ORIGINAL ARTICLE

CONTENTS

Dispensing of medicines via vending machines

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ABSTRACT

Aim: to analyze the possibilities to implement dispensing of medicines via vending machines.

Materials and Methods: A systematic literature review was conducted using PubMed, Scopus, and Google Scholar databases. A SWOT analysis of dispensing medicines through vending machines was performed. Ukrainian legal framework and content analysis were used to assess feasibility, with an anonymous survey of 106 respondents aged 20 to 70 gathering opinions on installing vending machines for over-the-counter medications in public places.

Results: The study showed the following: 1) strengths were: convenience, access to medicines in remote areas; 2) weaknesses: limited number of medicines, lack of possibility to consult with a pharmacist, cost of vending machines; 3) opportunities: possibilities to use for prescribed medicines or for chronic diseases medication; 4) threats: exclusion of pharmaceutical professionals from the process of ensuring access to medicinal products, self-medication and danger of side effects. The 58 % of respondents supported vending machines, citing convenience, availability, and shorter pharmacy queues.

Conclusions: Dispensing medicines via vending machines presents a viable alternative to traditional methods. The main advantage is patient convenience, but attention must be given to mitigating risks from self-medication. Licensing terms should be established for business entities involved in vending machine operations, ideally those holding a retail license for medicinal products.

KEY WORDS: access to medicines; pharmaceutical regulation; pharmaceutical policy

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INTRODUCTION

Access to medicines is a crucial aspect of public health. In recent years, various forms of increasing access to medicinal products have become widespread, such as dispensing medicines via vending machines. Vending machines are widely used for food, drinks, small necessities, and many other things. However, the use of vending machines in the pharmaceutical sphere is a challenging area [1, 2]. Medicines are distinct from other commercial goods in many ways: potential impact on health and life, potential misuse or dangerous side effects, the requirement for a prescription from healthcare professionals or pharmacist consultation, sensitive storage conditions (temperature, humidity, light protection), and others. Given these factors, dispensing medicines via vending machines is not widely used due to precautionary measures.

The idea of using vending machines for medicines and other medical products was notably accelerated by the COVID-19 pandemic [3], as both individuals and healthcare systems sought possibilities to reduce virus transmission risks, minimize contact, and increase convenience. This distribution form remained in demand even after the pandemic period.

Dispensing medicines via vending machines has potential from an access to medicines (specifically, physical accessibility) perspective [4]. It provides convenience, especially for: availability outside regular pharmacy hours; accessibility in remote areas; reducing waiting times; urgent, but not emergency, situations; and availability in places where many people are (airports, train stations, shopping malls, etc.). However, concerns regarding safety, regulatory compliance, and the scope of medicines available through this distribution form need to be addressed.

Legal regulations regarding the dispensing of medicines vary across European countries [1, 5], largely depending on the possibility to dispense medicinal products outside of pharmacies. However, legal regulation of such distribution forms as dispensing medicines via vending machines goes slightly beyond, raising the question of whether it is possible to dispense medicinal products in this way at all. In this regard, Ukraine's experience in implementing online trade in medicinal products, implementing "mobile pharmacy points," and the receiving medicines by mail pilot project may be valuable.

