

Review Article

Educational Interventions to Prevent Occupational Accidents Associated with Psychoactive Substance Use among Healthcare Workers: A Scoping Review

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Psychoactive substance (PAS) use among healthcare workers is a critical concern for patient safety, workforce well-being, and occupational health. Although the risks associated with impaired professional practice are well recognized, evidence on educational strategies designed to prevent PAS-related occupational accidents in healthcare settings remains limited. This scoping review aimed to identify and describe educational interventions implemented in healthcare workplace settings and to summarize the reported evidence regarding their preventive potential. A systematic search was conducted in PubMed, Scopus, Web of Science, Embase, and Google Scholar using a Population-Intervention-Outcome framework. Articles published in English or Spanish up to August 2025 were eligible. Of 753 records identified, 18 full-text articles were assessed and four met the inclusion criteria. Two studies addressed healthcare professionals broadly and two focused on registered nurses. Three articles were empirical studies and one was a conceptual or narrative review. The identified strategies included speaking-up practices, evidence-based toolkits for drug-free workplace programs, training to recognize signs of PAS use, education on legal and ethical responsibilities, follow-up and monitoring mechanisms, and structured workplace reentry policies. Overall, the available evidence suggests that isolated educational actions are insufficient. Effective prevention requires integrated institutional strategies combining continuous education, clear policies, psychosocial support, confidential reporting pathways, and systematic monitoring. Future research should evaluate the effectiveness of these interventions using robust designs and standardized outcomes related to occupational accidents, patient safety, and worker well-being.

Introduction

The use of psychoactive substances (PAS) remains a major public health concern worldwide. These substances act on the central nervous system and may alter mood, perception, behavior, and cognitive functioning [1]. The World Drug Report 2025 estimated that, in 2023, 316 million people worldwide used drugs other than alcohol or tobacco, corresponding to approximately 6% of the population aged 15–64 years [2]. In occupational settings, PAS use is relevant because it may impair attention, judgment, coordination, and response time, thereby increasing the probability of unsafe behaviors and work-related incidents.

Alcohol consumption has been associated with a threefold increase in the risk of occupational accidents and with a greater number of workdays lost due to illness [3]. The severity of alcohol use disorder (AUD) is also directly proportional to absenteeism, with affected workers losing between 13 and 32 workdays per year [4]. Evidence indicates that benzodiazepine use increases the risk of occupational incidents [5]. Similarly, cannabinoid use may impair attention and concentration, particularly in tasks that require precision, vigilance, and rapid response [3].

In the healthcare sector, this issue is especially relevant because impaired performance can compromise both workers and patients. A cross-sectional study by Shah et al. reported that 51.7% of healthcare workers had used a PAS at least once in their lifetime [6]. International evidence also suggests that substance use disorders affect a meaningful proportion of health-related professionals, with reported prevalence estimates of 12.9% among women and 21.4% among men in some occupational groups [7][8].

Despite this evidence, a significant knowledge gap remains regarding educational interventions designed to mitigate PAS-related occupational risks among healthcare personnel. The extent to which these strategies have been implemented in workplace settings, and the degree to which they prevent occupational accidents, remain unclear. This gap limits the development of targeted policies and interventions adapted to the specific characteristics of healthcare organizations.

Therefore, this study aimed to identify and describe educational interventions implemented in healthcare workplace settings to prevent occupational accidents associated with PAS use and to summarize the evidence regarding their reported preventive potential. The review seeks to provide a foundation for

future prevention strategies addressing substance use, occupational safety, and patient safety in the healthcare sector.

Materials and Methods

Design and reporting framework

A scoping review was conducted in August 2025 and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) [9]. The review used a Population-Intervention-Outcome (PIO) framework to define the search strategy and eligibility criteria: population, healthcare workers; intervention, educational strategies aimed at reducing the risk of occupational accidents related to PAS use; and outcome, occupational accidents associated with or attributable to PAS use.

Search strategy

The following search strategy was developed and adapted to the syntax of each database: ("Substance-Related Disorders" OR "substance abuse" OR "substance use" OR "drug abuse" OR "psychoactive substance") AND ("Health Personnel" OR "healthcare worker*" OR "health care provider*" OR "medical staff" OR physician* OR nurse* OR clinician*) AND ("Accidents, Occupational" OR "occupational accidents" OR "workplace accident*" OR "occupational exposure" OR "occupational injuries") AND ("Education" OR "Health Education" OR education OR training OR awareness OR instruction). Searches were conducted in PubMed, Scopus, Web of Science, Embase, and Google Scholar.

