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# Knowledge and awareness of drugs' overdose in emergency departments: Cross sectional study among health care workers and medical students in Hail city, Saudi Arabia

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## ABSTRACT

*Introduction:* According to WHO, there are about 275 million people (or 5.5% of the global population aged 15-64 years) used drugs at least once in 2019. About 36.3 million people suffered from drug use disorders in 2019. Drug over does is one of risk factor which leads to poor health and death. *Aim:* This cross-sectional study was carried out to assess of awareness of drug over does in ED among health care workers and medical students in Hail city in KSA. *Methods:* 205 of health care workers and medical students in Hail city in KSA were the subjects of the present study. The study was conducted in Hail, KSA from May till November 2022. Data entry and analysis were done by using SPSS version 25. *Results:* Saudi were the most participants173 (84.4%), almost half of them were 118 (57.6%) females. The middle age was the most addict age group 40 (19.5%). Opioid, Amphetamine and acetaminophen represented the highest percentage of drug overdose. *Conclusions:* The study concluded that the most common drug overdose was opioid. Some of the participants showed insufficient knowledge about naloxone. Thus, we recommended implementing method to raise the awareness to contribute in reducing burden of this problem.

**Keywords:** Hail, KSA, Overdose, Opioid, Amphetamine, acetaminophen.



## 1. INTRODUCTION

Drugs abuse shows a significant global problem (Al-Jerani et al., 2019).

Substance abuse is considered one of the top risk factors for poor health globally and the medical care cost for people who abuse substances is near doubly as high as those who do not (UNODC, 2015). Substance use disorder is a health issue that is a result of chronic drug use and is characterized by a group of cognitive, behavioural and physiological symptoms that a drug user (PWUD) demonstrates (American Psychiatric Association, 2013). People with substance abuse problems are over-represented in ES compared to the broader community (Bohnert et al., 2018).

In the Middle East, amphetamine and other substance misuse have been reported to be widespread. Despite the fact that these countries, including Saudi Arabia, implement strict sharia law for the sale, possession and consumption of any illegal substance of abuse (Ibrahim et al., 2018). Saudi Arabia is the land of Islam. There are religious and legal bans on the possession or consumption of alcohol and drugs, but some Saudis use alcohol and drugs (Bassiony, 2013). Being Muslim does not guarantee an implacable adhesion to all the directives of Islam. As a result, the shame of disclosure of substance abuse makes implementation and understanding of treatment strategies challenging (Ibrahim et al., 2018).

Some Saudis women also use drugs (Khalawi et al., 2017). Women cannot access drugs, unlike men in Saudi Arabia (Khalawi et al., 2017). The Saudi Arabian government is doing everything it can to raise awareness about the harmful effects of substance abuse. Rapid socio-economic and cultural development has resulted in the emergence of new attitudes, new ways of life and new recreational activities, including drug use (Siddiqui and Salim, 2016). Approximately 7% to 8% of Saudis reported using drugs, and 70% of all people who use drugs are between the ages of 12 and 22 (Alshmrani, 2017).

The most common substances consumed by Saudi Arabians were amphetamines, heroin, alcohol and cannabis, and a majority of PWDs were multiple substance dependency (Ibrahim et al., 2018). Acute intoxication is one of the gravest medical emergencies, with serious morbidity and mortality; it represents an economic burden for governments (Wahba et al., 2021). It can be defined as the intentional or unintended administration of a higher dose of prescription or over-the-counter drugs than the recommended dose (Al-Jaser et al., 2013).

The misuse of amphetamines has become a major preoccupation of the Saudi people. It is frequently misused due to its euphoric and stimulating effects (Attafi et al., 2021). As a result, its abuse as a means of increasing alertness and awareness among students, drivers and night workers should be discouraged (Attafi et al., 2021). Chronic overdose or overuse of amphetamine causes tachycardia, high blood pressure, restless and psychosis. In addition, the chronic use of amphetamine is accompanied with high trends in homicide and suicide mortality, especially among individuals with psychopathic personality (Attafi et al., 2021).

Severe intoxication is observed after illicit use of higher doses and causes hyperthermia, dehydration, severe high blood pressure, myocardial infarction, strokes, seizures, and sudden cardiac death. In addition, severe acidosis, multiple organ failure and death may occur (Karch et al., 1999). Every year, the Emergency Department (ED) provides care to an increasing number of patients suffering from opioid overdose and medical complications related to opioid use disorder (Kilaru et al., 2020). The use of opioids is highly addictive, with a high risk of overdose and death. The World Health Organization reports that the number of deaths resulting from drug overdoses had reached up to 168,000 deaths in the year of 2015, with opioid overdose having the highest number (Al-Jerani et al., 2019).

It is estimated that the number of people dependent on illicit drugs on the planet is largely determined by the usage of cannabis, which is the most widely used psychoactive substance globally (Lintzeris et al., 2019). The results of a study carried out at Al-Amal Hospital in Jeddah showed that 24.8% of their patients had consumed cannabis (Bahji et al., 2020). In addition to cognitive and psychiatric problems, cannabis use is accompanied with a range of physical health conditions (Lintzeris et al., 2019). In addition to the long-term effects of cannabinoids, other long-term effects of cannabinoids use include addiction, altered brain development, cognitive impairment, poor educational outcomes, diminished quality of life, and an increased risk of chronic respiratory tract, psychotic disorders, injuries, traffic accidents, and suicide attempts (Bahji et al., 2020).

