert medical personals commented on it. We used a pen and data is filled from a medical record card review. The questionnaire is written in English and the data were collected by trained data collectors (year 1 residents). Collected data included socio demography, route and timing of exposure, type poison and incident, clinical features, preexisting medical conditions, therapeutic interventions and outcome. Data collectors were trained by the investigators who also had supervised the data collection process.

4.9. Data quality control and management

Before data collection, one of the measures that was undertaken is to ensure quality of data by giving training on data collection for the data collectors before the study. Data completeness were checked daily by the supervisor and investigator when receiving the questionnaire. Before data entry, in order to make data processing easier codes are given to each medical record and data entry format were prepared using kobo data collection toolbox software according to pre-coded questionnaires. During data entry, all collected data were entered into kobo data collection toolbox software and checked for double data verification. As part of training, the data collection tools were pretested in 5% of the total sample at other two Hospitals one in the city and other one from one of the referring hospital at 26 km distance before the actual data collection to check the questionnaire address the study variables, as well to check the extent at which questions understood

by the data collectors and to identify areas for modification and correction and there was minimal modification to the questionnaire. Before conducting analysis in SPSS software, data cleaning were done to check outliers, to check consistency and to verify the skip pattern were followed.

4.10. Operational definitions

Acute poisoning: It is an injury in which the toxic effects occur almost immediately after taking the poisoning agents, usually within hours from the time of exposure(2).

Treatment outcome of acute poisoning: The treatment outcome of acute poisoning were Recovered or died.

Death: Confirmed with absence in sign of life by clinicians and death certificate given

Recovery: Patient discharged from hospital with improvement or cured.

Time lapse: The time between poison exposure and the emergency visit(3).

Delayed presentation: poisoning cases presenting within two hours have better chance of getting decontamination treatment and those who present after two hours are considered as delayed.

4.11. Data Analysis

The collected data were cleaned, transferred to excel then exported to SPSS version 25 for analysis. The main outcome in this study is mortality rate and its contributing factors. Descriptive analysis were carried out using frequency distributions, central tendency and dispersion measures. Bivariate logistic regression were employed to see the association between independent variables and the outcomes of acute poisoning. P value <0.25 were considered as a cutoff point for candidate selection for multivariable logistic regression analysis to identify independent predictors of death from acute poisoning while accounting for confounding. Association with p- value of < 0.05 are considered to be statistically significant.

4.12. *Ethical Considerations*

The study was conducted after ethics approval was obtained from Hawassa University College of medicine and health science institutional review board (IRB), with the reference number **Ref. No: IRB/090/16** on date **12/03/2024**. Then letter of support was obtained from the college academic and clinical corporate directorate office to access medical records and data were collected with confidentiality by using anonymous data collection tool.

4.13. *Dissemination of the result*

Results will be disseminated to Hawassa University community through presentation and hard copy. In addition it will be presented to Sidama regional health bureau through hard copy. An effort shall be made to publish the information in reputable journal.

5. Result

5.1.Socio-demographic characteristics of patients

This study retrospectively analyzed 212 cases of acute poisoning; of these, 110 (51.9%) were male; the median age of patients with acute poisoning was 22 years standard deviation of 8.2 years and with a range of 60 years; the highest proportion of patients 102(48.1%) were young adults (20–25 years of age); more than half of the patients 136 (64.2%) were urban dwellers; and the majority of patients 131(61.8%) presented to Hawassa University Comprehensive Specialized Hospital via self-referral mode as described in [table 2](#).

Table 2: Socio-demographic characteristics of patients with acute poisoning at HUCMHS_ Comprehensive Specialized Hospital, 2024 (n = 212).

Variable	Category	Frequency	percent
Sex	Female	102	48.1
	Male	110	51.9
Age in years	15-19 years	53	25.0
	20-25 years	102	48.1
	>26	57	26.9
Residency area	Rural	76	35.8
	Urban	136	64.2
Mode of presentation	Referral	81	38.2
	Self -referred	131	61.8

5.2.Intent of exposure

When the intent and mode of acute poisoning exposure are taken into account, 176 (83%) of the patients in this study intentionally exposed to acute poisoning, whereas 36 (17%) cases were exposed by accident. The most typical exposure route, accounting for 183(86.3%) of cases, is oral, snake bite 24/11.3% and inhalation of CO accounts for 5(2.4%). The most frequent causes of acute poisoning among individuals intending to intentionally injure themselves were family conflicts (60.2%), which include arguments or fights between spouses, siblings, parents, and children, along with suicide attempts (31.8%). And the overall contribution is described in [figure 2](#)

