

PROFILE AND OUTCOME OF ACUTE POISONING CASES:
A RETROSPECTIVE ANALYSIS

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Abstract

Background: In areas where pesticides, medications, household chemicals, and other hazardous substances are easily available, acute poisoning is a significant cause of ER visits, hospital admissions, morbidity, and mortality. Demographic, social, environmental, and healthcare-related factors all influence the epidemiological features and clinical results of poisoning. The demographic profile, clinical complications, treatment needs, hospitalization, and results of acute poisoning cases were all assessed in this study.

Methods: Using routinely accessible hospital data of patients with acute poisoning diagnoses, a retrospective observational analysis was carried out. A structured data collecting strategy was used to obtain information on age, sex, kind and intent of poisoning, exposure route and timing, clinical symptoms, complications, treatment approaches, critical care needs, length of hospital stay, and final clinical outcomes. The results were analyzed in conjunction with data from published hospital based research and a comprehensive analysis of the consequences of acute poisoning.

Results: According to the reviewed data, young and middle-aged adults were more likely to suffer from acute poisoning, and a significant percentage of these patients were male. The greatest age groups in a four-year hospital-based dataset of 4,435 cases were 21-30 years (41.6%) and 10-20 years (39.1%), with males accounting for 58.7% of cases and rural inhabitants for 55.4%. The most common reported situation was suicidal poisoning (54.5%), which was followed by accidental poisoning (2.2%) and homicidal/stupefying poisoning (43.3%). Reliable chemicals, organophosphate compounds, sedatives, rodenticides, and caustic materials were among the often encountered dangerous agents. Pneumonia (15.2%), intermediate syndrome (9.25%), tracheostomy (5.94%), and nosocomial infection (5.88%) were the main consequences, indicating severe clinical morbidity.

Conclusion: With a high frequency of purposeful exposure, serious respiratory problems, the need for urgent care, and inconsistent clinical results, acute poisoning constitutes a significant and diverse clinical and public health burden. Males, young adults, and people from rural or agricultural areas seem to be significant high-risk categories. Reducing complications and death requires early detection, quick hospital presentation, standardized emergency response, suitable breathing support, and prompt intensive-care referral.

Introduction

Acute poisoning is a serious public health issue and a common reason for admission to the hospital and visits to the emergency department globally. Epidemiological profile of poisonings is very different between countries and regions, depends on the availability of toxic substances, socioeconomic status, occupation, culture and healthcare services. Poisoning, especially pesticide poisoning, has been identified by the World Health Organization (WHO) as an important cause of morbidity and mortality, and is a significant problem in developing countries (WHO, 2020). Poisoning hospital-based studies also have revealed a significant difference in the incidence, demographic profile, kinds of poisonous materials, clinical features, and outcomes of poisoning cases (Salem et al., 2024; Woyessa & Palanichamy, 2020).

What type of poisoning a hospital experience will closely parallel the toxic substances found and used in the community surrounding it. Many pesticides, organophosphate compounds, household chemicals, drugs and other agricultural and industrial chemicals can cause poisoning. Pesticides are significant in the context of agricultural communities due to their broad availability and accessibility. One of the major types of pesticides commonly encountered is organophosphorus compounds which are also an important cause of acute poisoning needing emergency and intensive care management (Roberts & Aaron, 2007; Sungur & Güven, 2001). A prior study revealed that clinical characteristics of poisoning patients are age and sex-dependent, which depends on the geographical location, poison type and exposure circumstances (Prashar & Ramesh, 2018).

Another significant factor of acute poisoning is intentional self-poisoning. The availability of

pesticides and other toxic agents could make their use in deliberate self-harm more readily possible, especially in rural and/or agricultural communities. The intentional and suicide poisoning rates have been variously reported in the different hospitals settings, but the rate of the intentional or suicide poisoning has been found to be high (Madhavan et al., 2015; Thakur & Gurbani, 2017). A systematic review of organophosphate poisoning showed that intentional poisoning was commonly reported and highlighted the importance of epidemiology features of poisoning depending on the population and geographical context (Alva et al., 2025). So, a case-specific evaluation of the situation and the purpose of the poisoning will be necessary to understand the epidemiology of the problem and formulate an appropriate prevention strategy.

Organophosphate poisoning is clinically significant because it can cause significant and life-threatening effects. Cholinergic activity is increased by acetylcholinesterase inhibitors and leads to effects on the respiratory, cardiovascular, gastrointestinal and nervous systems. Symptoms include vomiting, heavy secretions, sweating, fasciculations, drowsiness, difficulty breathing, and changes in the heart and blood vessels. The severe cases may lead to respiratory failure and sometimes require endotracheal intubation and mechanical ventilation (Pappano, 2018; Pope et al., 2005). The severity of poisonings can also be estimated by clinical scoring systems like Peradeniya Organophosphorus Poisoning (POP) scale which has been explored as a clinico-prognostic tool for clinical outcomes (Dubey et al., 2016; Kamath & Gautam, 2021). The severity of the acute poisoning will depend on a variety of factors such as the nature and quantity of the poison, the route of ingestion, whether the poisoning was intentional or not,

the grade of the poisoning at presentation, how long after exposure until presentation to hospital, and the availability of suitable emergency and intensive care. Presentation may be delayed, leading to the progression of toxicity, the development of complications, prolonged hospitalisation and death. The mean time to hospital admission in a systematic review of 28,593 patients with OP poisoning was around 6 hours, and a significant percentage of the patients had developed complications and mechanical ventilation (Alva et al., 2025). Likewise, retrospective and cohort studies have shown that high degrees of poisoning can lead to complications such as respiratory issues, long hospitalizations and deaths (Goncharov et al., 2023; Sarailoo et al., 2022).

Although there are hospital-based studies of the profile and outcome of acute poisoning, these may vary significantly between different hospitals and different geographic regions. There may be differences in the nature of the poisonous agent, sociodemographic factors, the purpose of the poisoning, severity of symptoms, treatment options, and referral arrangements which affect the results that are seen. Hospital-based studies have highlighted the need for assessment of demographic factors, poisoning agent, clinical presentation, complications, length of hospital stay and outcome to gain insight into the burden of poisoning in the area (Raghu et al., 2015; Mathew et al., 2019).

For these reasons a retrospective analysis of all acute poisoning cases that presented to hospital was conducted to determine the profile and outcome of these cases. The study will focus on demographic characteristics of patients, type of poisoning, circumstances/exposure intent, clinical complications, management needs, hospital stays and treatment results. A knowledge of these characteristics would be useful evidence of the local epidemiological pattern of acute poisoning and can help healthcare professionals and public policy makers access the early diagnosis, emergency management, prevention and reducing adverse outcomes including mortality.