Barbiturates depress central nervous system with effects that resemble alcohol. Barbiturates are misused by teenagers due to the first euphoric and pleasurable effects they provide at greater doses. Ten times the amount required for hypnosis is the barbiturate dosage that has the potential to cause serious hazardous consequences. Similar to acute alcohol intoxication, acute barbiturates intoxication, it causes exhilaration at first, then sedation, ataxia, and slurred speech. Moreover, it causes forgetfulness and blackouts. Cardiorespiratory depression develops in cases of extreme intoxication and progresses to coma (Alghamdi et al., 2018).

On the other hand, Methamphetamine (METH) is a stimulant that is illegal and widely abused (Jayanthi et al., 2021). In Jeddah, Saudi Arabia, methamphetamine-related mortality increased by more than 500% between 2016 and 2018 (Almarhabi et al., 2018; Al-Asmari, 2021). The primary goal of the current study was to determine how much knowledge there was about drug overdose in emergency departments among medical students and staff in hospitals in Hail, Saudi Arabia.

## 2. MATERIALS AND METHODS

### Study Design

Using an online survey for a cross-sectional study.

### Study populations

It was conducted in the Hail region of Saudi Arabia in May 2022 till November 2022 among both male and female medical students and healthcare professionals from both urban and rural locations, as well as individuals of all ages and nationalities. Those were the study's participants.

### Sample collection and processing

Self-administered computerized Google form questionnaire was applied to gather the data. The study's sample size was calculated as 205 participants for a 95% confidence level and a margin of error of 5%, and the researchers created a questionnaire that satisfied the study's objectives. The Raosoft sample size method was applied to analyze the result. Afterwards, the data collection sheets were converted to an excel sheet for interpretation and statistical analysis with RStudio (R version 4.1.1). Information that has been presented as frequencies and percentages (categorical variables) or as a median and interquartile range (continuous variables). The linear regression analysis was carried out to look at factors related to the knowledge score. The knowledge score was used as the dependent variable, while the demographic characteristics were used as the independent variables

### Data entry and statistical analysis

The Statistical Package for Social Sciences (SPSS) software version 25 was used to process the statistical analysis (SPSS Inc., Chicago, IL, USA). All data associated with this study are present in the paper.

### Informed Consent and ethical approval

The University of Hail's research ethics committee (REC) had evaluated and approved the present study, and the university president had also given his or her approval. The research project had a reference number (H-2022-240), and it was completed on May 17, 2022. The study's participants were made aware of the study's voluntariness and the importance of their input. Nobody's personal information was gathered. Each author certifies that the participants provided their informed consent in order to publish this original article. Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

## 3. RESULTS

Table 1 showed demographic characteristics among the studied population, KSA 2022. Number of participants was the highest in the 20-30 age group; 134 (65.4%) second, the 31-40 age group; 45 (22.0%). Both the 41-50 age group and less than 20-year age group had the lowest number of participants; 13 (6.3%). Regarding genders, 118 (57.6%) were females and 87 (42.4%) males. For nationality, 173 (84.4%) were Saudi and 32 (15.6%) were non- Saudi. For specialty the highest number of participants were physician; 77 (37.6%). Secord, medical students; 69 (33.7%), then, nurses; 57 (27.8) and others were; 2 (1.0%). Regarding workplace, governmental were 150 (73.2%) and private sectors were 9 (4.4%).

Table 2 showed the frequency and rate of responses. Regarding which type of drug overdose, they witness, 10 (5%) answered opioid, 8 (3.9%) amphetamine, 7 (3.4%) acetaminophen, 4 (2%) heroin, 2 (1%) for each aspirin and methamphetamine, and 1 (0.5%) for each antibiotic, benzodiazepine, salbutamol, fenethylline, cocaine, methanol and pregabalin. Regarding the time the addict was using the drug most of them answered 5 years or fewer; 64 (31.2%), more than 5 years; 20 (9.8%). When asked about the age of the addict, 40 (19.5%) were middle age, 34 (16.6%) were young (teenagers), 13 (6.3%) were elderly.

When asked about the characteristics of the addiction, 142 (69.3%) answered all the choices, 20 (9.8%) answered diminished recognition of significant problems in one's behavior, 18 (8.8%) impairment in behavioral control, 14 (6.8%) none of the choices, and 11 (5.4%) dysfunctional emotional response. Regarding how they knew if someone was overdosing, 147 (71.7%) answered all the choices, 23 (11.2%) breathing irregular or has stopped, 21 (10.2%) breathing is very slow and shallow, 9 (4.4%) pulse is slow, erratic or not there at all, 5 (2.4%) choking sounds or snoring (sometimes called the 'death rattle') vomiting. Regarding the clinical appearance of an overdose, 137 (66.8%) answered all the choices, 27 (13.2%) chose two answers, 18 (8.8%) pinpoint pupils, 17 (8.3%) unconsciousness, 6 (2.9%) respiratory depression.

**Table 1** Demographic characteristics among the studied population, KSA, 2022 (n = 205)

| | Frequency (NO.) | Percent (%) |
|---|---|---|
| Age group | | |
| <20 | 13 | 6.3 |
| 20-30 | 134 | 65.4 |
| 31-40 | 45 | 22.0 |
| 41-50 | 13 | 6.3 |
| 51> | 0 | 0.0 |
| Gender | | |
| Male | 87 | 42.4 |
| Female | 118 | 57.6 |
| Nationality | | |
| Saudi | 173 | 84.4 |
| Non-Saudi | 32 | 15.6 |
| Specialty | | |
| Physician | 77 | 37.6 |
| Nurse | 57 | 27.8 |
| Medical student | 69 | 33.7 |
| Others | 2 | 1.0 |
| Place of work | | |
| Governmental | 150 | 73.2 |
| Private | 9 | 4.4 |

Regarding causes of opioid overdose, 134 (65.4%) answered all the choices, 23 (11.2%) complications of substance abuse, 19 (9.3%) intentional overdose, 17 (8.3%) unintentional overdose, 10 (4.9%) therapeutic drug error, 2 (1%) none of the choices. Regarding what increases the risk of opioid overdose, 107 (52.2%) answered all the above, 51 (24.9%) A+B, 16 (7.8%) those who severe medical and psychiatric conditions such as depression, HIV and lung/liver disease, 15 (7.3%) return to use after cessation, 12 (5.9%) female gender, 4 (2%) elderly.

