**Original Article :**

# Extent of Misuse and Dependence of Codeine-Containing Products among the Majmaah Population, KSA

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## Abstract

**Background and Aims:**
Over-the-counter medications are drugs that can be taken without prescription by a licenced practitioner; thus, their use is a global challenge that impacts patient care. Codeine-containing products are one of the over-the-counter medications that are available in Saudi Arabia without physician prescriptions, and little information is available about their abuse and dependence on these products. Therefore, our study aims to evaluate the degree of misuse of codeine-containing products among the Al Majmaah population.

**Methods:**
This cross-sectional study employs a snowball convenience sampling technique,which is crucial because it allows researchers to access a difficult-to-reach and often hidden population: individuals misusing Codeine. The research was conducted over eleven months and utilized an online questionnaire to gather data about adult residents of Al Majmaah city's Codeine misuse. The data were collected via Google Forms and analysed via SPSS software

**Results:**
This study involved 392 participants. A significant proportion (43.9%) admitted to using codeine medications, primarily because of easy accessibility (83.1%) from pharmacies without a prescription. Commonly cited symptoms prompting codeine medication usage included headaches (74.4%) and the common cold (61.0%), with the majority (89.5%) reporting no side effects. Pharmacies were the primary source of codeine medications (91.9%). In terms of knowledge, the majority (88.5%) acknowledged the potential harm associated with misuse, with addiction (60.2%) being the most recognized side effect. Despite this awareness, a significant proportion (45.4%) focused on usage instructions rather than side effects when reading package information.

**Conclusions:**
A significant proportion of participants resort to codeine medications, primarily because of their easy accessibility from pharmacies without a prescription. By addressing the gaps in knowledge and behaviour, public health efforts can strive towards safer and more informed medication practices within the community.

**Keywords:**
Opioid Misuse, drug abuse, public health intervention, self-medication, substance dependence

## Introduction:

Self-medication (SM), which is defined as the use of any substance not prescribed by a licensed practitioner to self-alter recommended doses, is a global challenge that impacts patient care[1]. Additionally, it is defined as the use of medications to treat symptoms or diseases that one has self-diagnosed. It also includes taking a medication as directed by a doctor on an ongoing or intermittent basis to treat persistent or recurrent problems[2].

Codeine-containing products are over-the-counter medications that are available in Saudi Arabia without a physician's prescription. One study revealed that analgesics constitute the highest class of drugs used in Saudi Arabia[3]. According to data from the National Drug Treatment Monitoring System in the United Kingdom, 2.2% of clients (n=4248) undergoing structured drug treatment used codeine as their major or secondary substance in 2013 and 2014[4]. A methylated morphine derivative found naturally in poppy seeds is called codeine, also known as 3-methylmorphine. In addition to its antitussive and antidiarrheal qualities, this short-acting, weak- to mid-range opiate is frequently used to treat mild to moderate pain in adults. Adults are advised to take 30 to 60 mg orally every 4 hours, up to a maximum of 240 mg. Changes in pain perception and emotional reactions are caused by endogenous enzymes that convert morphine to its active form. When codeine is used, normal opioid side effects, such as sedation, euphoria, and constipation, occur. Notably, owing to genetic differences in metabolism, patient reactions to codeine and the danger of intoxication differ[5].

The people who misuse codeine vary somewhat in that they are dependent on it, aware of their dependence but using it to quell cravings and prevent withdrawal; some use it within recommended limits without realizing it, but they do so often to treat headaches caused by withdrawal; and some wilfully ignore the directions of codeine products to become intoxicated. There are a few indicators of the prevalence and incidence of this "hidden" type of non-compliant use of habit-forming medications, and those that do depend on the individuals who acknowledge their addiction and seek assistance[6]. A study conducted in France revealed that 6.8% of people misuse Codeine analgesics and that 17.8% have Codeine dependence (n = 118), and these percentages are much greater than those associated with Paracetamol. Approximately 19.5% used it every day for more than six months[7]. Additionally, research published in 2019 concluded that 178 (34.2%) medical and pharmacy students at Nigerian University use opioid-containing

formulations, of which 171 (96.1%) are codeine-containing products[8].

