

# Social Determinants and their Impact on Self-Medicating Practices and Medication Adherence

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## Abstract

Self-medication, the practice of using medicine - Over The Counter (OTC), prescription (Rx), or alternative/complementary - without direct physician involvement and guidance has been on the rise due to increased information, individuals wanting to play a larger role in their healthcare, and the availability of OTC medications. While self-medication has its benefits, namely avoiding patient costs and providing resources for minor illnesses and injuries, complications can arise from this practice. Many at-home medical errors can be attributed to self-medication practices where patients took too much, too little, the incorrect type, or the incorrect delivery of medicine. In the age of the internet, healthcare providers, such as doctors and pharmacists, who play an active role in medication, become less relevant when patients decide to self-medicate. Patients may not know how to navigate dosing instructions or be aware of adverse drug interactions, which are two of the main concerns when it comes to self-medication. Certain demographics, including young children, older adults, and those with low health literacy are especially susceptible to incorrect self-medicating practices, including accidentally under/over-dosing, medication non-adherence, and taking multiple medications that have significant interactions. Increasing education and health literacy regarding self-medication, improving patient-provider communication in innovative ways, and creating smart dosing and adherence devices are all trends we will continue to see as self-medication practices expand.

**Keywords:** Social determinants; Self-medication; Adherence to medication; Patient compliance

Effective drug treatment with patient counselling; Role of healthcare professionals

**Abbreviations:** OTC: Over-The-Counter; SMP: Self-Medication Practices; SES: Socio-Economic Status; DOT: Directly Observed Therapy

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## Background

Everyday illnesses-from the common cold to headaches-are occurrences most people are familiar with, however, only about 15% of cases result in patients seeking medical attention [1]. Even once patients seek medical attention, most have already tried remedying the situation at home by practicing self-medication [1].

Self-medication is the concept of using available medication to treat or manage an issue identified by the patient. Self-medication is an important part of healthcare and allows patients to play a larger role in the management of their health [2]. While there are benefits to practicing self-medication after or before going to a physician, medical errors, delays in care, and drug interactions may result [3]. Lack of sufficient knowledge may contribute to morbidity from self-medication practices, and it is estimated that caring for patients with medication-associated errors exceeds \$40 billion every year [4]. In this publication, the risks, trends, and implications of adherence to self-medication will be reviewed. Self-medication practices may reduce the cost and time traditionally associated with seeking medical care [3]. It is generally cheaper for individuals to purchase OTC medication than to visit a physician and fill a prescription [1]. Practicing self-medication before turning to healthcare providers can also allow for better allocation of medical resources, especially in areas where healthcare is scarce. With the availability of Over-The-Counter (OTC) medications to treat a variety of

issues and an increase in individuals wanting to play a role in the maintenance of their health, it is no surprise many people turn to these medications to try and solve minor ailments at home [3]. On the other hand, using medication without a physician's guidance can lead to significant medication errors, especially when patients are taking multiple medications or taking them for a prolonged period [3]. OTC medications may have interactions, side effects, or considerations that patients could be unaware of, and this can lead to over/under-dosing, dependence, and other medical errors that lead to morbidity or mortality [3]. Studies have shown that patients are often undereducated about OTC medications, and believe they are universally safe [5]. Delaying care is also a risk with self-medication, as the patient may incorrectly identify an issue as treatable at home, and postpone getting care for a problem that requires more immediate medical intervention [2]. Medication adherence can also be difficult when a patient is self-medicating, as they are often medicating on their own schedules, rather than one recommended by a physician. Studies have shown that around 50% of people likely do not adhere to their medications as prescribed for chronic illness [6]. This is appalling considering these are the gravest of diseases and are often terminal.