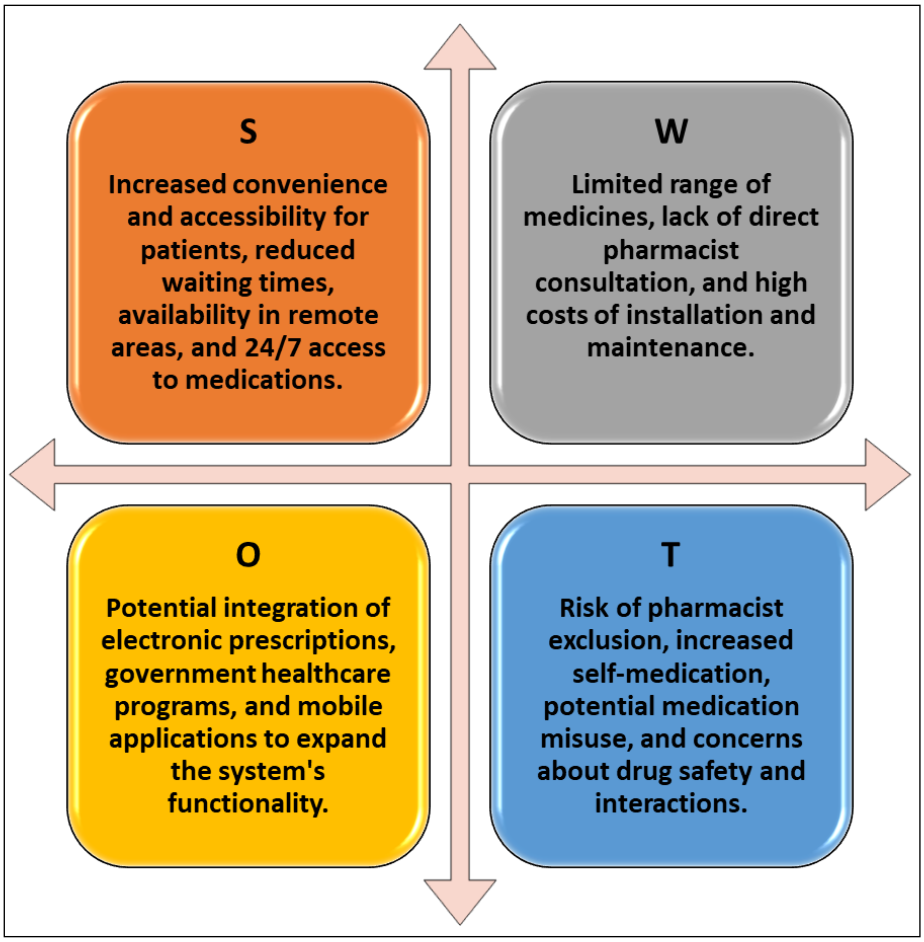

Fig. 1. SWOT analysis of automated medicine dispensing

AIM

The aim of the study was to analyze the possibilities of implementing the dispensing of medicines via vending machines. This article also considers the strengths, weaknesses, opportunities, and threats of this method of dispensing medicines.

MATERIALS AND METHODS

This study primarily relies on existing literature that reviews different aspects of dispensing medicines via vending machines. A systematic search was conducted using PubMed, Scopus, and Google Scholar databases. First, a SWOT analysis regarding the dispensing of medicines via vending machines is proposed. Then, based on the access to medicines approach and the Ukrainian legal framework, including content analysis as an example, the possible introduction of dispensing medicines via vending machines was analyzed. The study also employs the dialectical and hermeneutic methods and incorporates perspectives from scientific literature. Additionally, an anonymous survey of 106 respondents aged 20 to 70 was conducted to determine their opinions on installing over-the-counter medication dispensing machines in public places. The material was statistically processed, with percentages calculated.

COMPLIANCE WITH ETHICAL STANDARDS

The authors declare that all norms of academic integrity and ethical standards of scientific activity were observed in the preparation of the article "Dispensing of medicines via vending machines." References to the works of other researchers have been made through proper citation in accordance with copyright legislation. The requirements of scientific citation ethics have been met. All study procedures were conducted in accordance with the ethical standards set by the Declaration of Helsinki. Participants were informed about the study's objectives and provided voluntary informed consent for participation. The survey was conducted anonymously to ensure confidentiality.

RESULTS

SWOT analysis regarding dispensing of medicines via vending machines. The SWOT analysis is conducted considering the positions and interests of the stakeholders, which include: state interests (including those

of regulatory bodies and authorities), pharmaceutical companies and pharmacies (including pharmacists, dispensers, and other pharmaceutical sector representatives), and patients (Fig. 1).

STRENGTHS – AS CURRENT FACTORS THAT COULD PROVIDE VARIOUS ADVANTAGES

Convenience for patients is driven by the need for more accessible and efficient ways to provide medicines.