Regarding what should be done if a patient was comatose and in respiratory distress, 88 (42.9%) answered all the above, 53 (25.9%) A+B, 31 (15.1%) airway control must be obtained before doing anything else, 24 (11.7%) endotracheal intubation is suggested for all patients who unable to care for their airways, 9 (4.4%). If there is no suspicion of opiate overdose, then naloxone should be administered to reverse the respiratory depression. Regarding whether if they observed a person overdosing on opioids, they should begin rescue breathing until health workers arrive, 173 (84.4%) answered correctly with true, 19 (9.3%) answered I don't know, 13 (6.3%) answered incorrectly.

Regarding if they should place the patient into a recovery position once they confirmed the patient is breathing, 175 (85.4%) answered correctly, 17 (8.3%) answered "I don't know", 13 (6.3%) gave wrong answer. Regarding the fact that Narcan (naloxone) will reverse the effect of an opioid overdose, 171 (83.4%) answered correctly with true, 22 (10.7%) answered "I don't know", 12 (5.9%) false. Regarding how long naloxone takes to start reverse an opioid overdose, 79 (38.5%) answered correctly with 2-3min, 64 (31.2%) answered I don't know, 51 (24.9%) 5-10min and 11 (5.4%) >10 min. Regarding which drug is contraindicated in the management of sympathomimetic agent of a patient with hypertension, 105 (51.2%) answered beta blocker, 44 (21.5%) benzodiazepines, 36 (17.6%) calcium channel blockers, 20 (9.8%) none of the above.

Table 3 showed the correlation between the awareness and age groups of the studied population. The answers were significantly different in the characteristics of addiction (P-value = 0.024), how did you know if someone was overdosing (P-value = 0.00005), causes of overdose (P-value = 0.014), the action taken if patient was comatose and in respiratory distress (P-value = 0.0004), recovery position for breathing patient (P-value = 0.003), Narcan effect for opioid overdose (P-value = 0.00) and how long naloxone take time to start effecting (P-value = 0.038). Participants of age group 31-40 showed the highest awareness with the percentage (75.3%).

**Table 2** Participants' answers and percentages for the overdose awareness questions (n = 205)

| Q/A | Number | % |
|---|---|---|
| Overdose with which kind of drug | | |
| Acetaminophen | 7 | 3.4 |
| Amphetamine | 8 | 3.9 |
| Aspirin | 2 | 1.0 |
| Antibiotics | 1 | 0.5 |
| Benzodiazepine | 1 | 0.5 |
| Salbutamol | 1 | 0.5 |
| Fenethylline | 1 | 0.5 |
| Cocaine | 1 | 0.5 |
| Heroin | 4 | 2.0 |
| Methanol | 1 | 0.5 |
| Methamphetamine | 2 | 1.0 |
| Opioid | 10 | 5.0 |
| Pregabalin | 1 | 0.5 |
| Time using drugs | | |
| 5years or fewer | 64 | 31.2 |
| More than 5 years | 20 | 9.8 |
| Age of addict | | |
| Young (teenagers) | 34 | 16.6 |
| Middle age | 40 | 19.5 |
| Elderly | 13 | 6.3 |
| Characteristics of Addiction | | |
| Diminished recognition of significant problems in one's behavior | 20 | 9.8 |
| Impairment in behavioral control | 18 | 8.8 |
| Dysfunctional emotional response | 11 | 5.4 |
| None of the above | 14 | 6.8 |
| All of the above | 142 | 69.3 |
| How did you know if someone was overdosing? | | |
| Slow and shallow Breathing | 21 | 10.2 |
| Breathing irregular or has stopped | 23 | 11.2 |
| Slow Pulse, irregular or not palpable at all | 9 | 4.4 |
| Choking sounds or snoring (sometimes called the 'death rattle') vomiting | 5 | 2.4 |
| All of the above | 147 | 71.7 |
| Clinical picture of an overdose | | |
| Pinpoint pupils | 20 | 8.8 |
| Unconsciousness | 18 | 8.3 |
| Respiratory depression | 11 | 2.9 |
| A+B | 14 | 13.2 |
| All of the above | 142 | 66.8 |
| Causes of opioid overdose can comprise | | |
| Complications of substance abuse | 23 | 11.2 |
| Unintentional overdose | 17 | 8.3 |
| Intentional overdose | 19 | 9.3 |
| Therapeutic drug error | 10 | 4.9 |
| None of the above | 2 | 1.0 |