### Self-Medication Practices

In order to practice self-medication, a patient must perform functions similar to those of physicians when prescribing medication. First, the patient must identify the symptoms/illness. Today, many turn to the internet to diagnose experienced symptoms [7]. While using the internet can help patients understand medical diagnoses and bring about questions they can ask doctors, information can be inaccurate, and it can be hard for individuals to differentiate and attribute symptoms between minor symptoms and major diseases [7]. The patient must also identify the correct medication, dosage, and schedule to ensure the efficacy of the treatment. Medication labels, media, previous experience, and professional recommendations contribute to the selection and administration of medications [2]. When individuals decide to practice self-medication, many will use OTC products. Over-the-counter medications are those available without a prescription from a healthcare provider, and commonly include allergen/histamine medications and Nonsteroidal anti-inflammatory drugs or NSAIDs [2]. Many of these medications are also available by prescription, usually in higher doses. Both prescription and OTC medications undergo reviews by governing agencies and pharmaceutical companies to ensure efficacy, safety, and classifications, as well as determine prescription or OTC status [2]. OTC medications are sold and distributed with the intention that consumers will use them on their initiative, and packaging and instructions reflect this [2]. Prescription medications can also be used to practice self-medication, often with leftover medication from a previous illness, or prescription medicine obtained from friends or family members [8]. Individuals that have leftover medication from an acute illness, or were prescribed medication for an issue that was resolved may hold on to the medication with the mentality to use it at a later date. This is a common practice for prescription pain medications,

as they are often overprescribed and not used up by the patient. In one study following opioid prescriptions after surgery, 86% of patients did not take all of the medication, and over half of these patients planned to hold on to the remaining pills [9]. Prescriptions that are not taken as directed may also be kept and used at a later time. Some patients may not finish a course of antibiotics for a current infection, and then use the remaining pills for a new infection later on. Self-medicating with prescriptions prescribed for a different illness can be problematic as well - for example, a patient taking leftover antibiotics for a viral infection can lead to side effects, and bacteria resistance, all while not addressing the illness [9]. Due to the potential for misuse, the United States Federal Drug Administration recommends bringing all unused and expired medications to a local drug take-back program, where professionals will properly dispose of the medication [10]. In the United States, the Federal Drug Administration (FDA) governs OTC medications and recommends patients read and understand the medication labels before treating themselves [11]. The CDC reports that 48.6% of Americans have taken at least one prescription medication in the last 30 days [12]. Some OTC medications may have severe side effects if mixed with certain prescription medications or alcohol, and selection requires extra attention for these patients.

Individuals may also decide to self-medicate with herbal or nutritional supplements, rather than use OTC medication. The World Health Organization estimates that up to 80% of individuals use these non-conventional medications in their health regimen [13]. Considered dietary supplements, herbal and nutritional products cannot claim efficacy or treatment of a particular illness and do not undergo the same regulatory processes as prescription and OTC medications. This means that self-medicating with these products calls for extra precautions to ensure interactions and adverse effects are prevented [14]. A survey of 500 preoperative patients found that 51% use herbs, vitamins, dietary supplements, or homeopathic medicines. While patients may believe these alternative or complementary natural medicines have little to no adverse effects, 27% of these preoperative patients had consumed supplements that may inhibit coagulation, affect blood pressure and electrolytes, or have cardiac effects, which may contribute to adverse effects with operative and post-operative procedures [13].

### Professional participation in self-medication

Many patients rely on physicians and other healthcare providers to gain insight into how to manage illnesses and symptoms. Proper OTC medication guidance by providers can help reduce errors associated with self-medication. While one study found that 57% of patients had used OTC medications in the past month, only 37% of physicians asked about OTC use. The patient [1] initiated most discussions about OTC medications during visits. Improvements in patient-provider communication could increase the number of patients educated in proper OTC use. For patients that rely on pharmacist recommendations, multiple studies have shown that efficacy is not usually the primary consideration when pharmacists make recommendations, but rather the safety of the product. Many pharmacists have reported patient expectations and autonomy

often outweighs evidence-based factors that contribute to choosing an OTC medication [5]. The involvement of too many medical providers may have the opposite effect, with too many conflicting recommendations. Patients that do not get straightforward medical advice may be far less likely to follow a physician's advice. When presented with conflicting messages from multiple sources about the same medication, people can be less likely to take the medication at all [15].

### Young children and self-medication

A specific and potentially harmful risk to children who are recipients of self-medication by a caregiver is inaccurate dosing. Liquid medications are often relied on for young children and are more complex to administer, accounting for more than 80% of pediatric home-medication errors. One study found that more than half of caregivers gave a dose outside the recommended amount. Physician involvement, such as demonstrations, marking the correct dose on a syringe, or verbal/written instructions have been successful in minimizing dosing errors [16], but with self-medication, a physician is not involved in the process, leaving room for these errors to occur [17]. Children taking multiple medications are at an increased risk for medication errors from potential drug interactions, interval errors, and double dosing [17]. While the FDA recommends including devices that have standard measurements with all liquid medication, not all OTC or prescription medications will follow that guideline [17]. If caregivers do not know how to ask for one, they may turn to kitchen spoons or dosing cups, which may not be accurate. Utilizing larger measuring spoons for smaller doses of medicine increases the risk of overdosing, and using a measuring device that is too small requires numerical skills that may lead to inaccurate dosage, due to needing to refill and deliver medication multiple times to reach the desired dose [17]. One study comparing medication delivery using a color-coded dosing system and syringes versus conventional syringes and measuring spoons found that caregivers were more likely to deviate from a recommended dose when using a conventional method [16]. Without explicit guidelines, such as those indicated by colored lines that corresponded to the correct measurement of medication, caregivers were significantly more likely to overdose and/or underdo medication on their children [16].