In several countries, the number of pharmacies is regulated, with specific requirements established for their opening and operation. Some countries, including Ukraine, do not have such restrictions. It is quite common to have multiple pharmacies on the same street or even within the same building. From the perspective of a patient's ability to access medicinal products, this is very convenient. The use of vending machines for dispensing medicines would further expand the number of locations where patients can purchase medicines. Alongside this, non-prescription vending machines can increase patient satisfaction. For example, automated machines provide on-demand medicines and medical products at airports and train stations, reducing the need for queuing at hospitals or pharmacies, thereby increasing patient satisfaction [2].

Another aspect of convenience for patients is working hours. The number of pharmacies operating at night or on weekends and holidays is limited. The ability to use vending machines for dispensing medicines allows patients to access medications virtually at any time.

Additionally, using vending machines for dispensing medicines could reduce waiting time. Medicines can be purchased instantly without waiting in pharmacy lines.

Access to medicines in remote areas. Potentially, vending machines for dispensing medicines could be used in settlements where there are no stationary pharmacies.

WEAKNESSES – AS CURRENT FACTORS THAT COULD POTENTIALLY HAVE DISADVANTAGES AND POSSIBLE RISKS

Limited number of medicines. Vending machines could handle limited number of medicines. Thus, it could be used only for most frequently medicines. Any controlled substances must be excluded.

The ability to consult with a pharmacist. In many cases patients ask a pharmacist for some explanation therefore buy some medicines. At vending machines this option could be substituted with the possibility to make a phone call or by pressing a button to connect with an on-duty pharmacist.

Cost of vending machines. Vending machines by themselves are quite costly machines. For businesses, installing and maintaining such vending machines may not be cost-effective

OPPORTUNITIES – AS POSSIBILITIES TO GROW, IMPROVE PERFORMANCE AND GAIN BENEFITS

Vending machines could be used not only for most frequently used medicines, but also for prescribed medicines or for chronic diseases medication. For example, in Ukraine, state program "Affordable Medicines" is introduced, by which patients can receive medicines they need free of charge or with a partial co-payment. Currently, medicines under this government program can be obtained, including through an electronic prescription. The electronic prescription format consists of a 16-character alphanumeric code. Theoretically, a patient could enter this 16-digit code to receive the prescribed medication or make an additional payment using a payment terminal. Another option could be the use of a QR or barcode code, which would be scanned by the vending machine. Possibility to use different mobile applications also should be considered.

THREATS – AS FACTORS WHICH COULD NEGATIVELY IMPACT ON PROCESS OF DISPENSING MEDICINES VIA VENDING MACHINES

The key threat appears to be the potential exclusion of pharmaceutical professionals, particularly pharmacists, from the process of ensuring public access to medicinal products.

SELF-MEDICATION AND SIDE EFFECTS

An increase in the availability of non-prescription vending machines will likely lead to a rise in self-medication practices, building on existing trend [2]. Self-medication could take different forms: starting from misinterpretation of pain or other symptoms, leading to overdosing or misuse of medicines. This may lead to polypharmacy, situations where patients inadvertently acquire multiple medications that may interact adversely. It should be noted that there is research indicating that, on the contrary, the level of potential medical errors decreases [6].

As part of the study, a survey was conducted among 106 respondents aged 20 to 70 years to assess their attitudes toward the installation of vending machines for dispensing medications.