Eligibility criteria

No restrictions were applied regarding study design in order to provide a comprehensive overview of the available evidence. Articles published in English or Spanish up to August 2025 were eligible, as these were the languages mastered by the authors. Studies were included if they involved healthcare workers and evaluated, proposed, or described educational strategies to reduce the risk of occupational accidents related to PAS use. Studies were excluded if they were published more than 15 years before the search date, reported only partial results, or were published in languages other than English or Spanish. Older sources were used only as contextual background when considered relevant to the discussion.

Article selection

Search results were imported into Rayyan for duplicate removal and screening. Titles and abstracts were screened independently by three reviewers (J.M.M.T., M.F.M.M., and L.C.P.F.). Potentially eligible records were assessed through full-text review using the inclusion and exclusion criteria. Disagreements were resolved by consensus; when consensus could not be reached, a fourth reviewer (D.A.M.) acted as arbitrator.

Data extraction and synthesis

Data were extracted using a standardized matrix that included author(s), year of publication, study design, population characteristics, type of educational or preventive intervention, and reported outcomes or practical implications. Given the heterogeneity and limited number of included studies, findings were synthesized narratively rather than through quantitative meta-analysis.

Results

The search identified 753 records. After removing five duplicates, 748 records were screened by title and abstract. Eighteen articles were assessed in full text, and four met the eligibility criteria for inclusion in the review (Figure 1).