| | | |
|---|---|---|
| All of the above | 134 | 65.4 |
| Hazards of opioid overdose increases in the following | | |
| Go back to use after stop | 15 | 7.3 |
| Those who had severe chronic diseases such as HIV, liver disease or depression, | 16 | 7.8 |
| Female gender | 12 | 5.9 |
| Elderly | 4 | 2.0 |
| A+B | 51 | 24.9 |
| All of the above | 107 | 52.2 |
| If the patient was comatose and in respiratory distress, which of the following should be done? | | |
| Control of Airway must be done before anything else | 31 | 15.1 |
| Endotracheal intubation is advised to all patients who are incapable to protect their airways | 24 | 11.7 |
| If there is no doubt of opiate overdose, then naloxone should be given to overturn the respiratory depression | 9 | 4.4 |
| A+B | 53 | 25.9 |
| All of the above | 88 | 42.9 |
| If you see a person overdosing on opioids, you begin rescue breathing until health workers arrive | | |
| True | 173 | 84.4 |
| False | 13 | 6.3 |
| I don't know | 19 | 9.3 |
| Once you confirmed the individual was breathing, you can place into the recovery position | | |
| True | 175 | 85.4 |
| False | 13 | 6.3 |
| I don't know | 17 | 8.3 |
| Narcan (naloxone) will reverse the effect of an opioid overdose | | |
| True | 171 | 83.4 |
| False | 12 | 5.9 |
| I don't know | 22 | 10.7 |
| How long does naloxone take to start reverse an opioid overdose? | | |
| 2-3min | 79 | 38.5 |
| 5-10min | 51 | 24.9 |
| 10< min | 11 | 5.4 |
| I don't know | 64 | 31.2 |
| Which drug is contraindicated in the management of sympathomimetic agent of a patient with hypertension? | | |
| Calcium channel blockers | 36 | 17.6 |
| Beta blocker | 105 | 51.2 |
| Benzodiazepines | 44 | 21.5 |
| None of the above | 20 | 9.8 |

**Table 3** The correlation between the awareness and age groups of the studied population

| Q/A | Age | | | | P-Value |
|---|---|---|---|---|---|
| | <20 | 21-30 | 31-40 | 41-50 | |
| Characteristics of addiction | | | | | |
| Diminished recognition of significant problems in one's behavior | 1 | 13 | 4 | 2 | 0.024 |
| Impairment in behavioral control | 2 | 13 | 2 | 1 | |
| Dysfunctional emotional response | 2 | 8 | 1 | 0 | |
| None of the above | 4 | 9 | 1 | 0 | |
| All of the above | 4 | 91 | 37 | 10 | |
| How do you know if someone is overdosing? | | | | | |
| Slow and shallow Breathing | 0 | 20 | 0 | 1 | 0.00005 |
| Breathing irregular or has stopped | 4 | 13 | 4 | 2 | |
| Slow, erratic pulse or not palpable at all | 3 | 5 | 1 | 0 | |
| Choking or snoring sounds (sometimes called the 'death rattle') vomiting | 2 | 3 | 0 | 0 | |
| All of the above | 4 | 93 | 40 | 10 | |
| Clinical picture of an overdose | | | | | |
| Pinpoint pupils | 1 | 14 | 2 | 1 | 0.050 |
| Unconsciousness | 1 | 15 | 1 | 0 | |
| Respiratory depression | 2 | 4 | 0 | 0 | |
| A+B | 4 | 15 | 6 | 2 | |
| All of the above | 5 | 86 | 36 | 10 | |
| Causes of opioid overdose can comprise | | | | | |
| Complications of substance abuse | 2 | 17 | 2 | 2 | 0.014 |
| Unintentional overdose | 2 | 12 | 3 | 0 | |
| Intentional overdose | 2 | 16 | 1 | 0 | |
| Therapeutic drug error | 2 | 8 | 0 | 0 | |
| None of the above | 1 | 1 | 0 | 0 | |
| All of the above | 4 | 80 | 39 | 11 | |
| Hazards of opioid of overdose increases in the following | | | | | |
| Go back to use after stop | 3 | 10 | 1 | 1 | 0.215 |
| Those who severe chronic diseases e.g., HIV, depression or liver disease | 2 | 12 | 2 | 0 | |
| Female gender | 1 | 9 | 2 | 0 | |
| Elderly | 1 | 3 | 0 | 0 | |
| A+B | 2 | 28 | 16 | 5 | |
| All of the above | 4 | 72 | 24 | 7 | |
| If the patient is comatose and in respiratory distress, which of the following should be done | | | | | |
| Control of Airway must be done before anything else | 7 | 18 | 5 | 1 | 0.0004 |
| Endotracheal intubation is advised to all patients who are incapable to protect their airways | 1 | 19 | 3 | 1 | |
| If there is no doubt of opiate overdose, then naloxone should be given to overturn the respiratory depression | 2 | 7 | 0 | 0 | |
| A+B | 0 | 29 | 17 | 7 | |
| All of the above | 3 | 63 | 20 | 4 | |
| If you see a person overdosing on opioids, you begin rescue breathing until health workers arrive | | | | | |
| True | 11 | 108 | 41 | 13 | 0.466 |
| False | 1 | 10 | 2 | 0 | |

| | | | | | |
|---|---|---|---|---|---|
| I don't know | 1 | 16 | 2 | 0 | |
| Once you confirmed the individual was breathing, you can place into the recovery position | | | | | |
| True | 7 | 113 | 43 | 12 | 0.003 |
| False | 4 | 8 | 1 | 0 | |
| I don't know | 2 | 13 | 1 | 1 | |
| Narcan (naloxone) will reverse the effect of an opioid overdose | | | | | |
| True | 4 | 113 | 42 | 12 | 0.000 |
| False | 1 | 8 | 2 | 1 | |
| I don't know | 8 | 13 | 1 | 0 | |
| How long does naloxone take to start reverse an opioid overdose | | | | | |
| 2-3min | 2 | 46 | 21 | 10 | 0.038 |
| 5-10min | 4 | 31 | 12 | 2 | |
| 10< min | 1 | 8 | 2 | 0 | |
| I don't know | 6 | 49 | 8 | 1 | |
| Which drug is contraindicated in the management of sympathomimetic agent of a patient with hypertension | | | | | |
| Calcium channel blockers | 3 | 24 | 7 | 2 | 0.365 |
| Beta blocker | 3 | 67 | 28 | 7 | |
| Benzodiazepines | 5 | 27 | 8 | 4 | |
| None of the above | 2 | 16 | 2 | 0 | |