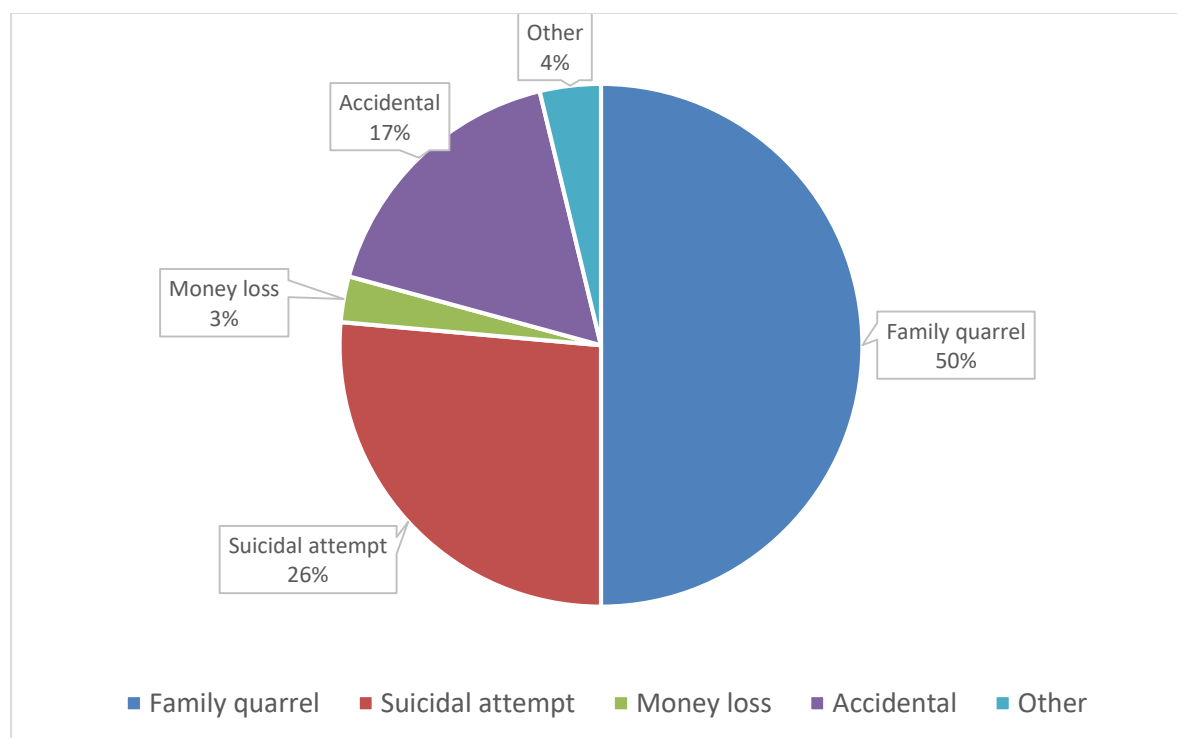


Figure 2: causes of acute poisoning at HUCSH, 2024 (n=212)

5.3. Poisoning agents and intent

Organophosphates were the most common poisoning agent identified in this study, accounting for 66 (31.1%). Other common poisoning agents included bleach and detergents 52(24.4%), rodenticides 24 (11.3%), snake bites 24 (11.3%), various pharmacological agents 20 (11.4%), others 11(5.1%), anticonvulsants 7(3.3%), carbon monoxide poisoning 5(2.4%) and amitriptyline 3 (1.4%). However, the distribution of the causal chemicals varied depending on the poisoning scenario. Organophosphates accounted for 22 (39.3%) of the instances of suicidal attempt, with rodenticides 9(16%), detergents and bleach 8(14.3%), various pharmaceutical agents 7(12.5%), anticonvulsants 4(7.1%), amitriptyline, and other substances 3(5.3%). In contrast, it was discovered that among the unintentional/accidental cases, snake bites accounted for 24 (66.7%) of the cases, with organophosphate and CO poisoning coming in second and third, respectively, with 7 (19.9%) and 5 (19.4%) occurrences as described in [Table 3](#).