Materials and Methods

Study Design and Setting

Retrospective observational study designed to determine the demographic profile, clinical profile, course of poisoning, complications, poisoning treatment needs and outcomes in patients presenting with acute poisoning. This study utilized routinely available hospital records of patients evaluated and treated for acute poisoning for the study period. In the past, there have been hospital-based studies on poisoning outcomes using a retrospective design that examined patient characteristics, clinical presentation, complications, length of stay in the hospital, and mortality (Mehrpour et al., 2018; Chuang et al., 2018; Chien et al., 2012).

Study Population and Selection Criteria

The study group consisted of patients who were admitted to the hospital with known acute poisoning diagnosis or history during the study period. Individuals of both sexes and of eligible age who needed assessment and/or treatment in the ED, in-patient department or intensive care unit were eligible. Patients were added if there was enough demographic, clinical, treatment and outcome data in their records. Patients who were treated entirely on an outpatient basis, patients who had no sufficient information to confirm the diagnosis of acute poisoning, and records that lacked sufficient information about the major study variables were not included. Chronic or long-term toxic exposure was also excluded as it was not a toxic reaction in acute poisoning. In past poisoning studies, hospitalized patients with a known history of poisoning were also selected, and incomplete demographic and clinical data as well as chronic exposures were excluded.

Data Collection

Hospital records were reviewed, and data were extracted using a structured data collection format, which was done in retrospect. Variables were chosen based on those typically included in previous poisoning studies. Data gathered included demographic data (age and sex), characteristic data (type of poison, circumstances or intentions of poisoning), clinical data, complication data, treatment and

supportive intervention data, length of hospitalization, and final outcome data. The supporting systematic review was conducted with a similar structured extraction process with various characteristics of the studies included (i.e. study characteristics, sample size, age of participants, sex, cause of poisoning, length of hospitalization, complications, outcome, and comorbidities).

Assessment of Poisoning Characteristics

The medical documentation available was used to document the type and circumstances of the poisoning. The circumstances of the exposure were divided into the following categories: accidental, intentional/suicidal, and unknown, when the available documentation allowed such classification, and the type of poison was classified as the documented poison or "other. Information about the route of exposure, if available, and the time lapse between the occurrence of poisoning and hospital presentation was also documented. In previous studies, similar classifications have been used to describe poisonings and have shown that the cause of poisoning is accidental, suicidal, intentional, and unknown in the hospital setting.

Clinical Characteristics and Complications

Medical records were used to obtain clinical manifestations recorded at admission and during hospitalization. These encompassed gastrointestinal, respiratory, neurological, cardiovascular and other clinically relevant manifestations. Other complications arising during hospital stay were recorded. If present, serious complications (respiratory failure, pneumonia, seizures, intermediate syndrome, acute kidney injury, sepsis, and multiorgan dysfunction) were documented. Some major complications observed in previous acute poisoning studies include pneumonia, intermediate syndrome, and respiratory failure, intubation, and mechanical ventilation, especially in severe poisoning cases (Alva et al., 2025; Kamath & Gautam, 2021).

Treatment and Hospitalization

Data on treatment and supportive care was retrieved from the medical record. Treatments

involved decontamination or gastric lavage, antidotal therapy, IV medications, O₂, ET intubation, mechanical ventilation, admission to the ICU, hemodialysis, and any other supportive or surgical measures when available. Some treatments reported previously to patients with poisoning include decontamination, gastric lavage, atropine, oximes, mechanical ventilation, hemodialysis, and surgical intervention. Duration of hospitalization was measured in days from admission to discharge, death or transfer, as per hospital records available. Length of hospitalization was deemed to be an important outcome as this has been reported in patients with severe poisoning and complications.

Outcome Measures

The primary outcome was the final clinical outcome of the poisoning episode. Documented outcome was classified as recovered and discharged, referred/transferred, discharged against medical advice (if applicable), or death during hospitalization. Secondary outcomes were complications, admission to intensive care unit, need for endotracheal intubation/mechanical ventilation and hospital stay. Mortality was defined as an adverse outcome and recovery/discharge as a favorable outcome. In previous poisoning studies, similar outcome measures such as recovery, mortality, complications, mechanical ventilation and hospital stay were assessed.

Statistical Analysis

The data collected were processed into a computer database, and then, for consistency and completeness, they were reviewed before statistical analysis. Descriptive data for categorical variables (sex, type of poisoning, intent, complications, treatment interventions and final outcome) were displayed as frequencies and percentages.

Ethical Considerations

This study was based on retrospective hospital records and patient confidentiality was ensured throughout the study. The analytical dataset and report did not contain personal identifiers. The data were only used for research purposes,

and patient records were not accessible for people other than the authorized research team. The study was approved by the

appropriate institutional ethics committee as required for retrospective medical-record research.