Table 4 showed the correlation between the awareness and specialty of the studied population. A significant difference in the answers was observed about how did you know if someone was overdosing (P-value = 0.000), clinical picture of an overdose (P-value = 0.021), causes of overdose of opioid can comprise (P-value = 0.002), risk of opioid overdose increases in the following (P-value = 0.003), if the patient is comatose and in respiratory distress, which of the following should be done (P-value = 0.008), if you see a person overdosing on opioids, you begin rescue breathing until health workers arrive (P-value = 0.001), once you confirm the individual is breathing, you can place into the recovery position (P-value = 0.002), Narcan (naloxone) will reverse the effect of an opioid overdose (P-value = 0.001). Physicians showed the highest awareness with the percentage (68.8%).

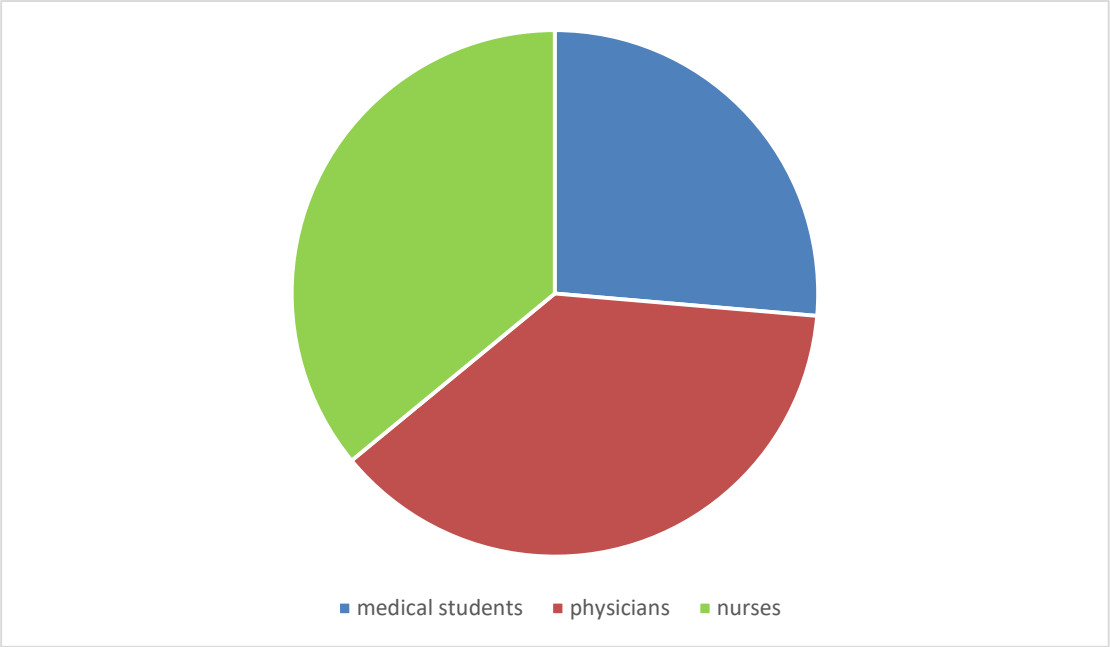
**Table 4** The correlation between the awareness and specialty of the studied population

| Q/A | Speciality | | | | P-Value |
|---|---|---|---|---|---|
| | Medical student | Physician | Nurse | Others | |
| Characteristics of addiction | | | | | |
| Diminished recognition of significant problems in one's behavior | 9 | 9 | 2 | 0 | 0.005 |
| Impairment in behavioral control | 12 | 3 | 3 | 0 | |
| Dysfunctional emotional response | 4 | 1 | 6 | 0 | |
| None of the above | 7 | 1 | 6 | 0 | |
| All the above | 37 | 63 | 40 | 2 | |
| How do you know if someone is overdosing? | | | | | |
| Slow, shallow Breathing | 16 | 4 | 1 | 0 | 0.000 |
| Breathing irregular or has stopped | 10 | 6 | 7 | 0 | |
| Slow, erratic Pulse or not palpable at all | 5 | 0 | 4 | 0 | |
| Choking sounds or a snoring- (sometimes called the 'death rattle') vomiting | 3 | 1 | 0 | 1 | |
| All of the above | 35 | 66 | 45 | 1 | |
| Clinical picture of an overdose | | | | | |
| Pinpoint pupils | 10 | 6 | 2 | 0 | 0.021 |