Another study, carried out in 2021, investigated how physicians feel about codeine misuse and revealed that doctors are concerned with patients purposefully using codeine to improve their mood, misuse behaviours, patients' ignorance of habit-forming use, iatrogenic dependence, and the source of the drug through illicit dispensation[9]. In Saudi Arabia, there is little information available about the abuse of and dependence on products containing codeine. Thus, our study aims to evaluate the extent of misuse and dependence on codeine-containing products, as well as the knowledge and attitudes toward the harm of these substances, among the Al Majmaah population.

**Materials and Methods:**

This is a cross-sectional community-based study conducted among individuals misusing codeine, employing a snowball convenience sampling technique, a method essential for reaching populations that are hidden and difficult to access. This study was conducted through an online questionnaire among the Majmaah population from March 2024 until January 2025, with a total duration of 11 months. A pretested, pre-coded questionnaire was used for the study, which was created by researchers on the abuse of over-the-counter medications[10].

It is used to collect data to measure the extent of misuse and dependence on codeine-containing products. Ethical approval was obtained from the Majmaah University Research Ethics Committee (Approval number: MUREC-Nov.19/COM-2024/43).

The inclusion criterion for the study was healthy adults of AlMajmaah city above the age of 18 years who were not healthcare professionals. However, none of the exclusion criteria were met.

The sample size was calculated via the following formula:

$$N = (z^2 * p * (1 - p))/e^2$$

Z = 1.96 (corresponding to a 95% confidence level)

p = 0.5 (estimated response distribution)

e = 0.05 (margin of error)

$$N = 1.96^2 * 0.5 * (1 - 0.5))/0.05\text{^}2$$

$$N = 384$$

Based on the literature, we developed a questionnaire that was distributed via Google Forms for participants to complete. It was translated into the Arabic language, as it is the primary language of Saudi Arabia. The questionnaires contained three sections. Section 1 covered sociodemographic characteristics, which included age, sex, marital status, educational level,

occupational status, and monthly income. Section 2 consisted of eight questions to assess the attitudes of Saudi adults towards unprescribed OTCs, such as conditions for which OTCs were used, frequency of use, basis of use, and source of antibiotics, etc. Section 3 contained seven questions for knowledge assessment, awareness of the misuse of OTC medications, and the types of medications used, among others.

Data were gathered through a self-administered online survey, with the first item being informed consent. Moreover, all participants had chosen their answers from the given options, and it took approximately 15 minutes for them to complete the questionnaire.

Descriptive statistics for categorical variables, including frequencies and percentages, were used to summarize the sociodemographic characteristics of the participants. Chi-square tests and Fisher's exact tests (or Fisher-Freeman-Halton exact test for larger contingency tables) were employed to assess the associations between sociodemographic variables and codeine medication usage. A p-value < 0.05 was considered statistically significant. All the statistical calculations were performed via IBM SPSS version 27.0.1.

**Results:**

**Sociodemographic:**

The sociodemographic characteristics of the participants in the study are as follows: a total of 392 individuals participated, with varying age distributions. The majority of participants were in the age range of 18-24 years (35.5%), followed by those aged 35-44 years (24.7%) and those aged 25-34 years (17.6%). There were slightly more female participants (58.2%) than male participants (41.8%). In terms of marital status, the majority were married (49.7%), followed by individuals who had never married (47.2%). Educationally, most participants held a bachelor's degree (56.6%), followed by those with a high school education (23.0%) and a diploma (11.5%). Occupationally, a significant portion of the participants were unemployed (33.7%), followed by students (21.4%) and teachers (16.3%). The monthly income of the participants varied, with the majority earning fewer than 3000 Saudi riyals (43.1%), followed by those earning between 3001 and 6000 Saudi riyals (14.5%). The distribution of participants across different demographics provides a comprehensive understanding of the sample population involved in the study. (Table 1).