Table 3: Causative agents and circumstance of poisoning exposure at HUCSH, 2024 n=212

Variable /Poisoning agent	Category/ Circumstance of poisoning	Frequency	Percent
Organophosphate (n=66)	Family quarrel	35	53
	Suicide attempt	21	31.8
	Money/ property loss	7	10.6
	Other(low score in exam--)	3	4.6
Bleach and detergents(n=52)	Family quarrel	41	78.8
	Suicide attempt	7	13.5
	Money/ property loss	1	1.9
	Other(low score in exam--)	3	5.8
Rodenticides(n=24)	Family quarrel	15	62.5
	Suicide attempt	9	37.5
Snake bite(n=24)	Accident	24	100
Different Pharmacological agents(n=20)	Family quarrel	7	35
	Suicide attempt	6	30
	Accident	7	35
Anticonvulsants(n=7)	Family quarrel	3	42.9
	Suicide attempt	4	57.1
CO poisoning(n=5)	Accident	5	100
Amitriptyline(n=3)	Suicide attempt	3	100
Unknown(n=11)	Family quarrel	8	72.7
	Suicide attempt	3	28.3

5.4. PATIENTS' CLINICAL CHARACTERISTICS AND TREATMENTS GIVEN

As regards to the clinical characteristics of the patients, only 30 (14.2%) patients had comorbidities of which mental illness accounts for 25(11.8%), Cardiovascular and diabetes mellitus 2 (1%) and hypertension and renal diseases3 (1.4%). In this study 13(6.1%) of the poisoning cases had a history of previous suicidal attempts. And most of the patients in this study has a delayed presentation to our hospital 120(56.6%) presented after two hours of poisoning and majority of them 129(60.8%) stayed for twenty four hours or less. While all patients received IV fluid in their presentation to the ED about 173(81.4%) of patients received antacid as described in [table 4](#). Among patients included in this study 50(23.6%) of them has medical complication in their stay at our hospital of which pneumonia being the most common complication which is clinically plausible as such patients are at increased risk if aspiration pneumonia specially for the oral route of poisoning see [table 5](#).

Table 4: Treatment given during course of hospitalization for acute poisoning patients at HUCSH, 2024(n = 212).

Treatment type/Variable	Category	Frequency	Percent
IV fluid	Yes	212	100
	No	-	-
Antidote	Yes	71	33.5
	No	141	66.5
Antacid	Yes	173	81.6
	No	39	18.4
Antiemetic	Yes	83	39.2
	No	129	60.8
Antibiotics	Yes	47	22.2
	No	165	77.8
Inotropes	Yes	13	6.1
	No	199	93.9
Mechanical ventilator support	Yes	8	3.8
	No	204	96.2

Table 5: Complications and complications types among patients treated for acute poisoning cases at HUCSH, 2024 (n=212)

Complications and type of complications	Category	Frequency	Percent
Complications(n=50)	Yes	50	23.6
	No	162	76.4
Pneumonia(n=50)	Yes	42	84
	No	8	16
Respiratory failure (n=50)	Yes	10	20
	No	40	80
Hypotension(n=50)	Yes	16	32
	No	34	68
Abscess (n=50)	Yes	1	2
	No	49	98
Cellulitis(n=50)	Yes	1	2
	No	49	98
Multiple organ failure including Acute Kidney injury(n=50)	Yes	2	4
	No	48	96
Coagulopathy(n=50)	Yes	2	4
	No	48	96

5.5. Associated factors and out come

From a total of 212 poisoning cases 192 (90.6%) patients recovered and were discharged to home, and the remaining 20(9.4%) of patients at (95% CI: 6.2%, 14.2%) were died. Among the 20 deaths reported, organophosphate represents the highest percentage 17 (85%) and the other death were due to CO poisoning, rodenticide and snakebite 1(5%) each.

In binary logistic regression, age, sex, residency area, presence of comorbidities, duration of presentation, presence of medical complication and total duration of hospital stay were statistically significant at a value of p of 0.25 and less. The result of the multivariable logistic regression analysis showed that the independent factors associated with death were hospital stay more than two days [AOR: **1.009(.00, .18)**]; p value of: **.002**] as described in [table 6](#).

Table 6: multivariable logistic regression analysis of factors associated with negative outcome of acute poisoning cases at Hawassa University Comprehensive specialized hospital (n=212).