| | | | | | |
|---|---|---|---|---|---|
| Unconsciousness | 12 | 2 | 3 | 0 | |
| Respiratory depression | 3 | 1 | 2 | 0 | |
| A+B | 8 | 8 | 10 | 1 | |
| All of the above | 36 | 60 | 40 | 1 | |
| Causes of overdose of opioid can comprise | | | | | |
| Complications of substance abuse | 13 | 5 | 4 | 1 | 0.002 |
| Unintentional overdose | 9 | 4 | 4 | 0 | |
| Intentional overdose | 12 | 3 | 4 | 0 | |
| Therapeutic drug error | 6 | 1 | 3 | 0 | |
| None of the above | 1 | 0 | 1 | 0 | |
| All of the above | 28 | 64 | 41 | 1 | |
| Risk of overdose of opioid rises in the following | | | | | |
| Go back to use after stop | 10 | 4 | 1 | 0 | 0.003 |
| Those with severe chronic diseases e.g., HIV, depression, liver disease | 9 | 4 | 2 | 1 | |
| Female gender | 6 | 2 | 4 | 0 | |
| Elderly | 3 | 0 | 1 | 0 | |
| A+B | 17 | 25 | 9 | 0 | |
| All of the above | 24 | 42 | 40 | 1 | |
| If the patient is comatose and in respiratory distress, which of the following should be done | | | | | |
| Control of Airway must be done before anything else | 15 | 8 | 7 | 1 | 0.008 |
| Endotracheal intubation is advised to all patients who are incapable to protect their airways | 15 | 6 | 3 | 0 | |
| If there is no doubt of opiate overdose, then naloxone should be given to overturn the respiratory depression | 5 | 0 | 4 | 0 | |
| A+B | 11 | 25 | 17 | 0 | |
| All of the above | 23 | 38 | 26 | 1 | |
| If you see a person overdosing on opioids, you begin rescue breathing until health workers arrive | | | | | |
| True | 48 | 72 | 52 | 1 | 0.001 |
| False | 9 | 2 | 2 | 0 | |
| I don't know | 12 | 3 | 3 | 1 | |
| Once you confirm the individual is breathing, you can place into the recovery position | | | | | |
| True | 51 | 73 | 50 | 1 | 0.002 |
| False | 6 | 2 | 5 | 0 | |
| I don't know | 12 | 2 | 2 | 1 | |
| Narcan (naloxone) will reverse the effect of an opioid overdose | | | | | |
| True | 56 | 69 | 46 | 0 | 0.001 |
| False | 5 | 5 | 2 | 0 | |
| I don't know | 8 | 3 | 9 | 2 | |
| How long does naloxone take to start reverse an opioid overdose | | | | | |
| 2-3min | 20 | 34 | 25 | 0 | 0.077 |
| 5-10min | 15 | 23 | 13 | 0 | |
| 10< min | 4 | 5 | 2 | 0 | |
| I don't know | 30 | 15 | 17 | 2 | |
| Which drug is contraindicated in the management of sympathomimetic agent of a patient with hypertension | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Calcium channel blockers | 10 | 14 | 12 | 0 | 0.381 |
| Beta blocker | 35 | 41 | 29 | 0 | |
| Benzodiazepines | 16 | 18 | 9 | 1 | |
| None of the above | 8 | 4 | 7 | 1 | |

Graph 1 Show the level of awareness between speciality. Physicians had the highest level of awareness (68.8%). The second were nurses with a level of awareness of (65.6%) and lastly medical student with a level of awareness of (48.1%).




**Graph 1** Level of awareness between specialty

## 4. DISCUSSION

In the knowledge assessment section of the present research, the overall percentage of awareness was 64.6%. The data in the present study suggested that the answers had significant difference given by different age groups of health workers and students about the characteristics of addiction. The older age group (41-50) was more aware of the decreased detection of significant problems in one's behavior, impairment in behavioral control, and dysfunctional emotional response as the characteristics of addiction, while the younger age group (21-30) was more aware of all of the above.

The older age group was more likely to understand addiction better since they had more experience. They might have seen it firsthand through someone they knew or had struggled with addiction themselves. This enriched them with more intimate knowledge of what addiction looks and feels like. On the other hand, the younger age group of health workers and students was more likely to get information about addiction from the media or other outside sources. That why their understanding of addiction was more limited, and they were less likely to be able to identify the warning signs.

According to Table 2, Amphetamine abuse has become a highly significant alarm facing the Saudi people. It has euphoric and stimulant effects that are why it is frequently abused. It was used as a method of raising alertness in drivers, night workers. Overdose or excessively chronic abuse of amphetamine causes tachycardia, agitation, hypertension, and psychosis. A study had done in southern region showed that during the previous 10 years there was a rise in abuse of amphetamine (Attafi et al., 2021). A study in Al-Qassim showed that 24% of their study participants used amphetamine only (Ibrahim et al., 2018).

In another study, abusing amphetamine prevalence among admitted patients was 38.6% (Almarhabi et al., 2018; Al-Asmari, 2021). A study done between 1986 and 2006 in a hospital in Dammam, KSA, found the relative amphetamine addiction frequency that jumped from 12.1% to 48.1% (Iqbal, 2004). Similarly, the present study clarified that a high percentage of overdose was amphetamine (3.9%). Opioids are made from plants and can be used for other aims, because of its euphoric effect that makes people happy and relaxed. It has a risk of addiction, overdose and even death. The most dangerous opioids are heroin (Attafi et al., 2021).

In a previous study done in Saudi Arabia, in addiction treatment setting among Saudi patients there were 6.6% - 83.6% of heroin abusers (Bassiony, 2013). Another research done in Saudi Arabia 84% of their patients abused heroin (Hafeiz, 1995). Also, a study conducted in South Africa showed that 79% of the most frequently used substances were heroin and 26% cocaine (Wilson et al., 2022). Similarly, the present study showed the highest level of drug overdose opioid (5%) and more specifically heroin (2%) while cocaine (0.5%).

A study in South Africa had found 76% of their participants had used drugs more than five years (Wilson et al., 2022), which was Contrary to the present study, that showed high proportion of the participants were administering drugs for less than 5 years. In the present research, the participants had reported a history of overdose (n=205). They were asked more questions about the symptoms of overdose experienced by them. They replied all of the following: Breathing was very slow (10.2%), shallow, irregular or had stopped (11.2%), pulse was slow or not there at all (4.4%), a snore like gurgling noise or choking sounds (2.4%), and vomiting (0%). 71% were as similar as a previous study done in Flint, Michigan the overdosed patients experienced the following symptoms: Nausea and vomiting (78%), difficulty breathing/stopped breathing (38%), heart beat was slow too fast or too slow (44%) (Bohnert et al., 2018).