**Table 1: Sociodemographic characteristics of the participants (n=392).**

| | | N | % |
|---|---|---|---|
| Age | From 18 to 24 years | 139 | 35.5% |
| | From 25 to 34 years | 69 | 17.6% |
| | From 35 to 44 years | 97 | 24.7% |
| | From 45 to 54 years | 66 | 16.8% |
| | From 55 to 64 years | 21 | 5.4% |
| Sex | Female | 228 | 58.2% |
| | Male | 164 | 41.8% |
| marital status | Bachelor | 185 | 47.2% |
| | Divorced | 5 | 1.3% |
| | Married | 195 | 49.7% |
| | Widower | 7 | 1.8% |
| Educational level | BSC | 222 | 56.6% |
| | Diploma | 45 | 11.5% |
| | High school | 90 | 23.0% |
| | Intermediate stage | 8 | 2.0% |
| | Masters | 16 | 4.1% |
| | Ph.D | 9 | 2.3% |
| | Primary stage | 2 | 0.5% |
| Function | Accountant | 10 | 2.6% |
| | Administrative | 28 | 7.1% |
| | Doctor | 3 | 0.8% |
| | Engineer | 11 | 2.8% |
| | Government Employee | 21 | 5.4% |
| | Military | 10 | 2.6% |
| | Nurse | 7 | 1.8% |
| | Retired | 22 | 5.6% |
| | Student | 84 | 21.4% |
| | Teacher | 64 | 16.3% |
| | Unemployed | 132 | 33.7% |
| Monthly income | Between 3001 & 6000 Saudi riyals | 57 | 14.5% |
| | Between 6,001 & 10,000 Saudi riyals | 55 | 14.0% |
| | Less than 3000 Saudi riyals | 169 | 43.1% |
| | More than 10,000 Saudi riyals | 111 | 28.3% |

## Opinions Regarding the Misuse of Codeine Medications:

Among the respondents, the majority (54.6%) reported dealing with minor illnesses such as colds or headaches through home remedies, whereas a significant portion (23.5%) reported obtaining medication from pharmacies without a prescription. A considerable proportion (43.9%) admitted to using medications containing codeine. The primary reason cited for purchasing these medications was their easy accessibility (83.1%). Despite this, the majority (69.1%) of participants reported not giving codeine to their children. Among those who used medications containing codeine, the most common symptoms prompting usage were headaches (74.4%) and the common cold (61.0%). Notably, the majority (89.5%) reported no side effects from the use of medications containing codeine. When relying on these medications, participants predominantly leaned on their previous experiences (55.2%) and advice from pharmacists (26.2%). The primary source of medications containing codeine was pharmacies (91.9%). This summary provides insights into the prevalence of codeine medication use, reasons for usage, and reliance factors among the study participants. (Table 2).

**Table 2: Participants' opinions regarding the misuse of codeine medications**

| | | N | % |
|---|---|---|---|
| How do you deal with minor illnesses such as a cold or headache? | Home remedies, such as hot drinks, etc. | 214 | 54.6% |
| | I take medicine from the pharmacy without a prescription | 92 | 23.5% |
| | I go to the health care center | 44 | 11.2% |
| | I don't do anything | 42 | 10.7% |
| Are you using a medication that contains codeine? | No | 220 | 56.1% |
| | Yes | 172 | 43.9% |
| Why buy medications containing codeine (n=172) | Because it is easy to get | 143 | 83.1% |
| | Because hospital appointments are late | 46 | 26.7% |
| | Because treatment in private hospitals is expensive | 19 | 11.0% |
| | Because there is no transportation to the health care center | 4 | 2.3% |
| If you have children, do you give them medications that contain codeine? (n=172) | No | 112 | 69.1% |
| | Yes | 50 | 30.9% |
| How many times have you used medications containing codeine in the last six months? (n=172) | Once or twice | 72 | 41.9% |
| | Three to four times | 43 | 25.0% |
| | More than six times | 41 | 23.8% |
| | Five to six times | 16 | 9.3% |
| What are the symptoms that make you use medication that contains codeine (n=172) | Headache | 128 | 74.4% |
| | Common cold | 105 | 61.0% |
| | Tooth ache | 68 | 39.5% |
| | Throat pains | 57 | 33.1% |
| | Muscle pain | 43 | 25.0% |
| | Pain associated with menstruation | 35 | 20.3% |
| | Insomnia | 10 | 5.8% |
| | Stomach pain | 7 | 4.1% |
| | Constipation or diarrhea | 5 | 2.9% |
| | Hair loss | 0 | 0.0% |
| Have you ever experienced any side effects from using a medication containing codeine? (n=172) | No | 154 | 89.5% |
| | Yes | 18 | 10.5% |
| What do you rely on when using medications containing codeine? (n=172) | Previous experience | 95 | 55.2% |
| | Pharmacist advice | 45 | 26.2% |
| | Advice from a friend or relative | 26 | 15.1% |
| | A prescription for a friend or relative | 6 | 3.5% |

| | | | |
|---|---|---|---|
| Source of medications containing codeine (n=172) | Pharmacy | 158 | 91.9% |
| | From a relative or friend | 10 | 5.8% |
| | Prescription | 1 | 0.6% |
| | Health center | 1 | 0.6% |
| | Father is a doctor | 1 | 0.6% |
| | All the pharmacy and a relative | 1 | 0.6% |