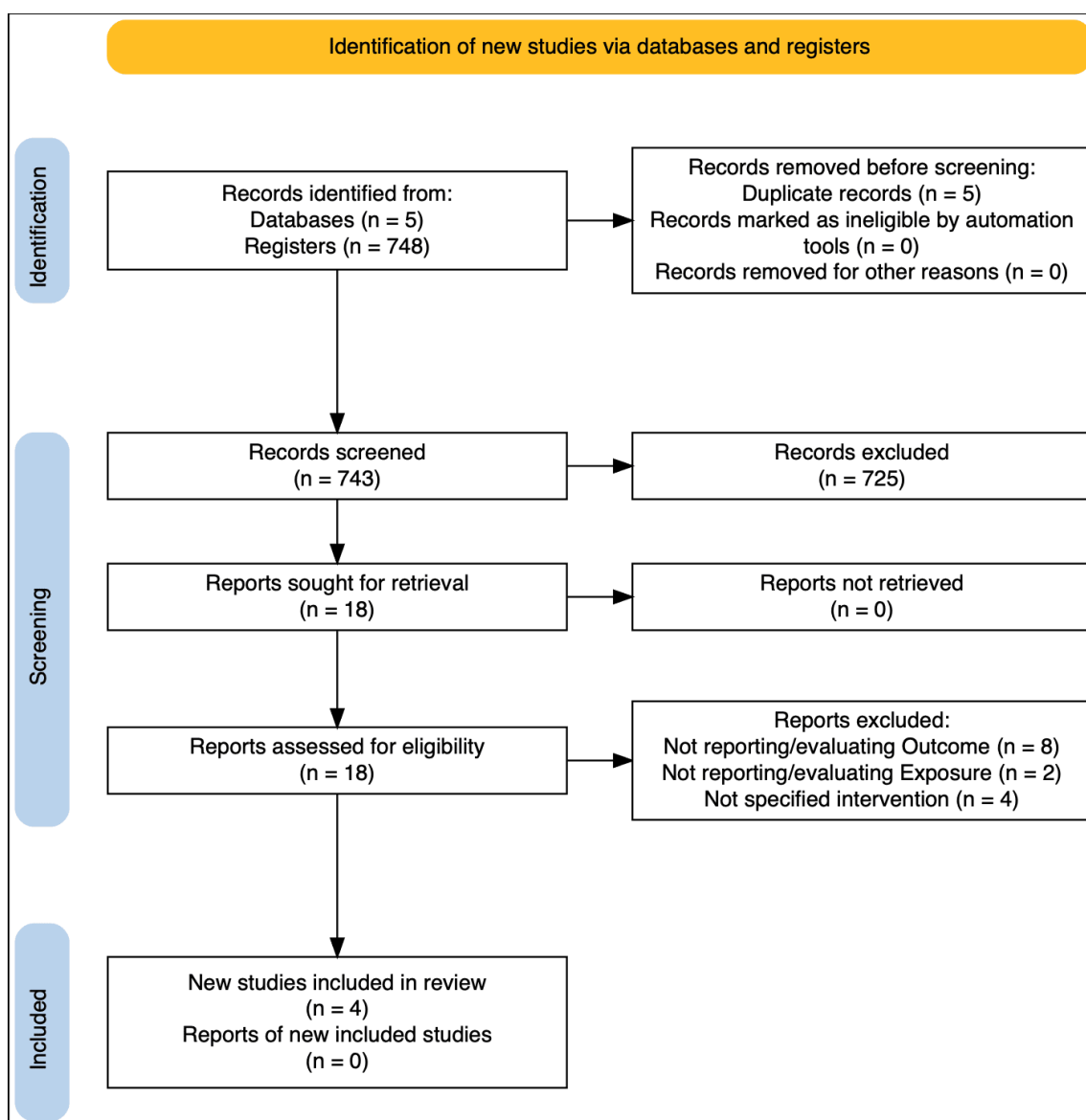


Figure 1. Study selection flow.

Two of the four included studies addressed healthcare professionals broadly [\[10\]\[11\]](#), while two focused specifically on registered nurses or nurse anesthetists [\[12\]\[13\]](#). Three articles were empirical studies, and one was a conceptual or narrative review. The evidence base was limited and heterogeneous, which prevented a formal assessment of intervention effectiveness across studies.

The included studies identified several educational and organizational strategies aimed at preventing PAS-related occupational accidents. One approach was speaking up, which relies on peer awareness, accountability, and communication when unsafe practice is suspected [\[10\]](#). Another strategy involved a

toolkit for drug-free workplace programs that incorporated evidence-based screening resources and educational materials on substance use ^[12]. Additional recommendations included training staff to recognize signs and symptoms of PAS use, educating employees and leaders about legal and ethical responsibilities, implementing monitoring and follow-up mechanisms, and establishing clear policies for workplace reentry ^{[11][13]}.

Study	Design	Population	Educational/preventive component	Main implication
Banja ^[10]	Conceptual/narrative review	Healthcare professionals	Speaking up, peer accountability, and discussion of drug and alcohol testing after adverse events.	Education must be embedded in a safety culture and supported by formal institutional procedures.
Smith and Campbell ^[11]	Empirical qualitative study	Healthcare professionals and healthcare leaders	Training, clear policies, monitoring, support, and workplace reentry procedures for impaired professionals.	Prevention requires a comprehensive strategy rather than isolated disciplinary actions.
Betcher et al. ^[12]	Empirical study	Occupational health nurses	Drug-free workplace toolkit with screening resources and educational materials.	Toolkits may strengthen nurses' capacity to implement or improve workplace prevention programs.
Taylor ^[13]	Evidence-based protocol / applied review	Certified registered nurse anesthetists	Education for identification and prevention of substance misuse in the workplace.	Profession-specific protocols may facilitate early recognition and structured response pathways.

Table 1. Summary of included studies and identified educational or preventive components.

Discussion

This scoping review found limited evidence on educational interventions designed to prevent occupational accidents associated with PAS use among healthcare workers. Although substance use and impairment among healthcare personnel have been widely discussed as patient safety and occupational health concerns, few studies have evaluated structured educational interventions in workplace settings. The available literature suggests that education is necessary but insufficient unless combined with institutional policies, confidential reporting mechanisms, psychosocial support, and structured follow-up.

From a systems perspective, unsafe events should not be understood solely as individual failures. Patient safety research emphasizes that errors are shaped by the work environment, where structural, organizational, and human factors interact to transform individual vulnerabilities into adverse events ^[10]. Healthcare professionals frequently work under high demands, sustained pressure, rotating shifts, emotional burden, and exposure to critical situations. These conditions may contribute to the initiation, maintenance, or worsening of PAS use behaviors and may also reduce the likelihood that colleagues intervene early.

Epidemiological evidence indicates that 8-15% of physicians, nurses, and pharmacists may engage in workplace-related drug or alcohol misuse, regardless of gender, socioeconomic status, educational background, culture, or geographic location ^[11]. The severity of this issue is amplified by the limited effectiveness of measures designed to protect patients from impaired practice and by organizational factors such as extended working hours, excessive workload, staff shortages, and low job satisfaction ^[11].