In the present work, the causes of opioid overdose were divided into intentional overdose, unintentional overdose, complications of substance abuse, therapeutic drug error. On the other hand, another study conducted in Michigan divided the intent of overdose of the addicted participants into accidentally they didn't know (what effect would be), accidentally they (lost track of the amount), accidentally they (combined drugs and/or alcohol, on purpose (wanted to die or didn't care about risks), unsure of reason (Bohnert et al., 2018). A study was done on American Indian/Alaska natives and non-Hispanic whites focused on the death of drug overdose and found the middle-aged people where the highest (25-54 years old =135) (Joshi et al., 2018).

That was different from the present study which focused on overdose itself between different ages and found that the middle age had the highest number of overdosing. The similarity between the two studies lied in that the most affected age is the middle-age. Naloxone is considered as opioid receptor antagonist usually used to reverse opioid overdose by competing for receptor. In the present study, it was intended to evaluate the awareness of health care practitioners at ED about naloxone effect on reversing opioid overdose where 85.4% of participants responses agreed (choose true) 6.3% disagreed (choose false) while 8.3% didn't know. Similarly, a previous study had demonstrated naloxone effectiveness for saving lives and decreasing addiction severity (Jones et al., 2017).

Table 3, indicated a significant variation in the responses of different age groups when asked how they knew if someone was overdosing. Most respondents in all age groups said they knew someone was overdosing if they were not breathing or breathing very slowly and shallowly. This suggested that the most common symptom of an overdose was respiratory distress. A smaller proportion of respondents in all age groups said that they knew someone were overdosing if they had slow, erratic pulse or not palpable at all. This reflected that a slower or irregular heartbeat was another common symptom of overdose of. The least common response across all age groups was that the sounds of choking or a snoring ('death rattle') indicated an overdose. This suggested that this symptom wasn't well-known as the others.

Table 3 showed the correlation between the awareness and age groups of the studied population regarding the signs of an overdose. A significant variation in the answers was observed regarding the symptoms of an overdose (P-value = 0.050). Most respondents aged 41-50 were aware of the overdose's clinical picture, while the least aware age group was 20 years old and above. This might be because the older age group is more likely to have experience with or be exposed to information about drug overdoses, while the younger age group was less likely to have that experience or exposure. This finding was in line with previous research (Saari et al., 2020; Koob, 2021), which had shown that older age groups were generally more aware of the clinical manifestation of an overdose than younger age groups.

The present study's results showed that the answers were significantly different in different age groups regarding the causes of opioid overdose. Most of the respondents were in group of 41-50 years old who answered that the cause of opioid overdose could include complications of substance abuse, while the most of the respondents in the group of 21-30 years old answered that the cause of overdose of opioids could include unintentional overdose. These results indicated that the different age groups of the population had different perceptions of the causes of overdose of opioids. The different age groups may have different levels of awareness of the causes of opioid overdose. It was also possible that the different age groups had different experiences with opioid overdose, leading to different perceptions of the causes of overdose.

Table 3 also showed that the majority of respondents believed that the opioid overdose's risk increased among people who resumed using after quitting, those with severe chronic diseases, and the elderly. The answers, however, did not significantly differ between the age groups. This reflected that awareness of the risk factors for opioid overdose was generally low among the

population studied. Thus, understanding the risk factors for overdose is critical for preventing them (Wang, 2019). Some of the risk factors listed in the Table 3, such as resuming use after quitting and having serious medical or mental health issues, were modifiable. This means that if people are aware of these risks, they can take steps to reduce them. For example, those returning to use after abstinence might reduce their risk by tapering their dose or using a lower-risk drug formulation (Wang, 2019).

The present study's result, on what to do if the patient was unconscious and experiencing respiratory distress, showed that the older age group (41-50 years) was significantly more likely to correctly answered the question than a younger age range (21-30 years and 31-40 years). This may be because the older age group was more likely to have experience with comatose and respiratory distress patients and, thus, be more familiar with the correct course of action to take. The older age group was more likely to manage a case of an overdose, while the younger age group had less knowledge and experience thus answered wrongly. One possible explanation for the difference in awareness between the age groups was that the older group is more likely to have personal experience with opioids. This could be because the older age group is more likely to have used opioids recreationally or been exposed to them through the medical system (Saari et al., 2020).

The younger age group, on the other hand, maybe less likely to have this personal experience and so may be less informed about the dangers of opioids and what to do in the event of an overdose. The responses provided by the various age groups of the population under consideration in the current study about the statement varied significantly, "Once you have determined that the person is breathing, you can put them in the recovery position". 12 out of 41 individuals aged 41-50 answered correctly, while 43 out of 113 individuals aged 31-40 answered correctly. The results of the present study showed a positive relationship between age and knowledge of the right course of action to take if someone collapses and appears to stop breathing. Similar results were reported by a previous research, which showed that older individuals were more aware of first-aid procedures than younger individuals (Koob, 2021).

The current study revealed a notable disparity in the responses given by the different age groups of the studied population regarding the reverse the effect of an opioid overdose by Narcan (naloxone). The older age group (41-50) was more likely to answer correctly than the younger age group (21-30). The outcomes of the present research showed that the awareness of the studied population regarding Narcan (naloxone) was good. However, there is an urgent request to increase the population's awareness regarding the use of Narcan (naloxone) in case of an opioid overdose.

In the present research, the P-value=0.038, which means indicating there was a considerable difference in the responses across the studied population's age groupings about "How long does naloxone take to start reverse an opioid overdose" and that the older age group was more aware of this issue than the younger age group. This may be because the higher experience of older age group about drug use and overdose than the younger age group, which was similarly explained in previous studies (Koob, 2021).