**Knowledge of Medications Containing Codeine:**

The majority (88.5%) acknowledged that the misuse of these medications may be harmful. Similarly, a significant proportion (69.9%) recognized the presence of side effects associated with their use. Among those aware of side effects, the most commonly cited were addiction (60.2%), nausea and vomiting (35.0%), and headaches (32.8%). While a considerable number of participants (45.4%) reported having read information on the package of medications containing codeine, the majority of them focused on how to use the medication (71.9%), followed by information on the symptoms treated (61.8%) and possible side effects (54.5%). Pharmacies were the most commonly cited source of information regarding dosage (33.9%), followed by previous experience (27.8%). In terms of medication usage in the past six months, painkillers were the most commonly used (72.7%). The participants' current health assessments varied, with the majority rating their health as excellent (42.1%) or very good (34.7%). This summary provides insights into participants' knowledge, behaviour, and perceptions regarding medications containing codeine, highlighting areas of awareness and potential areas for education or intervention. (Table 3).

**Table 3: Participants' Knowledge of Medications Containing Codeine.**

| | | N | % |
|---|---|---|---|
| Misuse of medications containing codeine may be harmful | Yes | 347 | 88.5% |
| | No | 45 | 11.5% |
| There are side effects of using medications containing codeine | Yes | 274 | 69.9% |
| | No | 118 | 30.1% |

| | | | |
|---|---|---|---|
| Side-effects of medications containing codeine (n=274) | Addiction | 165 | 60.2% |
| | Nausea and vomiting | 96 | 35.0% |
| | Headache | 90 | 32.8% |
| | Sensitive | 54 | 19.7% |
| | Heartburn sensation | 43 | 15.7% |
| | Internal or external bleeding | 20 | 7.3% |
| | Mania | 6 | 2.2% |
| | There are no side effects | 0 | 0.0% |
| Have you ever read the information on the package of medicines that contain codeine? | No | 214 | 54.6% |
| | Yes | 178 | 45.4% |
| If yes, what information did you read (n=178) | How to use | 128 | 71.9% |
| | Symptoms that the medicine treats | 110 | 61.8% |
| | Possible side effects | 97 | 54.5% |
| | Warning | 69 | 38.8% |
| | I do not use medications containing codeine | 0 | 0.0% |
| Your source of information about the dosage of medication containing codeine | Pharmacist | 133 | 33.9% |
| | According to previous experience | 109 | 27.8% |
| | None | 92 | 23.5% |
| | Accompanying publication | 90 | 23.0% |
| | Search engine | 88 | 22.4% |
| Which of the following medicines have you used in the past six months | Painkillers | 285 | 72.7% |
| | Vitamins | 114 | 29.1% |
| | Cold treatments | 90 | 23.0% |
| | Cough reliever | 56 | 14.3% |
| | Anti-allergic | 55 | 14.0% |
| | Antibacterial | 32 | 8.2% |
| | Muscle relaxants or laxatives | 32 | 8.2% |
| | Sleep aids | 28 | 7.1% |
| Your current health assessment | Excellent | 165 | 42.1% |
| | Very good | 136 | 34.7% |
| | Good | 75 | 19.1% |
| | Acceptable | 15 | 3.8% |
| | Bad | 1 | 0.3% |

**Factors associated with the use of Codeine Medications:**

Table 4 presents the prevalence of codeine medication usage among participants across various sociodemographic characteristics. The data indicate that there was no significant difference in codeine medication usage based on age group (p = 0.806), sex (p = 0.256), marital status (p = 0.673), or monthly income (p = 0.225). However, significant differences were observed based on the method of dealing with minor illnesses such as colds or headaches (p < 0.001), with a greater proportion of participants who take medicine from the pharmacy without a prescription (62.0%) reporting codeine medication usage than those who use home remedies (37.4%) or seek healthcare centre assistance. Additionally, there was a trend toward higher codeine medication usage among participants with higher educational levels, with the lowest usage observed among Ph.D. holders (11.1%). Compared with other professionals, healthcare professionals, such as nurses, reported higher codeine medication usage (85.7%). This summary provides insights into the factors associated with codeine medication usage among participants, highlighting the influence of methods for dealing with minor illnesses and educational background. (Table 4).

