Original Article: Drug Poisoning: Focus on Epidemiology, Diagnostic Methods, Management & Treatment: a Scoping Review

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ABSTRACT

Drug poisoning is a critical public health issue with significant implications for morbidity and mortality. This scoping review aims to provide a comprehensive overview of drug poisoning, focusing on epidemiology, diagnostic methods, management, and treatment. By systematically mapping the existing literature, we aim to identify the current state of knowledge in these areas and highlight gaps for future research. Preliminary findings suggest that drug poisoning affects diverse populations and involves a range of substances, including prescription medications, illicit drugs, and over-the-counter products. The epidemiology of drug poisoning varies across regions, with different patterns of substance use and associated risks. Diagnostic methods for drug poisoning encompass clinical assessment, toxicology screenings, and laboratory tests, with advancements in technology enhancing accuracy and efficiency. Management and treatment strategies for drug poisoning include supportive care, decontamination procedures, antidote administration, and psychotherapy interventions. Despite advancements in understanding drug poisoning, significant gaps remain in the literature. Limited research exists on specific populations, such as pediatric and geriatric patients, and the long-term consequences of drug poisoning. Additionally, more studies are needed to evaluate the effectiveness of various management and treatment approaches. This scoping review provides a foundation for future research and practice in drug poisoning. By synthesizing the current knowledge on epidemiology, diagnostic methods, management, and treatment, we aim to inform evidence-based interventions and improve patient outcomes.

Introduction

Drug poisoning is a serious public health concern that continues to pose a significant burden on individuals [1-3], families, and healthcare systems worldwide. According to the World Health Organization (WHO), drug poisoning is defined as the harmful or toxic effects of substances that can occur as a result of drug overdose, misuse [4-6], or abuse. These substances can range from prescription

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medications and over-the-counter drugs to illicit substances and chemicals [7-9].

The rise in drug poisoning cases over the past few decades has been alarming, with an increasing number of deaths and hospitalizations attributed to drug-related incidents. In the United States alone, drug poisoning has become a leading cause of injury-related deaths [10-12], surpassing even motor vehicle accidents. The impact of drug poisoning is devastating, not only on the individuals who suffer from it but also on their families and communities (fig 1).
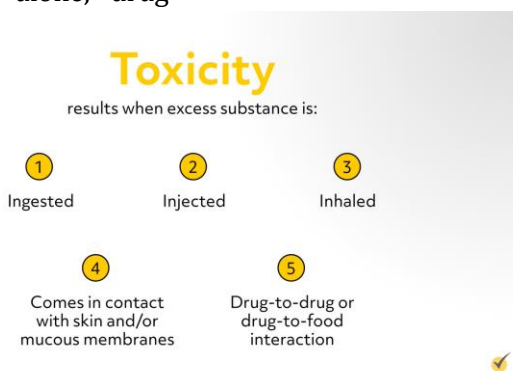

Figure 1: Drug poisoning and toxicity

The factors contributing to drug poisoning are multifaceted and complex. They can include individual risk factors such as age, gender, mental health issues, and genetics, as well as environmental factors such as availability and accessibility of drugs, social norms and attitudes towards drug use, and socioeconomic status. The use of multiple drugs, known as polypharmacy, can also increase the risk of drug poisoning [11-13].

One of the challenges in addressing drug poisoning is the lack of comprehensive and up-to-date data on the extent of the problem. Many cases of drug poisoning go unreported or misclassified [14-16], leading to an inaccurate understanding of the true impact of drug poisoning on public health [17-19]. This highlights the importance of conducting scoping reviews to synthesize the existing literature on drug poisoning and identify gaps in knowledge that need further investigation [20].

The objectives of this scoping review are to provide an overview of the current state of research on drug poisoning, including its prevalence, risk factors, outcomes, and prevention strategies. By mapping out the existing literature on drug poisoning, this review aims to identify gaps in knowledge and highlight areas for future research. The findings of this review will serve as a valuable resource for policymakers, healthcare providers, and researchers working to prevent and mitigate the impact of drug poisoning [21-23].