There was a significantly different answer given by the different age groups of the population studied. The older age group (41-50 years) was more likely to correctly identify calcium channel blockers as a contraindicated drug in managing hypertension than the younger age group (21-30 years). The result of the present work indicated that the majority of the public was knowledgeable about the importance of calcium channel blockers in managing hypertension. However, a significant minority were unaware of this class of drugs' contraindications in managing hypertension. This is a cause for concern as it may lead to inappropriate use of these drugs and potentially harmful consequences.

Table 4 in present study showed that there was a significantly difference in the answers given by different health workers and students about the characteristics of addiction. Physicians were more aware of all the characteristics of addiction, then the nurses, medical students, and others. Table 4 indicated a significant variation in the responses of different health workers and medical student when asked how they knew if someone was overdosing, the majority answered all signs of overdosing, and then by the slow and shallow breathing, irregular breathing or stopped breathing.

In the present study when asking about clinical picture of an overdose, most of health workers and medical students were aware of all signs and symptoms, including pinpoint pupils, unconscious, and respiratory distress. In a previous study of 852 patients who arrived at a hospital emergency department, a wide range of diverse symptoms was reported, particularly dizziness (92.8%), vomiting (68.8%) difficulty breathing (78.4%), constricted pupil (7.7%), and irritability (77.3%), headache (89.4%), and some were unconscious (16.8%) ($p < 0.0001$). Many patients had multiple symptoms (Wahba et al., 2021).

The present study's results showed that the health workers and medical students had different reasons regarding the causes of opioid overdose, most of them answered all of causes of opioid overdose, medical students showed differences between the answers. Karch et al., (1999) went with complications of substance abuse, while Attafi et al., (2021) went with intentional overdose. Table 4 showed that the risk of opioid overdose. Health workers and medical students were highly aware of all risk factors since most of them chose all the risks. Then the return to use after stop, those who had severe chronic conditions e.g., HIV, depression,

lung or liver diseases. A previous study reported that stress and pressure factors were well thought-out as most popular risk factors for initiation while relapse, anxiety, depression and hepatitis were considered as frequent co-morbidities associated with alcohol use in Saudi people (Bassiony, 2013).

In the present study, most of the answers of the question about management of comatose patient and in respiratory distress were replied correctly for physicians and medical students, with few differences for nurses. Similarly, a previous study in Najran region, KSA demonstrated the management toward adults with acute poisoning. Most of their patients were taken more than one treatment, and (46%) patients received certain treatment and antidotes for the contributory toxin. Gut decontamination (78.6%), activated charcoal (31.3%) and oxygen inhalation therapies (14.8%) were used in the cases, respectively. However, (16.2%) patients were stable with no symptoms, only observation for short time and then hospital discharge ($p < 0.0001$) (Wahba et al., 2021).

Moreover, another study reported that doctors sometimes exposed to difficulty in managing critically-poisoned patients. The clinical picture appeared in poisoned patients were dependent on many factors, such as the toxic dose and the type of toxin. The duration of exposure to the toxin and patient health before poisoned (Boyle et al., 2009). They said that if the patient recognized as being early intoxicated and if suitable testing and supportive treatment were initiated rapidly, most of the patients' outcomes would be good. The suitable and judicious administration of antidotes should be practiced, and the physician should obviously recognize the indications, contraindications and appropriate dosages of antidotes before administration (Boyle et al., 2009).

In the present study when asking about rescuing breathing of an overdosed person until health worker arrived, the majority established. Also, when asking about placing into the recovery position, once confirming returning of the individuals breathing, the majority agreed. In Table 4, most of the health workers and medical students settled that Narcan (naloxone) will reverse the effect of an opioid overdose. Also, when asking about the time of naloxone took to start reversing an opioid overdose, most of physicians and nurses answered 2-3 min, while most of medical students were unaware.

Supporting the present research, a previous study stated that, more than 15 countries worldwide had performed programs which included access to naloxone and overdose training, showing an increase in knowledge and efficiency around responding to an opioid over dose (Williams et al., 2014; Harm Reduction International, 2020). In addition, the provision of naloxone was restricted to self-use only, needing a prescription from a doctor. The risk of prosecution made it difficult to ensure peers, who are mostly opioid users themselves and primed to respond to a fatal overdose (South African Government, 2021).

In the present work, when asking health workers and medical students about which drug is contraindicated in the management of sympathomimetic agent of a patient with hypertension, the majority of physicians and students answered beta blocker, and then Benzodiazepines, while nurses answered calcium channel blockers, this was also previously reported (De-Letter et al., 2006).

**Strengths and Limitations**

This study was the first study in Hail to evaluate the awareness of drug overdose in ED among health care workers and medical students. There were some possible limitations in the proposed study, where, the group of age (20-30) were the majority of participants, while there were no participants from the age group above 50. The sample size was 200 while the responses were 205, which might bias the result. Also, the study was only for healthcare workers and medical students of one region.

## 5. CONCLUSION

In conclusion, the present study intended to assess healthcare practitioners' and medical students' awareness about drug overdose, they faced in the ED of Hail. The present pilot study demonstrated that a higher percentage of addiction, involved opioids, Amphetamine, and Acetaminophen, respectively, was common, especially among the middle age group (19.5%) and young (teenager) (16.6%). The present study reported that (depending on specialty), there was a difference between health care practitioners and medical students regarding knowledge and awareness of drug overdose. Furthermore, some health practitioners and medical students had demonstrated insufficient knowledge about naloxone administration.

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**Conflict of interest**

The authors declare that there is no conflict of interests.

**Data and materials availability**

All data sets collected during this study are available upon reasonable request from the corresponding author.

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