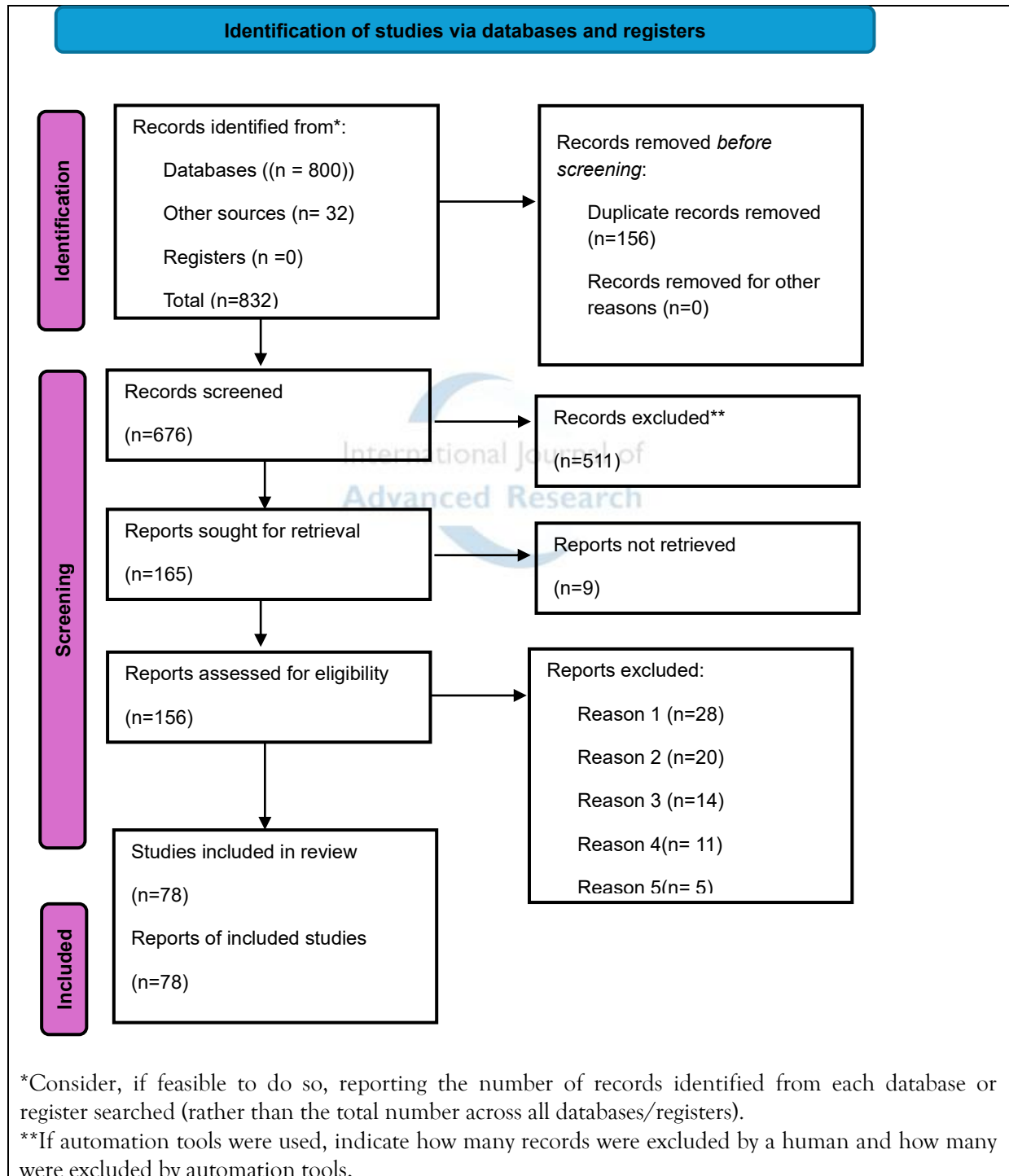


Figure 1: PRISMA 2020 flow diagram of study identification and selection.

Results**Demographic Characteristics of Acute Poisoning Cases**

Demographic Characteristics of Acute Poisoning Cases Acute poisoning was the most common type of poisoning across the reviewed evidence, and in several of the hospital based studies, the majority of patients were men and young adults. A total of 4,435 acute poisoning cases were reported in the four-year retrospective study by Bari et al. (2014). The average age of the patients was 24.8 years $\pm$ 12.6. The age group 21-30 years was the largest group, representing 1,844 (41.6%) cases, with age group 10-20 years being the second largest group, representing 1,736 (39.1%) cases. 445 (10.0%) patients were aged from 31-40 years and 410 (9.3%) were aged above 40 years. In terms of sex distribution, 2,604 (58.7%) of the patients had obtained poisonings, while 1,831 (41.3%) had obtained poisonings, with a ratio of 1.4:1 (male:female). There was also a predominance of males in most age groups. The largest age group of patients was 21-30 years with 1176 males (63.8%) and 668 females (36.2%). Similarly, among patients aged 10-20

years, 962 (55.4%) were male and 774 (44.6%) were female.

The majority of patients were from the rural areas (2455, 55.4%) followed by urban (1300, 29.3%) and semi-urban (680, 15.3%) patients. Among rural patients, 1,347 (54.9%) were male and 1,108 (45.1%) were female. The results of this study suggest that acute poisoning was more prevalent among young adults, among males and in the rural population within the hospital population surveyed. The pattern of younger and male patients predominating in several poisoned populations is corroborated by the findings of other studies included in the review. As an illustration, Prashar and Ramesh (2018) found 375 patients of pesticide poisoning, with a mean age of 31.65 $\pm$ 13.10 years, and 284 (75.7%) of them were male. Mehrpour et al (2018) assessed 267 patients admitted to an intensive care unit (ICU) with acute poisoning, with a median age of 42 years (IQR 31-52) and 183 (85.5%) male patients. However, despite the differences in age distribution among studies, young and middle-aged patients and males were significant subgroups of acute poisonings.

Table 1: Demographic characteristics of acute poisoning cases reported by Bari et al. (2014)

Characteristic	n	%
Total cases	4,435	100.0
Age group		
10-20 years	1,736	39.1
21-30 years	1,844	41.6
31-40 years	445	10.0
>40 years	410	9.3
Sex		
Male	2,604	58.7
Female	1,831	41.3
Residence		
Rural	2,455	55.4
Urban	1,300	29.3
Semi-urban	680	15.3

Complications of Acute Poisoning

The frequency-based analysis also showed that overall complications dominated, having 3,331 cases. The most common individual complication was pneumonia (506 patients);

intermediate syndrome, tracheostomy, and nosocomial infection were the second, third, and fourth most common individual complications, respectively, with 308 patients experiencing each of the following, respectively.

Intermediate syndrome was the second most common individual complication (308 patients), followed by tracheostomy (198 patients) and nosocomial infection (196 patients). Other, less common complications were seizures (33 cases), acute kidney injury (13 cases), acute kidney failure (sepsis and multiorgan dysfunction syndrome) (8 cases),

and creatinine > 5 mg/dL (6 cases). Pneumonia was the most common condition, at 15.2%, followed by intermediate syndrome at 9.25%, tracheostomy at 5.94%, nosocomial infection at 5.88%, seizures at 0.99%, acute kidney injury at 0.39%, sepsis with multiorgan dysfunction syndrome at 0.24%, and creatinine greater than 5 mg/dL at 0.18% (Figure 2).