In conducting this scoping review, a systematic search of electronic databases such as PubMed, Scopus, and Web of Science will be performed to identify relevant studies on drug poisoning. The search strategy will include keywords related to drug poisoning, overdose, toxicity, and adverse drug reactions. Inclusion criteria will be established to select studies that focus on drug poisoning as the primary outcome and provide data on the prevalence [24-26], risk factors, outcomes, or prevention strategies related to drug poisoning.

The findings of this scoping review will be summarized and presented in a narrative format, highlighting key themes and trends in the literature on drug poisoning. A thematic analysis will be conducted to identify common patterns and insights across the included studies. The limitations of the existing literature

on drug poisoning will also be discussed, along with recommendations for future research directions [27-29].

In conclusion, drug poisoning is a significant public health issue that requires a comprehensive and multifaceted approach to address. By synthesizing the existing literature on drug poisoning, this scoping review aims to provide a comprehensive overview of the current state of research and identify priorities for future investigation. It is hoped that this review will contribute to the development of effective strategies to prevent and mitigate the impact of drug poisoning on individuals and communities [30].

Epidemiology

Drug poisoning epidemiology is a critical area of study that seeks to understand the patterns, trends, and risk factors associated with drug poisoning incidents. Drug poisoning, which encompasses both intentional and unintentional overdoses of drugs, has emerged as a major public health concern globally, with significant implications for individuals, families, healthcare systems, and society as a whole. Understanding the epidemiology of drug poisoning is crucial for developing effective prevention strategies, interventions, and policies to reduce the burden of drug poisoning and improve public health outcomes [31-33].

The incidence of drug poisoning has been on the rise in recent years, with a significant increase in the number of drug-related deaths, hospitalizations, and emergency department visits. In the United States, for example, the Centers for Disease Control and Prevention (CDC) reports that drug poisoning has become a leading cause of injury-related deaths, surpassing deaths from motor vehicle accidents. The opioid epidemic, in particular, has contributed to the escalating rates of drug poisoning deaths in many countries, highlighting the urgent need for a better understanding of the epidemiology of drug poisoning (fig 2).
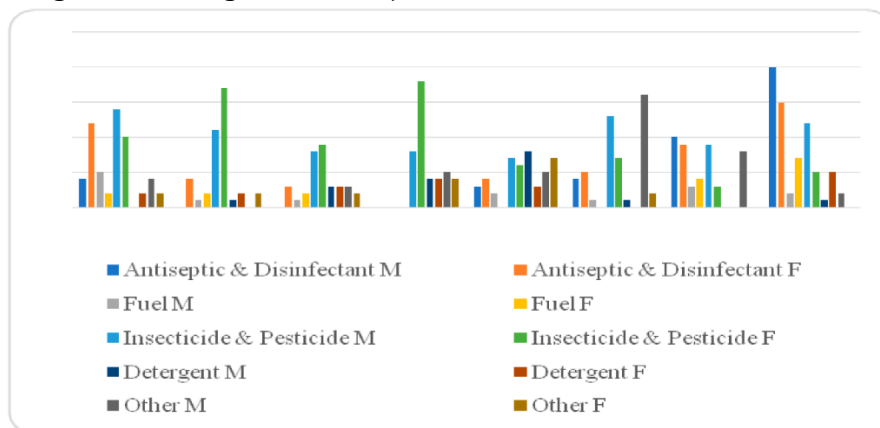

Figure 2: Drug poisoning epidemiology

Drug poisoning can result from various substances, including prescription medications, over-the-counter drugs, illicit drugs, and chemicals. The factors contributing to drug poisoning are multifaceted and can vary among different populations and settings. Individual risk factors such as age, gender, mental health disorders, substance use disorders, and socioeconomic status can play a significant role in determining the likelihood of experiencing a drug poisoning incident. Environmental factors, including drug availability, accessibility, and social norms around drug use, also influence the risk of drug poisoning [34-36].

One of the challenges in assessing the epidemiology of drug poisoning is the lack of

comprehensive and standardized data collection systems. Many drug poisoning incidents go unreported or are misclassified, leading to underestimates of the true burden of drug poisoning. Additionally, different jurisdictions may use varying definitions and criteria for identifying and categorizing drug poisoning cases, making it difficult to compare data across regions and time periods [37-39].