### Older adults and self-medication

As we age, medication use both prescription and OTC increases. Those that make up the oldest 10% of the population consume more than 25% of prescription medications [8]. Older adults often take medications for chronic conditions, reflecting the epidemiologic transition observed over the last century [18]. Of chronic diseases, circulatory and cardiac conditions are the most common conditions in older adults, and medications to treat them make up 20% of all prescriptions. In one study,  $\frac{2}{3}$  of adults aged 51-90 reported using prescription blood pressure medication, and 90% used OTC pain medications [19]. Because a high number of elderly patients take multiple medications, and/or mix OTC and prescription medications, they are at a higher risk for misuse, mainly from errors in self-administration [8]. Elderly individuals may have difficulty

opening, reading, and/or dosing medication, which can contribute to under-medication [8]. Older adults are also more likely to use other substances in conjunction with medication, such as caffeine or alcohol. Almost 60% of adults reported using caffeine daily, and 10% reported using alcohol. Concurrent use of caffeine, alcohol, OTC medications, and/or prescription medications can lead to severe adverse effects, which older adults may not be fully aware of [19].

### Socio-Economic Status (SES)

Looking at data from the elderly low SES community, one outstanding reason for them to take medication less frequently or stop altogether can be a lack of health insurance. After people retire, many of them are left uninsured or without prescription coverage, meaning they can go to the doctor but cannot afford a subsequent prescription [20]. Overall, those that lack prescription coverage may be far less likely to take medication as directed with the same illnesses that have prescription coverage [20]. When viewed under the lens of socioeconomic status, a consistent barrier in the remedy of health disparities is the compliance of the patient to medicate. A few obstacles contribute to medication adherence. Patients of low SES backgrounds may have a lack of education and finances compared to those of higher SES. These patients may be unsure of how to take their medicine, and either wean themselves off it, take it "as they see fit", or stop taking it entirely [21]. For medications that revolve around food intake, it can prove difficult for persons with poor education and health literacy to know how to take their medications. This can lead to immediate side effects, which is a deterrent for patients to continue with the medication [21]. For example, some medications must be taken with food and may have significant side effects, such as nausea, if this is not followed. Studies have found that having someone to hold these people accountable for taking their medicine helps [21]. Whether it be regular phone calls from the doctor's office to check-in or an accountability partner in the home such as a spouse, friendly reminders are beneficial for patients to improve medication adherence, especially in those of low SES [21]. An issue many low SES communities may face is deciding between allocating funds for basic needs and medications (OTC or prescribed). Oftentimes people and families choose necessities over medications, which can lead to health complications [22]. Many people also can request their prescriptions be changed to the generic brand, which upon review of the person's financial status is usually granted [22]. Outliers for these claims are women with a high school education or greater, and those diagnosed with more chronic illnesses / that need to take more medication [22]. A barrier that sets SES rungs apart can be their access to information. As hard as pharmacists and industry professionals may try, getting people with low SES specific information on their medications, whether it is prescribed or over the counter can be difficult. This may lead to a reduced willingness to take medications if the person feels they do not know enough about the product to trust its credibility and to understand the impact it will have on their body [2]. Health literacy is also a barrier to correctly using medication-both prescription and OTC, and often those of lower SES will have lower health literacy. Approximately 12% of US adults have limited English proficiency,

which can lead to medication errors from misunderstandings of physician or pharmacist instructions, and/or medication labels [17]. Multiple medications, medication frequency, and route can also complicate correct medication delivery. Patients may not understand twice a day to mean morning and night and may give doses too close together [17]. Language barriers may further the issue as well. Spanish-speaking patients may read “once daily” on an OTC medication and mistake this to be “eleven,” (“once” in Spanish translates to “eleven” in English) which can lead to significant overdosing [17].