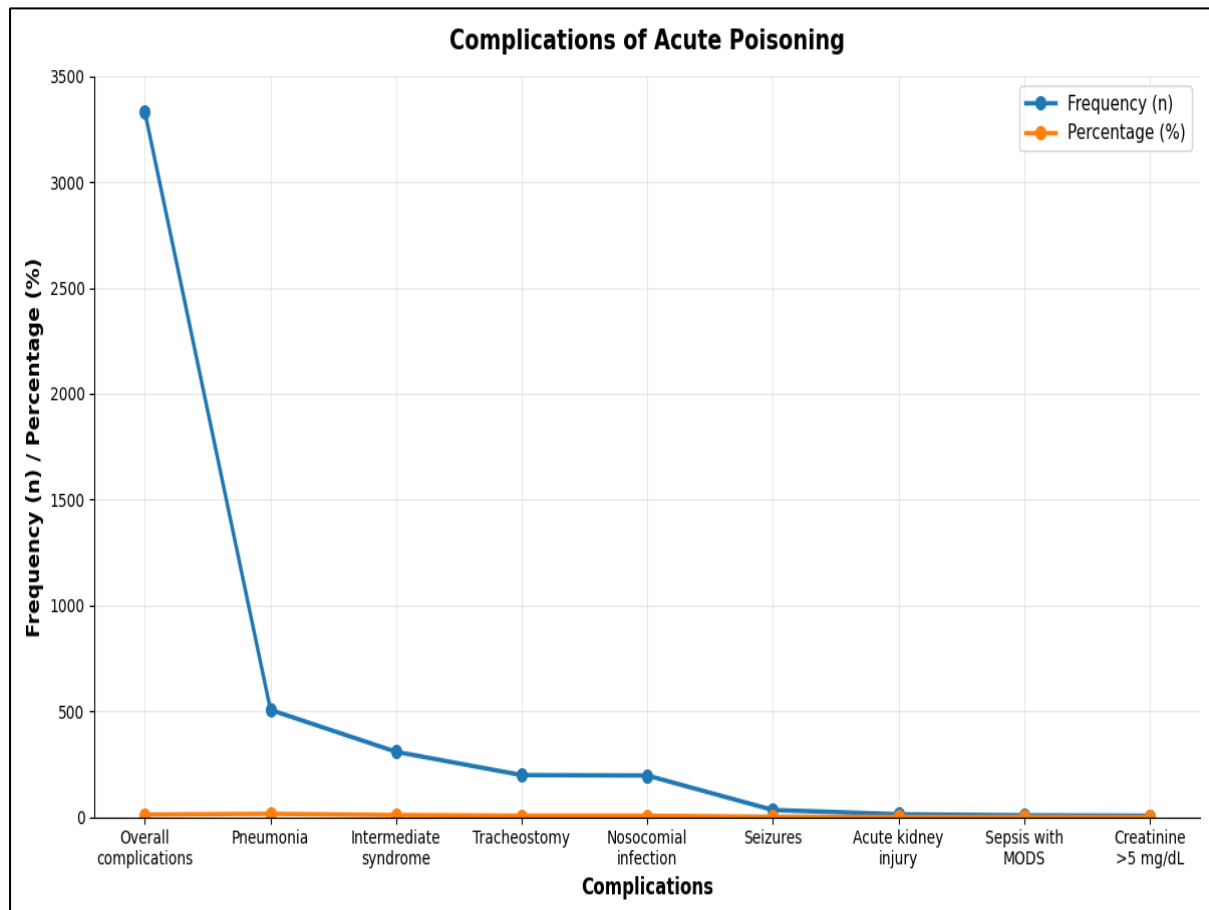


Figure 2: Complications of acute poisoning according to frequency and percentage.

Circumstances and Intent of Poisoning

The causes of poisoning showed suicidal poisoning to be the predominant motive for poisoning, accounting for 2419 (54.5%) of the 4435 acute poisoning cases reported by Bari et al. (2014). Homicidal/stupefying poisoning was the next most common cause with 1,919 cases (43.3%) and accidental poisoning accounted for 97 cases (2.2%). The distribution was thus

indicative of intentional poisoning as the primary mode of acute poisoning in the study population. Sex distribution was significantly different, with homicidal/stupefying poisoning occurring 67% of the time in males, and 33% of the time in females ($P < 0.001$). Suicidal poisoning, on the other hand, was slightly more common in female; females accounted for 50.7% of the suicides.

Table 2: Circumstances and intent of acute poisoning

Circumstance/intent	Frequency (n)	Percentage (%)
Suicidal	2,419	54.5
Homicidal/stupefying	1,919	43.3

Accidental	97	2.2
Total	4,435	100.0

Management and Treatment Received

Management and treatment received. There were multiple supportive and emergency interventions utilized in acute poisoning cases. Gastric lavage was reported in 177 patients (100.0%). A high proportion of patients (71.7%) were intubated and/or mechanically ventilated, highlighting the need for respiratory support for severely poisoned patients. Twelve

percent (124) of patients reported having hemodialysis and 3.3% (304) reported having a fracture of the lower leg and surgical intervention. These results confirm the use of a wide range of gastrointestinal decontamination procedures as well as more advanced treatment and critical care measures.

Table 3: Management and Treatment Received

Treatment / Management	Frequency (n)	Percentage (%)
Gastric lavage	177	100.0
Intubation / Mechanical ventilation	2,387	71.7
Hemodialysis	124	5.0
Lower-leg fracture/surgery	304	3.3

Factors Associated with Poor Outcome/Mortality

Poor Outcome/Mortality Factors Several important clinical indicators were identified by analysis of factors associated with poor outcome. The mean age reported was 42.22 ± 9.29 years and 20,127 (70.4%) of the reported patients were male. Of the patients in this study who provided this information, 794 (82.02%) were determined to be suicidal. The mean time until hospital admission was 5.97

hours ± 2.48 hours. There was a high incidence of complications (3,331; 11.6%) and of mechanical ventilation (2,387; 71.7%). Overall, the length of hospital stay was 7.07 ± 28.31 days. There were 6,732 (23.5%) patients reported for recovery and discharge, but overall mortality was 1,059 (3.7%). These results indicate that severe clinical complications, and mechanical ventilation were significant markers of poor clinical outcome (Figure 3).