Despite these challenges, a growing body of research has emerged on the epidemiology of drug poisoning, providing valuable insights into the patterns and trends of drug poisoning incidents. Epidemiological studies have examined the prevalence of drug poisoning, risk factors associated with drug poisoning, demographic characteristics of individuals affected by drug poisoning, and outcomes of drug poisoning incidents. These studies have identified important disparities in drug poisoning rates across populations and have highlighted the need for targeted interventions to address specific risk factors and vulnerabilities [40].

The objectives of this scoping review are to provide an overview of the current state of research on the epidemiology of drug poisoning, including its prevalence, trends, risk factors, outcomes, and prevention strategies. By synthesizing the existing literature on drug poisoning epidemiology, this review aims to identify gaps in knowledge and highlight areas for future research. The findings of this review will serve as a valuable resource for policymakers, public health officials, healthcare providers, and researchers working to address the growing burden of drug poisoning.

In conducting this scoping review, a systematic search of electronic databases such as PubMed, Scopus, and Web of Science will be performed to identify relevant studies on the epidemiology of drug poisoning. The search strategy will include keywords related to drug poisoning, drug overdose, drug toxicity, drug-related deaths, and epidemiology. Inclusion criteria will be established to select studies that focus on the epidemiological aspects of drug poisoning, provide data on the prevalence, trends, risk factors, outcomes, or prevention strategies related to drug poisoning, and are published in peer-reviewed journals.

Diagnostic methods

Accurate and timely diagnosis of drug poisoning is crucial for appropriate medical intervention, patient management, and prevention of adverse outcomes. Traditional diagnostic approaches, such as clinical assessment and patient history, have limitations in terms of specificity and sensitivity, particularly when dealing with complex cases involving multiple substances or novel drugs. In response to these challenges, researchers and clinicians have been exploring innovative diagnostic methods that leverage advances in technology, bioanalytical techniques, and data analysis [41].

The objective of this scoping review is to provide an overview of the current state of diagnostic methods for drug poisoning and identify the gaps and potential areas for further research. By systematically mapping the existing literature, we aim to summarize the available evidence, highlight the strengths and limitations of various diagnostic approaches, and identify emerging trends in this field [42-44].

To conduct this scoping review, we followed the established framework proposed by Arksey and O'Malley (2005), which involves five iterative stages: (1) identifying the research question, (2) searching for relevant studies, (3) selecting the studies, (4) charting the data, and (5) collating, summarizing, and reporting the results. Our research question for this review is: "What are the current diagnostic methods employed in the assessment and management of drug poisoning, and what is the level of evidence supporting their use?"(fig 3)
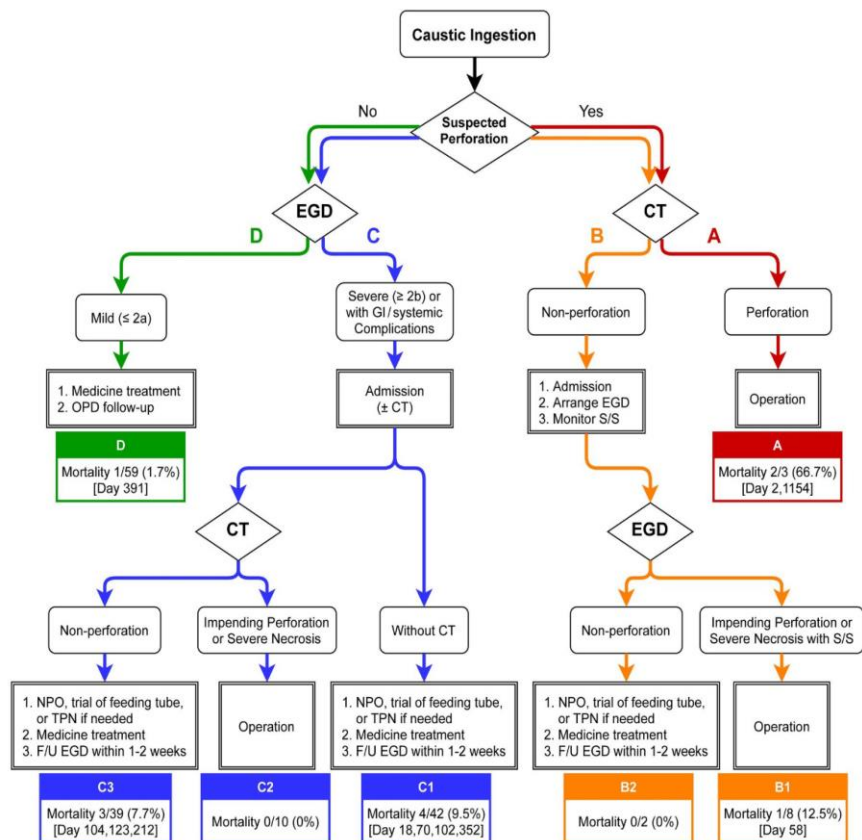
Figure 3: timely diagnosis of drug poisoning