**Table 4: Prevalence of Codeine Medication Usage Among Participants of Various Sociodemographic Characteristics.**

| | | Are you using a medication that contains codeine? | | | | |
|---|---|---|---|---|---|---|
| | No | | Yes | | P value[F] | |
| | N | Row % | N | Row % | | |
| Age | From 18 to 24 years | 80 | 57.6% | 59 | 42.4% | 0.806 |
| | From 35 to 44 years | 55 | 56.7% | 42 | 43.3% | |
| | From 25 to 34 years | 39 | 56.5% | 30 | 43.5% | |
| | From 45 to 54 years | 37 | 56.1% | 29 | 43.9% | |
| | From 55 to 64 years old | 9 | 42.9% | 12 | 57.1% | |
| Sex | Female | 122 | 53.5% | 106 | 46.5% | 0.256 |
| | Male | 98 | 59.8% | 66 | 40.2% | |
| Marital status | Married | 110 | 56.4% | 85 | 43.6% | 0.673 |
| | Bachelor | 103 | 55.7% | 82 | 44.3% | |
| | Widower | 3 | 42.9% | 4 | 57.1% | |
| | Divorced | 4 | 80.0% | 1 | 20.0% | |
| Educational level | BSC | 126 | 56.8% | 96 | 43.2% | 0.126 |
| | High school | 48 | 53.3% | 42 | 46.7% | |
| | Diploma | 26 | 57.8% | 19 | 42.2% | |
| | Masters | 5 | 31.3% | 11 | 68.8% | |
| | Ph.D | 8 | 88.9% | 1 | 11.1% | |
| | Intermediate stage | 5 | 62.5% | 3 | 37.5% | |
| | Primary stage | 2 | 100.0% | 0 | 0.0% | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Function | Unemployed | 78 | 59.1% | 54 | 40.9% | 0.088 |
| | Student | 43 | 51.2% | 41 | 48.8% | |
| | Teacher | 38 | 59.4% | 26 | 40.6% | |
| | Administrative | 13 | 46.4% | 15 | 53.6% | |
| | Retired | 9 | 40.9% | 13 | 59.1% | |
| | Government Employee | 15 | 71.4% | 6 | 28.6% | |
| | Engineer | 6 | 54.5% | 5 | 45.5% | |
| | Military | 6 | 60.0% | 4 | 40.0% | |
| | Accountant | 8 | 80.0% | 2 | 20.0% | |
| | Nurse | 1 | 14.3% | 6 | 85.7% | |
| | Doctor | 3 | 100.0% | 0 | 0.0% | |
| Monthly income | Less than 3000 Saudi riyals | 91 | 53.8% | 78 | 46.2% | 0.225 |
| | More than 10,000 Saudi riyals | 66 | 59.5% | 45 | 40.5% | |
| | Between 3001 & 6000 Saudi riyals | 37 | 64.9% | 20 | 35.1% | |
| | Between 6,001 & 10,000 Saudi riyals | 26 | 47.3% | 29 | 52.7% | |
| How do you deal with minor illnesses such as a cold or headache? | Home remedies, such as hot drinks, etc. | 134 | 62.6% | 80 | 37.4% | <0.001* |
| | I take medicine from the pharmacy without a prescription | 35 | 38.0% | 57 | 62.0% | |
| | I go to the health care center | 21 | 47.7% | 23 | 52.3% | |
| | I don't do anything | 30 | 71.4% | 12 | 28.6% | |

## Discussion:

The study conducted on misuse and dependence on codeine-containing products reveals the interplay between cultural practices, accessibility, and awareness. Despite a high level of knowledge regarding the potential risks associated with codeine, there is a notable discrepancy between this awareness and the actual usage patterns observed.