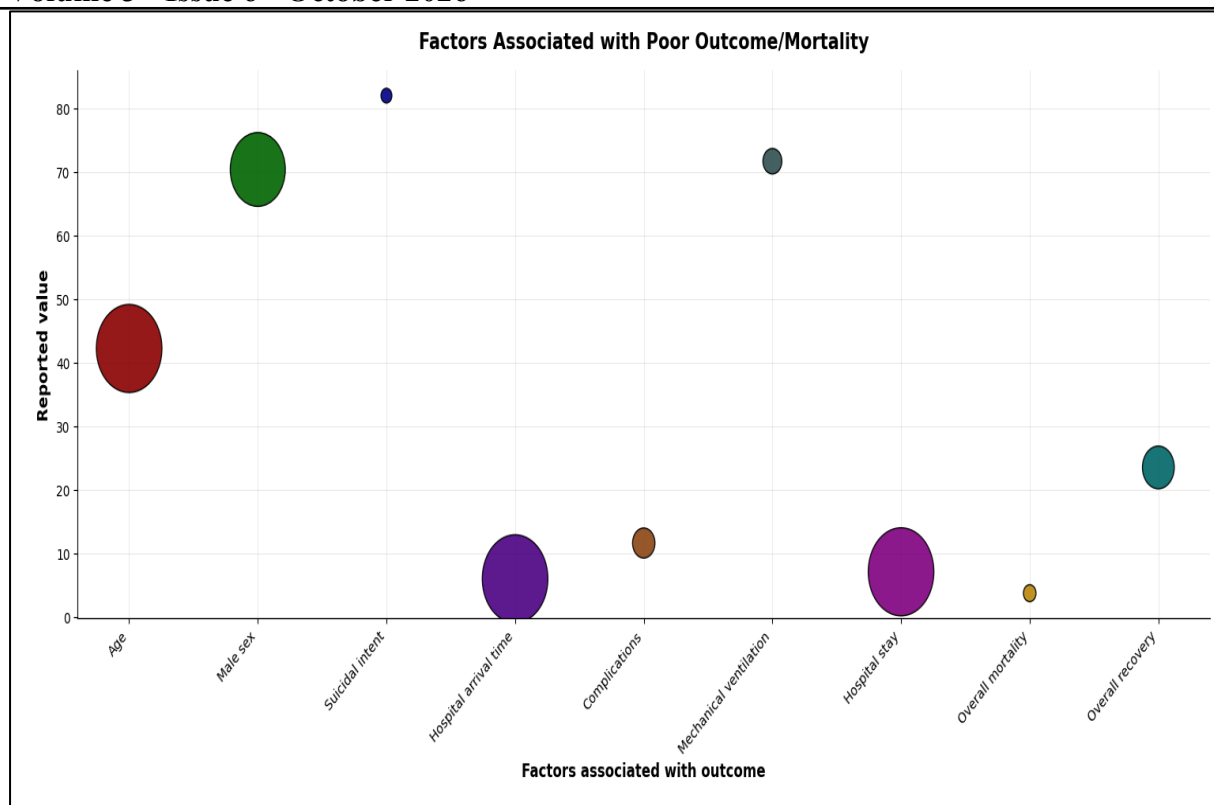


Figure 3: Factors associated with poor outcome/mortality in acute poisoning cases

Duration of Hospital Stay

The length of the hospital stay was highly variable across the studies included. The results of the systematic review indicated a mean hospital stay of 7.07 ± 28.31 days. Prashar and Ramesh (2018) found a mean stay of 6.50 ± 4.82 days, while the study conducted at Kasturba Medical College had a hospital stay from 1 to 63 days with a mean stay value of 11.9 days. Chuang et al. (2018) reported a

mean duration of 9.21 ± 11.60 days, while Chien et al. (2012) reported 5.50 ± 68.50 days. The mean hospital stay reported by the Adichunchingiri Medical College study was 11.195 ± 7.81 days. In one study, the period of duration was reported as median (interquartile range) of 19 (12.0–27.3) days. Overall, these results suggest significant differences in duration of hospitalization between patients with acute poisoning.

Table 4: Findings of Duration of Hospital Stay

Study / finding	Duration of hospital stay
Overall finding from the systematic review	7.07 ± 28.31 days
Prashar & Ramesh (2018)	6.50 ± 4.82 days
Kasturba Medical College study	1–63 days; average 11.9 days
Chuang et al. (2018)	9.21 ± 11.60 days
Chien et al. (2012)	5.50 ± 68.50 days
Adichunchingiri Medical College study	11.195 ± 7.81 days
Study reporting median	19 (12.0–27.3) days

Distribution of Acute Poisoning Cases According to Type of Poisoning

Distribution of Acute Poisoning Cases According to Type of Poisoning There was a wide variation in the distribution of acute

poisoning cases amongst the various kinds of poisoning. Commuter poisonings were the most common followed by organophosphate compounds. Sedatives were reported third most frequently followed by rodenticides,

corrosive agents and other poisoning agents. Smaller proportions of cases were alcohol, snakebite and Paracetamol/kerosene/petrol poisoning. In summary, the results suggest that

poisoning from the most easily available chemical and pharmaceutical substances was a significant component of all acute poisoning cases (Figure 4).

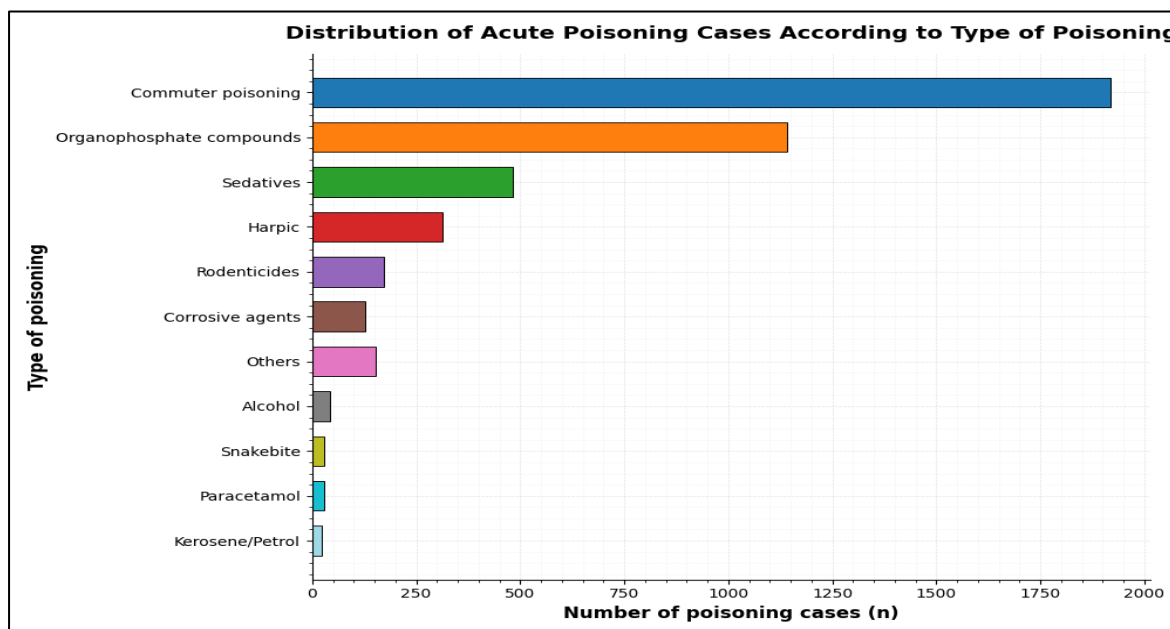


Figure 4: Distribution of acute poisoning cases according to type of poisoning.