The scoping review includes studies published in peer-reviewed journals, conference proceedings, and gray literature, with no restrictions on the publication date. We systematically searched electronic databases, including PubMed, Scopus, and Google Scholar, using a combination of keywords related to drug poisoning, toxicology, diagnostic methods, and relevant synonyms. The search strategy aimed to capture a comprehensive range of articles that address the diagnostic aspects of drug poisoning across various healthcare settings.

Upon completion of the search and selection process, we will extract relevant data from the included studies, including study characteristics, diagnostic methods employed, patient populations, and outcomes. We will then analyze and synthesize the findings to provide an overview of the current landscape of drug poisoning diagnostic methods. Additionally, we will identify any gaps in the literature and propose potential avenues for future research, such as the development of novel biomarkers, advancements in point-of-care testing, or the integration of artificial intelligence algorithms for improved diagnostic accuracy [45].

Mortality and morbidity

Drug poisoning, characterized by the harmful effects of drug use, represents a significant public health concern worldwide. It encompasses a range of scenarios, including accidental overdoses, intentional self-harm, and adverse drug reactions. The consequences of drug poisoning can be devastating, leading to increased mortality rates, severe morbidity, and long-term health complications. Understanding the factors contributing to drug poisoning-related mortality and morbidity is crucial for developing effective prevention strategies and improving patient outcomes. Therefore, this scoping review aims to provide an overview of

the current state of drug poisoning mortality and morbidity, identify gaps in the literature, and highlight potential areas for further research and intervention [46-48]. The magnitude of drug poisoning-related mortality and morbidity has reached alarming levels in recent years. Drug-related deaths have been consistently rising, fueled by the opioid crisis, the misuse of prescription medications, and the emergence of new psychoactive substances. In addition to the direct fatalities resulting from drug poisoning, there are significant indirect health consequences, including long-term health complications, disabilities, and reduced quality of life among survivors [49].

The objective of this scoping review is to systematically map the existing literature on drug poisoning mortality and morbidity. We will conduct a comprehensive search of electronic databases, including PubMed, Scopus, and Google Scholar, using a combination of keywords related to drug poisoning, mortality, morbidity, epidemiology, risk factors, and relevant synonyms. The search strategy will aim to capture a broad range of articles that address the mortality and morbidity aspects of drug poisoning across various populations and settings. To guide our review, we have formulated the following research question: "What are the current trends, risk factors, and outcomes associated with drug poisoning mortality and morbidity, and what are the gaps in the existing literature?" This question will serve as the foundation for our search strategy, data extraction process, and analysis of the included studies [50-52]. Upon completion of the search and selection process, we will extract relevant data from the included studies, including study characteristics, population demographics, risk factors, mortality rates, morbidity outcomes, and the methodologies used to assess drug poisoning-related mortality and morbidity. We will then analyze and synthesize the findings to provide a comprehensive overview of drug poisoning mortality and morbidity patterns, contributing factors, and the implications for public health.

The scoping review will explore various aspects of drug poisoning mortality and morbidity, including the types of drugs involved, demographic characteristics of affected individuals, geographic variations, and temporal trends. It will also examine the contributory factors, such as social determinants of health, access to healthcare services, polypharmacy, comorbidities, and the influence of socioeconomic factors on drug poisoning outcomes [53].

Identifying gaps in the literature will be a critical component of this review. By assessing the current evidence base, we aim to highlight areas where research is limited or lacking, such as specific populations (e.g., vulnerable groups, pediatric or geriatric populations), underrepresented regions, or the long-term consequences of drug poisoning. Furthermore, we will identify potential areas for future research, such as the evaluation of prevention strategies, interventions targeting high-risk populations, and the development of comprehensive surveillance systems to monitor drug poisoning mortality and morbidity.