Variables	Categories	Out come		COR(95% CI)	AOR (95% CI)	P value
		Death	Recovered			
Sex	Male	14	96	2.33(.86,6.32)	1.95(.43,8.87)	.39
	Female	6	96	-		
Age in years	15-19	1	52	-		
	20-25	9	93	5.03(.62,40.83)	6.51(.40,105.75)	.18
	>26	10	47	11.06(1.36,89.73)	15.46(1.02,23.27)	.048
Area of residency	Rural	12	64	3.00(1.16,7.70)	1.35(.05,2.47)	.295
	Urban	8	128			
Presence of comorbidities	Yes	1	30	.29(.04,2.30)	.94(.01,1.55)	.098
	No	19	163	-		
Presence of complications	Yes	14	36	10.11(3.63,28.11)	49.2(18.78,128.48)	.001
	No	6	156	-		
Duration of presentation	< 2 hours	5	88	-		
	> 2 hours	15	104	2.53(.89,7.26)	3.50(.68,17.89)	.13
Length of stay in the hospital	< 2 days	13	135	-		
	> 2 days	7	57	1.27(.48,3.36)	1.009(.00,.18)	.002
Circumstance of poisoning	Intentional	18	158	1.94(0.43,8.74)	2.30(.34,15.75)	.40
	Unintentional	2	34			

6. Discussion

In this study, most patients with acute poisoning were young adults (20–25 years). This result was congruent with the studies conducted in Ethiopia (3, 18), Kenya (12), and India (14,19). Young adults' susceptibility to stressful life circumstances, such as unemployment, marital issues, disappointment in love, work, or exams, incapacity to live up to parental expectations, and immaturity to handle those life hurdles, may be a plausible explanation for the high rate of poisoning among this demographic group. Which makes them more prone for suicidal attempt.

The gender distribution of acute poisoning in the current study revealed male preponderance. This finding appears to be matching with other studies conducted at a tertiary hospital in Eastern part of Ethiopia (23) and china (8). The higher proportion of men being acutely poisoned might be related to more exposure of males to occupational hazards, stress and accessibility of some chemicals (insecticides) is for the male as they are spending their time on outside jobs and the area is also area of cash crops like “ckat” for which a lot of poisonous chemicals are used. And Organophosphates were the most common poisoning agent identified in this study, accounting for 66 (31.1%), which the most widely used chemical as an insecticide yet again this chemical was the most common agent identified in other studies within our country, Gondar(3), Metu(22), Harar (23) and in one African country study, Kenya(12). However there are studies that show rodenticides to be the most common agent of acute poisoning still in these studies organophosphates (pesticides) were the second most common agents Debreabor (18) and Egypt (15). In contrast, in study conducted in Addis Ababa, Ethiopia (4) and Nigeria (10, 16) household chemicals were the commonest agents used for poisoning, and in China (8), North India (17) and other Indian study in a tertiary hospital (14) drugs were the commonest. Organophosphates are perhaps used for self-poisoning in this study for a number of reasons, including easy availability, less regulation surrounding the purchase and use of pesticides, and increased access to pesticides as a result of the widespread use of pesticides in our nation's agricultural industry.

The oral route is the most common route of exposure to poisoning agents encountered in this study 183 (86.3%). This was similar to other studies conducted in Nekemte (5), Jimma (7) and Gondar (3) Ethiopia, North India (17) and Egypt (15). This is illuminated by a specific poisoning agent and available formulation related to the agent. Inhalation accounts for 5 (2.4%) cases of carbon

monoxide poisoning in this study and snake bite was second most common cause for acute poisoning 24(11.3%).

In this study, 9.4% (95% CI: 6.2%, 14.2%) of the participants are died, which is comparable to the studies conducted in Debreabor 18.6% (18) and Gondar (17.6%)(3) Ethiopia and South India 13.6% (19) as reflected with intersection of CI with these studies. On the contrary of this study, a study conducted in Ambo Ethiopia (6) was 1.5%, and a study conducted in Metu (22) was found to be 27.6%. This may be the result of a poisoning that occurs in the home, early and simple access to medical services, and generally good facility setup and the proximity to major city for the access of medical care and the specific poisoning agents.

The majority of cases in this study are organophosphate poisoning, which can be fatal even at low doses. Another possible explanation for the study's relatively higher death rate is the decrement of an antidote function if patients present late as the natural course of aging (irreversible binding of organophosphate to acetyl choline receptor for which a specific antidote (Pralidoxime) is not available in our country the Ethiopian pharmaceutical service hence government hospitals lack this specific antidote, as evidenced with other studies in India. However the fatality rate in this study was relatively lower than studies done at Gondar University, South East India and Debreabor Hospital in which majority of deaths in these studies were Aluminum Phosphide which is almost fatal in all cases of poisoning even at smaller dose.