Clinical Presentation and Complications of Acute Poisoning

The clinical presentation and complications of acute poisoning. There was significant morbidity for acute poisoning with a clinical presentation and complications. Overall complications were reported in 3331 cases, 2387 (71.7%) patients required intubation and mechanical ventilation. Out of the individual complications, 506 cases (15.2%) reported as pneumonia, 308 (9.25%) as intermediate syndrome, 198 (5.94%) as tracheostomy, and

196 (5.88%) as nosocomial infection. Increased bronchial secretions were seen in 90 cases and nausea and vomiting were reported in 166 cases. There were 33 (0.99%) cases of seizures, and 13 (0.39%) cases of acute kidney injury. Severe sepsis (multiorgan dysfunction syndrome) was seen in 8 (0.24%) patients and 6 (0.18%) patients had a creatinine greater than 5 mg/dl. When exploring overall clinical burden, the Cumulative Distribution showed that overall complications and mechanical ventilation contributed the most (Figure 5).

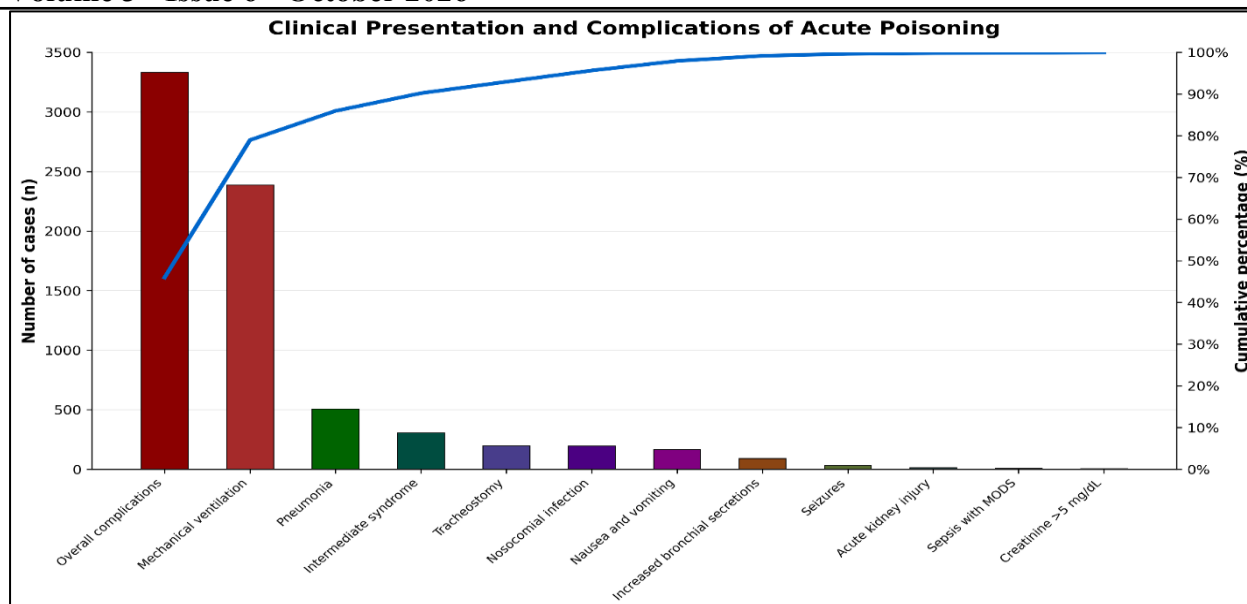


Figure 5: Clinical presentation and complications of acute poisoning.

Final clinical outcomes

Final clinical outcomes The disposition of patients in the final clinical outcome analysis was different. The largest portion of the patients with recovered/discharged conditions was 33.1%, with referred/transferred patients being 29.4% and discharged against medical advice being 20.6% (Figure 1). Death was the

second most frequent outcome, representing 16.9% of the plotted outcomes (Figure 5). These results suggest that, while recovery and discharge were the most substantial outcome category, referral, discharge against medical advice, and mortality also were significant clinical outcomes of acute poisonings.

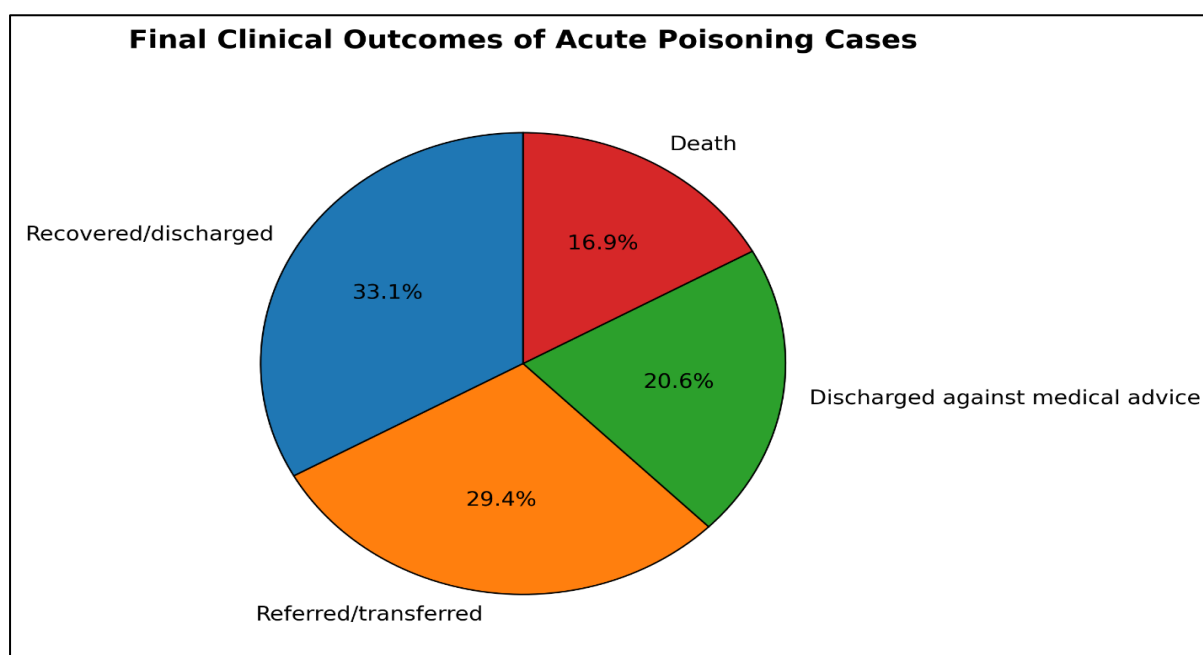


Figure 5: Final clinical outcomes of acute poisoning cases.