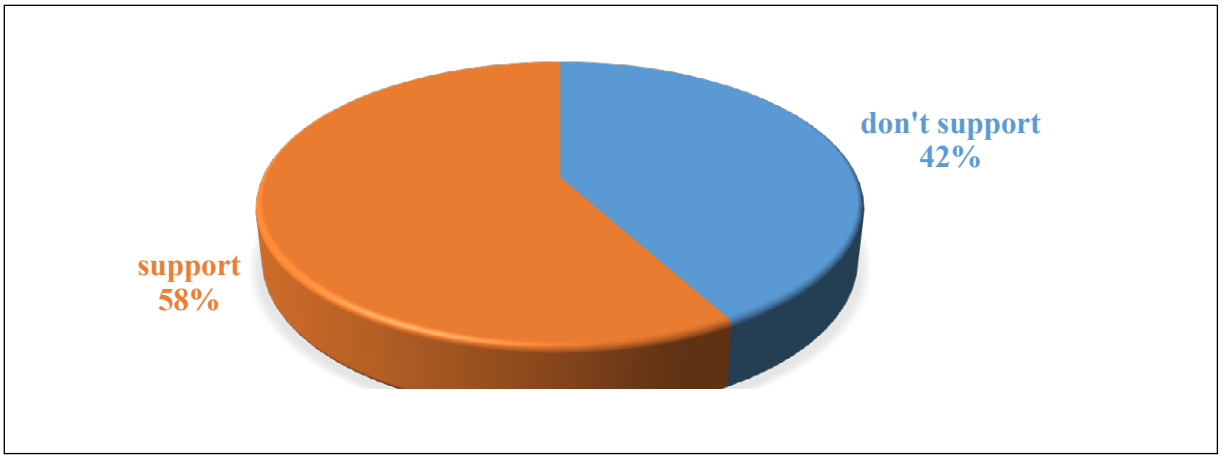

Fig. 2. Percentage distribution of respondents surveyed regarding the installation of over-the-counter medicine vending machines in public places

According to the survey, 68 % of respondents believe that the lack of 24-hour pharmacies is a problem, especially in times of war. 85 % of respondents said that they had at least once encountered a situation where a pharmacy was closed at night or on a day off.

Key survey results: 58 % of respondents (61 people) support the idea of installing pharmacy vending machines, highlighting their convenience, availability at any time, and reduction of queues in traditional pharmacies. 42% of respondents (45 people) were against it, expressing concerns about the lack of pharmaceutical consultation, potential misuse of medications, and the technical limitations of such machines (Fig. 2).

Among respondents aged 40 and older, 100 % supported the initiative to introduce pharmacy vending machines, citing the need for 24/7 access to medications and the convenience of purchasing them without waiting in line.

DISCUSSION

The concept of "access to medicines" is multifaceted and can be considered from various perspectives [4]. The concept of access to medicinal products encompasses issues of economic affordability, intellectual property protection, policy development, and ensuring the interests of vulnerable population groups, different patient access schemes, managed entry agreements, reimbursement issues, pricing policies, among others. Additionally, access to medicinal products includes the aspect of physical accessibility. Usually, physical accessibility refers to the availability and geographical accessibility of medicine for those who need them for rational use [7]. In the context of this study, the physical accessibility of medicines is viewed more as the ability to access medicines not only through traditional pharmacies.

In European countries it's a tendency towards the ability to dispense medicinal products not exclusively in pharmacies [5]. In the context of our study, it is useful to apply the following classification of non-pharmacy trade [1] in European countries, with certain remarks:

1) no non-pharmacy trade;

2) there is only a non-pharmacy trade in preparations with a low therapeutic effect (e.g., herbal medicines), or is under the supervision of a pharmacist or other person qualified in pharmaceutical sciences;

3) a non-pharmacy trade exists and is regulated by law and concerns selected active substances;

4) trade via non-pharmacy outlets.

The non-pharmacy outlets are defined as non-registered points of dispensing over the counter (OTC) medicines, for which there is no need to obtain a license for distribution and no need to fulfil inspection requirement for safe drug storage. The non-pharmacy outlets include supermarkets, petrol stations, drugstores, shops open to the public, and kiosks [1]. Obviously, if certain business entities are allowed to dispense medicines without a license, then, potentially, medicines could also be dispensed through vending machines. The presented classification primarily focuses on the location where medicines can be dispensed. However, in the context of dispensing medicines via vending machines, it is more appropriate to discuss the necessity of having or not having a relevant license for dispensing medicinal products.

In many European countries and in Ukraine, dispensing medicinal products is possible by business entities based on the appropriate license. The presence of a license indicates compliance with licensing conditions, which include, among other things: organizational requirements, requirements for premises, personnel requirements, and adherence to relevant good practices (namely – Good X Practice). When discussing vending machines, the question arises as to whether the accepted approach, based on the applicable licensing conditions, can be applied at all.