Certain professional groups may be particularly vulnerable. The availability of controlled substances in hospital settings has been associated with a higher incidence of substance use disorders among nurses working in emergency departments, intensive care units, and perioperative areas ^{[14][15]}. In a study of 57 anesthesiologists, opioid misuse was reported by 59.6%, benzodiazepine misuse by 3.1%, and alcohol misuse by 35.1% ^[16]. It has also been estimated that approximately 15% of anesthesiologists will develop a substance use disorder during their careers ^[17]. Among nurses receiving treatment for substance use disorders, many reported using substances that were readily accessible in their workplace, and referrals were often initiated through employee assistance programs or human resources rather than direct colleague intervention ^{[15][18][19][20]}.

Speaking-up interventions may support prevention by encouraging early communication about unsafe practice or signs of impairment. However, their implementation is challenging. In a study involving more than 1,700 healthcare professionals, Maxfield et al. found that many participants had observed behaviors that compromised patient safety, but only a small proportion fully addressed their concerns with the colleague involved [21]. Barriers included fear of retaliation, uncertainty about responsibility, limited confidence in communication skills, and skepticism regarding the organizational response. Therefore, speaking-up initiatives require communication training, psychological safety, leadership commitment, and clear escalation pathways.

Informal confrontation may be insufficient, especially when substance use is severe or when the professional perceives high personal or occupational consequences. For this reason, expert recommendations favor structured and professionally guided responses that include formal assessment of suspected behaviors, confidential reporting, comprehensive clinical evaluation, and individualized action plans. Educational interventions should therefore clarify not only how to recognize risks, but also how to act safely, ethically, and consistently within institutional procedures.

Drug-free workplace programs offer a broader framework for prevention. These programs may promote occupational health and safety when they incorporate team development, workplace assessment, policy formulation, structured implementation, and continuous evaluation [22]. Essential components include employee education, supervisor and leadership training, access to employee assistance programs, and testing protocols that comply with current regulations [22][23]. Their value lies in combining prevention, early detection, support, and accountability within a coherent organizational system.

The findings of this review suggest that the current evidence base remains fragmented. Many strategies focus on detection or sanction rather than on prevention, education, and the promotion of healthy work environments. A preventive and systemic approach is required to reduce PAS-related risks in healthcare organizations while protecting workers, patients, and institutions. Future studies should evaluate educational interventions using longitudinal designs, standardized outcome measures, and implementation indicators such as reporting confidence, knowledge retention, uptake of support services, and changes in occupational accident rates.

The main strength of this review is its broad search across indexed databases and grey literature, supported by predefined inclusion and exclusion criteria and multiple reviewers. The PRISMA-based selection process enhanced transparency. Nevertheless, several limitations should be acknowledged. The exclusion of non-English and non-Spanish articles may have introduced language bias. Reliance on

controlled vocabulary and database-specific indexing may have omitted relevant studies. Finally, the small number and heterogeneity of included articles prevented quantitative synthesis or firm conclusions about effectiveness.

Conclusion

PAS use among healthcare personnel remains a significant threat to patient safety, occupational safety, and worker well-being. Although educational strategies such as speaking-up training, screening toolkits, recognition of warning signs, and education on ethical and legal responsibilities show preventive potential, their implementation remains limited and insufficiently evaluated. The evidence supports a comprehensive approach that integrates continuous education, institutional policies, psychosocial support, confidential reporting mechanisms, monitoring, and structured workplace reentry. Future research should prioritize rigorous evaluation of these interventions and their impact on occupational accidents, patient safety outcomes, and healthcare worker health.

Abbreviations

AUD: alcohol use disorder; PAS: psychoactive substances; PIO: Population-Intervention-Outcome; PRISMA-ScR: Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews; SUD: substance use disorder.

Statements and Declarations

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Potential Competing Interests

The authors declare that they have no competing interests.

Ethics

This review analyzed published literature and did not involve human participants, human tissue, or identifiable private information. Therefore, ethics committee approval was not required.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Data Availability

All data analyzed in this review are derived from published studies cited in the reference list. No new primary data were generated.

Author contributions

D.A.M., E.P.R., and F.P.S. conceived and designed the study. J.M.M.T., M.F.M.M., and L.C.P.F. contributed to the literature search and screening. D.A.M., J.M.M.T., M.F.M.M., L.C.P.F., E.P.R., and F.P.S. contributed to data extraction, analysis, interpretation, drafting, and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript and accept responsibility for its content.

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