Discussion**Overall Pattern of Acute Poisoning**

The present review highlights the current importance of acute poisoning as a cause for emergency presentation and hospital admission, especially in low and middle income countries, where pesticides, pharmaceuticals, household chemicals and other toxic substances are readily available. The epidemiology of poisoning can differ significantly from one geographical region to another, from one occupation to another, from one toxic agent to another, and from one socio-economic to another and from one culture to another. Others have also found significant differences in the kind of poisons between different hospitals and regions, thus highlighting the need for local epidemiological surveillance for implementing preventive and emergency-care measures (Alva et al., 2025; Banerjee et al., 2012; Raghu et al., 2015; Kumar et al., 2010).

The findings of the present review are in accord with previous reports that the local pattern of poisoning is closely linked to the availability of a toxic agent, in particular when it is one that is readily available, such as chemicals and pharmaceuticals. Pesticides and organophosphorus compounds are often a significant part of poisoning incidents in agricultural settings, while pharmaceutical and domestic products may be more prevalent in urban settings (Eddleston et al., 2008; Mew et al., 2017).

Demographic Characteristics

This evidence was reviewed and it was noted that acute poisoning occurred especially in young and middle aged adults and that in some studies males predominated. Alva et al. (2025) conducted a systematic review, which showed a mean age of 42.22 ± 9.29 years; males comprised 70.4% of the participants. Likewise, Prashar and Ramesh (2018) have reported mean age of 31.65 ± 13.10 years and male predominance in the study of intensive care unit admission, whereas, Mehrpour et al. (2018) have reported on a median age of 42 years among the patients admitted to intensive care. The results indicated that the economically and socially active adults are an

important group of high risk for poisoning (Alva et al., 2025; Prashar & Ramesh, 2018; Mehrpour et al., 2018).

Male predominance could be due to occupational exposure to pesticides, especially in agricultural areas, and to differences in access to and handling toxic substances. Not all populations have the same sex patterns, however. Studies of deliberate self-poisoning have also shown high levels of female involvement, suggesting that social circumstances and the intention of poisoning may also impact the sex distribution observed. Further studies of deliberate self-poisoning have also found high levels of female involvement, which may indicate that social factors and intent of poisoning can influence the sex distribution observed (Smith, 2008; Khera, 2010).

Type and Intent of Poisoning

The distribution of the poisoning agents in the present review showed that the most frequently represented group were common and readily available toxic substances, followed by organophosphate compounds and sedative agents. This pattern is clinically significant as so would the different poisons, toxicological actions, clinical presentations, treatment, mortality would be different. This importance of organophosphate poisoning in the South Asian context is due to the large availability of agricultural pesticides and their being used for accidental and intentional poisoning (Ahmad et al., 2009; Eddleston & Chowdhury, 2016; Safdar et al., 2021).

The evidence reviewed included intentional poisoning as an important part. In some of the studies that were included into the previous systematic review, intentional poisoning was reported, and in the West Bengal study, suicidal intention was reported in 82.02% of patients. Similarly, other hospital-based studies have found suicidal poisoning to be a major reason for pesticide ingestion (Bhattacharjee et al., 2023; Chatterjee et al., 2020). Deliberate self-poisoning is also a significant public health issue in developing countries, as pesticides can be stored in the home or within agricultural working areas and may thus become easily accessible when there is a public health crisis

such as an emotional or social stress (Bose et al., 2009; Gunnell & Eddleston, 2003; Konradsen et al., 2003).

Clinical Presentation and Severity

The clinical information shows a significant number of severe poisonings. Common signs and symptoms for presentation included nausea and vomiting, bronchial manifestations, altered consciousness, and neurological complications, along with increased bronchial secretions. The common effects of organophosphate (OP) poisoning are due to an excess of cholinergic activity resulting from inhibition of acetylcholinesterase affecting the respiratory, gastrointestinal, cardiovascular and nervous systems (Al-Gefri & Gabali, 2021; Sinha et al., 2022).

A significant percentage of patients have required respiratory assistance, which further points to severely ill patients. Systematic evidence reviewed reported 2,387 (71.7%) patients needing mechanical ventilation. This is similar to the findings of other studies done in critically ill OP-poisoned patients where respiratory failure and a ventilatory requirement played a key role in the utilization of intensive care (Moon & Chun, 2014; Lee & Tai, 2001; Unnikrishnan & Shenoy, 2022).

Acute poisoning can lead to complications

Complications were an important aspect of clinical burden. In total, 3,331 (11.6%) patients reported overall complications. Most common individual complication was pneumonia (506; 15.2%), intermediate syndrome (308; 9.25%), tracheostomy (198; 5.94%) and nosocomial infection (196; 5.88%). The following complications were less common: seizures, acute kidney injury, sepsis with multiorgan dysfunction, and severe rises in creatinine. The results are similar to the earlier reports which indicated that respiratory complications and intermediate syndrome are the most common complications of severe organophosphate poisoning (Alva et al., 2025; Peter et al., 2010; Kamath & Gautam, 2021).

Pneumonia was especially seen in the present review. This could be due to aspiration, airway protection dysfunction, increased respiratory secretions, extended intubation or mechanical

ventilation. In a previous intensive care study, 78% of patients with poisoning had pneumonia and 22% had intermediate syndrome, indicating the significance of pneumonia in severe poisoning (Gonçalves et al., 2012). Neuromuscular weakness may occur following the acute cholinergic stage and result in long-term ventilatory support and tracheostomy (Balalimoud & Balali, 2008; Senanayake, 2003).

Management and Treatment

The management showed that treatment varied from gastrointestinal decontamination to intensive care treatment. In the pertinent study, all 177 patients had gastric lavage and 2,387 (71.7%) had intubation and mechanical ventilation. 124 (5.0%) had hemodialysis. In the previous literature, decontamination, atropine, oxime therapy, airway management and mechanical ventilation, and some extracorporeal interventions are also listed as elements of poisoning management (Aman et al., 2021; Eddleston et al., 2008; Roberts & Aaron, 2007).