Management

The management of drug poisoning involves a multidisciplinary approach, integrating medical, toxicological, and psychological interventions. Historically, managing drug poisoning cases relied heavily on supportive care, symptomatic treatment, and addressing complications as they arise. However, advancements in medical science, technology, and clinical practices have opened up new possibilities for more targeted and comprehensive management strategies.

The objective of this scoping review is to systematically map the existing literature on drug poisoning management, including studies published in peer-reviewed journals, conference

proceedings, and gray literature. By following the established framework proposed by Arksey and O'Malley (2005), we aim to identify relevant studies, extract data, and analyze the findings to provide a comprehensive overview of current practices, evidence-based interventions, and emerging trends in drug poisoning management. To conduct this scoping review, we formulated the following research question: "What are the current approaches and interventions employed in the management of drug poisoning, and what is the level of evidence supporting their effectiveness?" This question will guide our search strategy and data extraction process, allowing us to identify and synthesize relevant information on drug poisoning management across various healthcare settings.

The search strategy will involve comprehensive electronic database searches, including PubMed, Scopus, and Google Scholar, utilizing a combination of keywords related to drug poisoning, toxicology, management, interventions, and relevant synonyms. We will also manually search reference lists of included studies and review articles to ensure a comprehensive coverage of the literature. There will be no restrictions on the publication date, ensuring the inclusion of both recent and older studies [54-56]. Upon completion of the search and selection process, we will extract relevant data from the included studies, including study characteristics, interventions employed, patient populations, outcomes, and the level of evidence supporting their effectiveness. We will then analyze and synthesize the findings to provide a comprehensive overview of drug poisoning management practices, including both pharmacological and non-pharmacological interventions (fig 4).
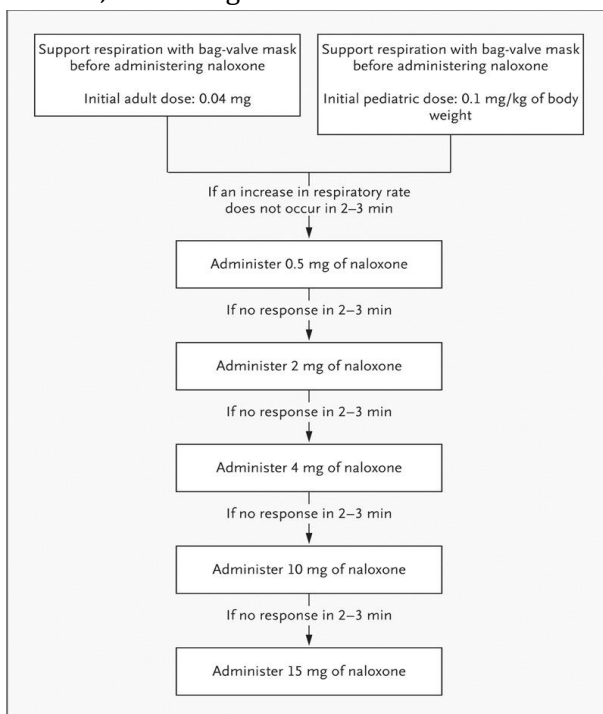

Figure 4: Management of drug poisoning

Treatment

The treatment of drug poisoning is a complex and multifaceted process that requires a comprehensive understanding of the toxicological properties of the substances involved, the patient's clinical presentation, and the available therapeutic options. Traditionally, the management of drug poisoning has focused

on supportive care, which includes measures such as airway management, respiratory support, fluid resuscitation, and correction of electrolyte imbalances. However, recent advancements in medical science, toxicology, and clinical practices have expanded the range of treatment strategies available for different types of drug poisoning.

The objective of this scoping review is to systematically map the existing literature on drug poisoning treatment. We will conduct a comprehensive search of electronic databases, including PubMed, Scopus, and Google Scholar, using a combination of keywords related to drug poisoning, toxicology, treatment, interventions, and relevant synonyms. The search strategy will aim to capture a broad range of articles that address the treatment aspects of drug poisoning across various healthcare settings.