According to this study the median duration of hospital stay for these patients was 2.44 days. This was in congruence with the results of a similar study in Iran and India. The mortality rate depends on many factors like type of poison consumed, its dose, and time of presentation to the hospital after consumption of poison, length of hospital stay, age of patients and the presence of complications.

The mortality rate from poisoning in this study is 20(9.4%), the most common cause of death was organophosphate 17(85%) followed by rodenticide, CO poisoning and snake bite 3(15%) each accounting for one death this mortality rate is significantly high compared to similar studies done in Ambo Ethiopia (6) but it's also relatively lower than other study results though it has significant intersection with studies done at Debreabor(18) and Gondar(3) .

7. Limitations and strength of the study

The strength of the study

The researchers consider this as a starting point for supplementary research and the catchment area of our hospital is also large which makes this study plausible to understand the burden and other issues of poisoning at least at facility level.

Limitations of the study

The results might not accurately reflect the topic facing the entire public because they are based solely on data from single hospital. Moreover, the study could not account for the outcomes of patients who were discharged against medical advice or referred and the very nature of the retrospective design hinders follow up of actual spectrum and generalizability and it was difficult to have some elements of socio demographic characteristics from medical records (marital status and educational status).

8. Conclusion

Patients with acute poisoning had a high fatality rate in poisoning cases. A longer hospital stay of more than 48 hours, the presence of medical complications after admission and in patients who are more than 26 years were found to be associated with death.

9. Recommendation

- ✚ This study showed young adults to be vulnerable to acute poisoning exposure either from family quarrel or suicidal attempts which makes the working segment of community at risk and it's imperative to work on the mental health of the community from the regional health bureau.
- ✚ Strict control of poisonous chemicals will have its own contribution in reducing poisonous exposure and it's an obligation of every stakeholders to reinforce proper chemical control and usage.
- ✚ Hospital should be ready at any time with the necessary drugs including antidotes as a mortality from acute poisoning is high.
- ✚ Other studies should be conducted to assess the risk factors of the increased burden of poisoning and associated factors of clinical outcomes in acute poisoning.
- ✚ Regional health bureaus (RHB) and public health emergency management (PHEM) offices should work on preventive strategies of acute poisoning.
- ✚ Early management and prevention of complication for hospitalized patients with acute poisoning is advisable for a better outcome.
- ✚ Including important antidotes and anti-venoms as essential drug list and informing the Ethiopian Pharmaceutical supply service
- ✚ Establishing regional/national call center for poison

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11. Annex

11.1. CHECK LIST

Check list to collect data for the retrospective analysis of Clinical outcomes and associated factors of acute poisoning among patients admitted to Hawassa University Comprehensive specialized Hospital Emergency Department from December 2018 to December 2023, Hawassa, Ethiopia.

s.no	The study variables	Response	Remark
	ID	_____.	
1. Socio-demography of the participants			
1.1.	Sex	1. Male 2. Female	
1.2.	Age	_____.	
1.3.	Area of residency	1. Urban 2. Rural	
1.4.	Mode of presentation	1. Referral 2. Self-referred	
2. History of acute poisoning who attended Emergency Department			
2.1.	Duration of presentation in hour or days	_____	
2.2.	Length of hospital stay in days	_____	
2.3.	Presence of chronic medical condition	1. Yes 2. NO	If no skip to Q.No.2.5
2.4.	Types of chronic medical condition	1. Mental illness 2. Malignancy 3. Diabetes Mellitus 4. Cardio vascular disease 5. Asthma 6. Others (specify)____	
2.5.	Circumstance of poisoning	1. Intentional 2. Accidental 3. Other(specify)_____	If not intentional skip to 2.8

2.6.	If intentional what is the reason?	1. Suicide 2. Family quarrel 3. Money loss 4. Other _____	
2.7.	If suicide was there previous attempt	1. Yes 2. No	
2.8.	Type of poisoning agents	_____	
2.9.	The types of treatments given	1. IV fluid 2. Antidote 3. Antacid 4. Antiemetics 5. Inotropes 6. Antibiotics 7. Mechanical ventilator support 8. Hemodialysis	
2.10.	Is there complications?	1. Yes 2. No	If no skip to 2.12
2.11.	If Complications	1. Pneumonia 2. Atelectasis 3. DVT 4. PTE 5. Other (specify)_____	
2.12.	Patients outcomes	1. Recovered 2. Death 3. Referred 4. Went against medical advice	
2.13.	If death, in which unit the patient was died?	1. ED 2. ICU 3. Medical ward 4. Other -----	