### Gender

Women can be less likely to book/attend follow-up visits with physicians, and refill prescriptions due to cost. In line with this is the statement “researchers found 26.2 percent of women and 19.8 percent of men reported cost-related non-adherence to medical care,” representing the likelihood once these determinants are overlapped [23]. Upon looking at sex and gender as a determinant for medication adherence, studies show that women are far more likely to take medications as prescribed than men are. Even if women are prescribed more medications, they are still more likely to take them all as directed [24]. Women also use more OTC medications than men, as found in several studies [8].

### Looking to the Future

In a way of solving the issue of medication adherence, many companies are looking to create devices that help with issues of forgetfulness. When pill organizers prove to not be enough, there are new technologies that send text alerts and monitor adherence based on how much medication is dispensed from a storage device and how often [25]. Many people can also be wary of taking medication as directed when the directions they are receiving are not clear. To avoid this, doctors’ offices have begun having nurses and secretaries call patients to re-explain or clarify medication instructions after visits [25]. It can prove difficult with all the information on the internet, how to exactly take a medication which can lead to confusion for the patient. By calling the patient, they can receive personalized directions from their physician. With technology advancements, pills have now been created with tracking devices so that doctors and patients alike can see where the medicine is impacting their body, which can give patients a sense of security in the knowledge they have on their medications, which may also lead to better adherence [25]. There is such a large call for an increase in medication adherence that it has turned into an industry over the last few decades. It is estimated that only 50% of people with chronic illness (es) take their medication as directed [26]. While the goal in many consciously performing acts of non-adherence is swayed by the cost of medication, many of these individuals may experience hospitalization due to this, and face an even larger bill from the hospital [26]. Economists predict that the medication adherence market is growing quickly, and is projected to reach \$6.0 billion by 2025, which may prove to greatly benefit the world of healthcare [26]. With more people taking medication as prescribed, many may be able to stay out of the hospital, which can help with overcrowding and current wait times. A breakthrough in adherence

may come from the growing industry of virtual DOT (Directly Observed Therapy) wherein a medical professional joins a video call with a patient and watches them take their medication as directed [26]. For older populations and those uncomfortable with apps, the use of medication reminders via voice-activated systems such as Amazon Alexa may prove helpful [27]. There are also devices on the market that when they monitor a drop in compliance, notify the family members of the patient so they are aware of their condition and act on a personal level [27]. This element of personalization may prove crucial moving forward, as to accommodate patients’ comfort levels and understanding of the necessity of medication. However, studies have shown that in many cases, pill reminder systems may not work. The most important factor in the improvement of adherence may prove to be the personalization aspect of programs set in place to improve adherence [28]. It has been stated as a need for interventions; however, in less dire terms this translates to a need for personal conversations about the patient’s unwillingness to follow prescriptions [28].

### Conclusion

In summation, there may be a multitude of reasons why patients do not take medications as prescribed or advised, and as we look to the future, we can devise plans, systems, and programs to aid in medication adherence and productive self-medication. Upon review of various social determinants, one can deduce that we as an overall population do not take medications as prescribed/directed nearly enough and that no matter our reasoning; this will only hurt us in the end. In all cases, avoidance of unnecessary hospitalization and complications has been the main goal. An underlying cause of wrongful self-medication is a lack of education on specific medicines and how they should be administered. We have found that in cases of parents dosing their children, they tend to overmedicate leading to an overdose. The elderly tends to under-medicate, oftentimes for chronic illnesses, which leads to hospitalizations. Families and persons in low SES communities also under-medicate to have funds for basic needs. Women are statistically more likely than men to commit acts of non-adherence, specifically to afford basic needs. Oftentimes social disparities can overlap, so it is important to look at how one determinant can impact another, and how those work together to formulate a person’s opinions and actions. All this is to ask how we can educate on proper self-medication and solve medication non-adherence in these communities. When we look to the future, there lies a bright and clear path ahead. Systematic changes like the implementation of virtual DOT appointments have already shown benefits since the start of the Coronavirus pandemic and may become the norm in coming years to improve medication adherence. Other more personalized routes such as text or AI voice reminders in the home will help those who are non-adherent due to forgetfulness. Alongside the growing demand for personalized care, these forms are set to make great headway in the world of public health and medication adherence in various populations. The overall theme for greater adherence has proven to be more personalized messaging, coming either directly from the physician’s office or from family members. The future of correcting



self-medication practices and medication adherence may lie in the willingness of the healthcare industry to respond positively to the call for personalized care.

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