To guide our review, we have formulated the following research question: "What are the current treatment approaches and interventions employed in the management of drug poisoning, and what is the level of evidence supporting their effectiveness?" This question will serve as the foundation for our search strategy, data extraction process, and analysis of the included studies.

Upon completion of the search and selection process, we will extract relevant data from the included studies, including study characteristics, treatment approaches employed, patient populations, outcomes, and the level of evidence supporting their effectiveness. We will then analyze and synthesize the findings to provide a comprehensive overview of drug poisoning treatment practices, including pharmacological and non-pharmacological interventions.

The scoping review will explore various aspects of drug poisoning treatment, including decontamination strategies, antidote administration, supportive care, and specific interventions for managing complications or adverse effects. It will also examine the role of different healthcare professionals, such as toxicologists, emergency department staff, intensivists, and mental health specialists, in the comprehensive treatment of drug poisoning cases.

Identifying gaps in the literature will be a critical component of this review. By assessing the current evidence base, we aim to highlight areas where research is limited or lacking, such as specific drug classes, novel toxicological challenges, or the effectiveness of emerging treatment modalities. Furthermore, we will identify potential areas for improvement and future research, such as the development of standardized treatment protocols, the use of targeted therapies, or the exploration of novel therapeutic agents.

Conclusion

Drug poisoning is a significant public health concern with serious consequences for mortality and morbidity. This scoping review aimed to provide an overview of the current state of drug poisoning mortality and morbidity, identify gaps in the literature, and highlight potential areas for further research and intervention. Through a systematic examination of existing literature, we have gained valuable insights into the patterns, risk factors, and outcomes associated with drug poisoning, emphasizing the urgent need for comprehensive strategies to address this complex issue.

Our review has revealed alarming trends in drug poisoning-related mortality, driven in large part by the opioid crisis and the misuse of prescription and illicit opioids. The rise in drug-related deaths reflects the devastating impact of these substances on individuals and communities. Moreover, drug poisoning morbidity extends far beyond the immediate consequences, with survivors often experiencing long-term health complications and reduced quality of life. The social and economic ramifications of drug poisoning

further underscore the need for effective prevention and intervention measures.

Several key risk factors have been identified in relation to drug poisoning mortality and morbidity. Socioeconomic factors, such as poverty, lack of education, and limited access to healthcare services, contribute to the vulnerability of certain populations. Mental health disorders, including substance use disorders, play a significant role in the risk of drug poisoning, emphasizing the importance of integrated approaches to address both mental health and substance use. Polypharmacy, particularly among older adults, represents a significant risk factor for adverse drug events and requires targeted interventions.

The implications of our findings for public health practice and policy are profound. Prevention efforts must focus on multiple levels, including primary prevention through education and awareness campaigns, as well as secondary prevention through early identification and intervention for individuals at risk. Equally important is the need for harm reduction strategies, such as access to naloxone, safe injection sites, and medication-assisted treatment, to reduce the harm associated with drug use. Comprehensive surveillance systems are necessary to monitor drug poisoning trends, identify emerging substances of concern, and evaluate the effectiveness of interventions.

Despite progress in understanding drug poisoning, several gaps in the literature remain. Specific populations, such as marginalized groups, adolescents, and older adults, require further investigation to tailor prevention and intervention efforts to their unique needs. Additionally, research on the long-term outcomes of drug poisoning, including the impact on physical and mental health, social functioning, and quality of life, is essential. The evaluation of prevention programs and interventions, including their cost-effectiveness and scalability, is crucial for evidence-based decision-making. In conclusion, drug poisoning represents a significant public health challenge with devastating consequences for individuals and communities. This scoping review has highlighted the need for comprehensive strategies that address the multifaceted nature of drug poisoning.

By understanding the patterns, risk factors, and outcomes associated with drug poisoning, we can inform targeted prevention efforts, enhance surveillance systems, and develop evidence-based interventions. Collaborative approaches involving healthcare professionals, policymakers, community organizations, and individuals affected by drug poisoning are essential to effectively address this complex issue. Through concerted efforts, we can reduce drug poisoning-related mortality and morbidity, improve the well-being of affected individuals, and promote healthier communities for all.

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