If we adhere to the position that the dispensing of medicines through vending machines remains subject to existing licensing conditions, the following questions arise regarding the organization of such activities:

1. **Which business entities could dispense medicines via vending machines**. Only business entities that hold a license for the retail trade of medicinal products (in other words, the operation of pharmacy establishments) should be allowed to engage in activities related to dispensing medicines through vending machines. The possibility of using vending machines can subsequently be revoked when there are concerns.

This essentially means that the ability to dispense medicines through vending machines, as well as the specific requirements for conducting such activities, must be enshrined in the relevant licensing conditions. For example, in Ukraine, obtaining a license for retail trade in medicinal products requires compliance with specific requirements. If a business entity wishes to manufacture medicines within a pharmacy, dispense medicines via electronic remote trade mechanisms, or use "mobile pharmacy points", each of these subcategories is subject to specific additional requirements.

It also means that licensing of dispensing medicines via vending machines should meet all licensing procedure requirements (including pre-inspection by recognized regulatory authority) and compliance requirements.

2. **Places, where business entities could install vending machines.** Nothing prevents a pharmacy from installing a vending machine inside its own premises. In Ukraine, some pharmacies from large pharmacy chains are already using such machines. Another option is installing vending machines outside the pharmacy premises. Vending machines can be placed in shopping centers, stores, gas stations, restaurants, educational institutions, residential complexes, etc. Essentially, the key requirement is that the location where the vending machine is installed ensures the proper storage conditions for the medicines inside. In this issue, they should be connected to the main electrical supply.

Information about the location of the vending machine must be entered into the relevant database, which records business entities authorized to conduct retail trade in medicinal products. This database should be administered by the relevant state authority authorized to oversee business activities in the field of retail trade in medicinal products.

Vending machines should be where they cannot be accessed by unauthorized persons including children [2]. Thus, according to the legislation of Ukraine, the dispensing of medicines to children under 14 years of age is prohibited. This means that when using vending machines, a mechanism for verifying the buyer's age must be implemented to prevent the sale of medicines to minors. Possible solutions could include identification through electronic documents or verification via a bank card with age restrictions.

3. **What medicines could be disposed via mending machines.** The authorized state bodies must establish a clear list of medicines that can be dispensed through vending machines. It could be every day medicines and associated items, including aspirin, paracetamol, ibuprofen, and indigestion and heartburn treatments readily available. Since these medicines are often compact and adequately wrapped, they can be distributed from small machines [2]. Furthermore, it should be restrictions on the quantity of these medicines that can be purchased at any one time from vending machines to avoid any potential harm.
4. **Requirement to consult pharmacist.** Pharmacist, who could be employed by business entities that hold a license for retail trade of medicinal products should be available to consult, on demand, remotely.

Automated medicine dispensing improves accessibility and convenience, especially in areas with limited pharmacy access or off-hours, enhancing healthcare delivery and aligning with goals of better medicine access and efficiency [8]. Additionally, alcohol-related impairment may affect medication purchases, especially in public areas like airports and entertainment districts. Proper regulations and buyer verification could help prevent such risks [9].

CONCLUSIONS

Dispensing medicines via vending machines is a viable alternative to "traditional" ways of dispensing medicine. Convenience for patients is the main strength of dispensing medicines via vending machines. However, there are also a number of potentially weak points and threats: exclusion of pharmaceutical professionals from the process of ensuring public access to medicinal products, self-medication, and the danger of side effects. Special attention should be given to minimizing risks associated with self-medication without professional guidance.

Preferably, business entities that hold a license for retail trade of medicinal products should be allowed to engage in activities related to dispensing medicines through vending machines. Licensing terms and conditions for dispensing medicines via vending machines should be established.

The results indicate significant interest in the implementation of pharmacy vending machines, particularly among older people. This suggests the potential for the future development of such a method of medication distribution, especially in regions with a lack of pharmacies or in high-traffic areas (airports, train stations, shopping centers, etc.).

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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