Pharmacist counselling is a crucial topic, especially in light of these data. Teaching them to inform consumers "Patients" about the effects and side effects of medications is crucial. By taking responsibility to inquire about the patient's medical history, this research can make significant progress in terms of managing the consumption of this type of medication.

The data suggest a prevalent culture of self-medication, with over half of the respondents preferring home remedies for minor ailments. However, nearly a quarter also acquire medication without prescriptions, indicating a potential gap in healthcare accessibility or regulation. The significant use of codeine (43.9%) could be attributed to its easy availability, as cited by 83.1% of users. Interestingly, a responsible stance is observed among the majority who refrain from administering codeine to children. The lack of reported side effects

by most users may contribute to continued use, supported by personal experiences and pharmacist advice[11, 12].

The high recognition of potential harm from misuse (88.5%) and awareness of side effects (69.9%) reflects a community that is informed yet perhaps overlooks the risks, given the high usage rates. The common knowledge of side effects such as addiction aligns with global concerns about opioid dependency[13,14]. The reliance on packaging information and pharmacies for dosage guidance underscores the need for improved patient education on medication risks [15,16].

Sociodemographic factors seem to play a minor role in codeine usage, with no significant differences across age, sex, marital status, or income. However, the method of dealing with minor illnesses is a significant factor, with those who obtain medicine without prescriptions being more likely to use codeine. This finding suggests that regulatory measures and healthcare practices could influence medication usage patterns[17,18]. The trend of higher usage among those with more education and specific professions, such as healthcare workers, raises questions about the influence of occupational stress and access to medication on drug usage behaviours[19,20].

**Clinical Implications and Future Research:**

Given the high proportion of individuals who obtain codeine medications without a prescription, there is an opportunity for pharmacists to provide counselling on appropriate medication use, potential side effects, and the importance of seeking medical advice before self-administering codeine-containing products [21]. Healthcare providers should remain vigilant for signs of codeine misuse or dependence among patients presenting with symptoms commonly treated with these medications, such as headaches or the common cold [22]. By promoting responsible medication use and enhancing patient education, healthcare professionals can contribute to reducing the prevalence of codeine misuse and its associated harm within the community.

Future research could explore the effectiveness of targeted educational interventions aimed at raising awareness about the risks of codeine misuse and promoting safer medication practices among the population. Longitudinal studies could assess the impact of such interventions on patterns of codeine medication usage, knowledge levels, and attitudes over time. Qualitative research approaches, such as focus group discussions or in-depth interviews, could provide deeper insights into the factors influencing individuals' decisions to use codeine medications without a prescription and their perceptions of the associated risks. By addressing these gaps in knowledge and understanding, future research can inform the development of targeted interventions and public health policies aimed at miti-

gating the harm associated with codeine misuse within the population.

**Limitations:**

Several limitations of the study should be acknowledged. The use of a snowball convenience sampling technique may have introduced selection bias, as participants were recruited through existing social networks, potentially limiting the generalizability of the results to the broader population of Al Majmaah city. The reliance on self-reported data via an online questionnaire may have introduced response bias, as participants may have underreported or overreported their medication usage or knowledge levels owing to social desirability or recall bias. The cross-sectional design of the study precludes the establishment of causal relationships between variables and provides only a snapshot of codeine medication usage and knowledge at a single point in time. Furthermore, the pre-coded, pretested questionnaire was not formally validated or reliably assessed, which could limit how accurately it measures attitudes, knowledge, and usage of drugs containing codeine. Due to resource limitations, a thorough psychometric examination was not conducted, despite the questionnaire being created based on literature and pretested for clarity and cultural relevance. Despite these limitations, this study provides valuable insights into the prevalence, knowledge, and factors associated with codeine medication usage, informing future efforts to address this public health concerneffectively.

**Conclusion:**

A significant proportion of participants resort to codeine medications, primarily because of their easy accessibility from pharmacies without a prescription. The primary reason cited for purchasing these medications was their easy accessibility. Despite awareness of potential harm, such as addiction, there remains a notable gap in understanding side effects, with a focus on usage instructions over other critical information on package labels. This study underscores the importance of targeted interventions to promote responsible medication use and increase awareness of the risks associated with codeine medications, particularly among healthcare professionals. By addressing these knowledge and behavioural gaps, public health efforts can strive toward safer and more informed medication practices within the community.

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