The slightly longer length of hospital stay in some studies could be attributed to respiratory complications, intermediate syndrome, the need for prolonged ventilatory support and secondary infections. The Adichunchingiri study, for instance, found that the mean hospital stay was 11.195 ± 7.81 days, and that patients with ventilator dependence for a long period of time had a higher mortality rate (Ahmed & Aref, 2024; Deveci et al., 2021; Siddiqui et al., 2017). Hence, length of hospital stay could be used as a surrogate measure of disease severity and healthcare resource utilization.

Factors associated with poor outcome and mortality

In the present review, it was found that some clinical features might be associated with poor prognosis. The mean time spent in the hospital was 5.97 ± 2.48 hours, and delayed presentation correlated with the development of toxicity, complications, increased hospital stay and death in the previous review. Prompt presentation is important for pesticide poisoning as early resuscitation, airway

management, antidotal treatment and supportive care can prevent the development of severe respiratory and neurological effects (Faluomi et al., 2022; Goel & Aggarwal, 2007; Reigart, 2009; Roberts & Brett, 2013).

Other factors that influence outcome are clinical severity. The Acute Physiology and Chronic Health Evaluation II (APACHE II) score and the Peradeniya Organophosphorus Poisoning Scale (P.O.P.S) have been shown to be positively correlated with mortality or severe illness in studies (Eisa et al., 2021; Sam et al., 2009). In one study, APACHE II was a significant predictor of mortality, suggesting that physiologic deterioration on admission may be useful in predicting mortality (Ho et al., 2005; Khan et al., 2002; Zou et al., 2020).

Another severe disease indicator in the present review was mechanical ventilation. Over 2/3 of the reported patients needed ventilatory support. These have also been demonstrated in previous studies to be associated with mortality: severity of the condition, inadequate initiation of therapy and prolonged mechanical ventilation (Esteban et al., 2002; Gadre et al., 2018; Nevins & Epstein, 2001). Mechanical ventilation therefore should not be considered a separate determinant of mortality but rather it is a marker of the severity of poisoning and respiratory failure (Khemani et al., 2015; Ramadori, 2023).

Final Clinical Outcomes

Reviewed evidence showed positive and negative results. Of the 28,593 patients in the systematic review, 6,732 (23.5%) recovered and were discharged while 1,059 (3.7%) died in hospital. The overall mortality was relatively low as compared to some of the individual studies, which could be attributed to varying poisoning agents, disease severity, access to healthcare, referral patterns, and the study population (Dawson et al., 2010; Telayneh et al., 2024).

There was also significant variation among individual studies. Prashar and Ramesh reported survival rate of 80.3% and mortality of 6.4% among patients admitted to the ICU, whereas Mehrpour et al. 2017 reported a mortality rate of 19.5% and a survival rate of 80.5% among patients admitted to the ICU.

The mortality rate was reported as 31.6% in a prospective study conducted in Karnataka which showed that mortality can be high in patients with severe poisoning who need intensive care (Maheswari et al., 2016; Sridhar, 2009).

The high mortality rates found in the more severe groups of hospital admissions highlight that hospital admissions mortality cannot be directly compared between studies without account for severity of cases. The probability of respiratory failure, altered consciousness, severe cholinergic manifestations, and complications are all greater in the patient population that presents to the ICUs than in less severe populations presenting to the ED, and the increased risk of these complications is also associated with increased mortality in these patients (Aher, 2023; Mehrpour et al. 2018).

Clinical and Public Health Implications

The results are of significance to emergency medicine and public health. Early recognition and prompt transfer to a hospital with the appropriate facilities are important. It has been strongly noted in the previous systematic review that delayed arrival may lead to complications, long hospitalization and death (Alva et al., 2025). Second, there must be a standardized approach to airway management, decontamination, use of antidotes, monitoring and transfer to intensive care in cases of acute poisoning in hospitals. Standardization can help to shorten treatment delays and enhance outcomes (Hüser et al., 2025; Lombardo et al., 2025).

Access to highly toxic pesticides and unsafe storage of pesticides also need to be addressed in order to prevent illness. Self-poisoning with pesticides continues to be an important cause of death worldwide, especially in agricultural households (Gunnell et al., 2007; Mew et al., 2017) and access to highly hazardous pesticides is considered an important intervention for preventing such deaths. Community education, safe pesticide storage, pesticide labelling, work place protection, mental health support and timely access to emergency services should therefore be addressed holistically, not just hospital based interventions.

Strengths and Limitations of the Reviewed Evidence

A major advantage of the evidence reviewed is that it offers some data on the patterns of poisoning, clinical symptoms, complications, treatment needs, hospitalization and outcomes for a relatively large number of patients. Systematic Review involved 28,593 patients and studies from various countries were included, thus giving a wide perspective of organophosphate poisoning (Alva et al., 2025). There is however a significant diversity among the studies included with regard to study design, population, poisoning agent, severity, hospital setting, treatment available, and definition of outcome. However, the findings of mortality and hospital-stay were summarized descriptively, rather than combined statistically, in the supporting review. This restriction should be taken into account when comparing between studies. Finally, denominators were different for some outcome categories across individual studies and so the percentages should not be pooled and used to calculate the study-specific mortality or recovery estimate.

Conclusion

Poisoning disproportionately affects young and middle-aged adults and is frequently associated with intentional exposure, particularly in settings where pesticides and other hazardous substances are easily accessible. Acute poisoning continues to be a significant cause of emergency morbidity and hospital utilization, with significant variation in the responsible toxic agents, exposure circumstances, clinical severity, and outcomes across populations. The findings emphasize the importance of managing acute poisoning outside of the hospital setting. Emergency preparedness, efficient referral systems, standardized airway and supportive-care protocols, adequate intensive-care capacity, and early detection of serious poisoning are critical. At the community level, safer pesticide storage and handling, greater labelling and occupational protection, restrictions on access to very dangerous toxic agents, public education, and strengthened mental-health and poisoning-prevention initiatives are needed. Future multicenter prospective studies utilizing

standardized criteria, comprehensive clinical datasets, and validated severity scores are required to uncover independent predictors of death and establish locally suitable preventative and therapy methods.

Declarations

Consent for publication

All subjects gave their “informed consent” for the publication of details within the text (“informed consent”) to be published in the above Journal and Article. Written “informed consent” was obtained from all authors for the publication of this manuscript.

Availability of data and materials

Data are provided within the manuscript or supplementary information files.

Competing Interest

All authors declare that there are no competing interests.

Conflict of interest

All the authors declare no conflicts of interest.

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