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AVAILABILITY AND STORAGE OF VACCINES IN COMMUNITY PHARMACIES

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ABSTRACT

Setting In populations with lower vaccination rates, social determinants of health contribute to vaccine inequality and increase the risk of consequences from infectious illnesses. The ability of pharmacists to prescribe and administer vaccinations has been granted in several countries, leading to an increase in immunization rates. On the other hand, little is known about how they identify and attack susceptible populations.

Goal This research aims to explain the ways in which community pharmacies target disadvantaged populations.

Techniques The Preferred Reporting Items for Systematic Reviews and Meta-Analyses procedures (PRISMA ScR) served as our inspiration for our August 2021 systematic search of the Embase and MEDLINE databases. Articles targeting a vulnerable population and discussing any vaccination in the context of a community pharmacy in English, French, or Spanish were reviewed for inclusion.

Outcomes 63 articles out of the 1039 that were found in the first search satisfied the inclusion requirements.

The majority of the literature (n = 54, 86%) came from North America and dealt with pneumococcal (n = 14, 22%), herpes zoster (n =

14, 22%), influenza (n = 29, 46%), or human papilloma virus immunization (n = 14, 22%). Age and pregnancy were the most often utilized lifecycle vulnerabilities (n = 48, 76%) to identify individuals at risk, followed by clinical variables (n = 18, 29%), socioeconomic determinants (n = 16, 25%), and regional vulnerabilities (n = 7, 11%). The strategies that were mentioned the most were giving a strong recommendation for vaccination, distributing leaflet/bag stuffers, making promotional posters in pharmacies, and offering staff training. Twenty-four obstacles and twenty-five enablers were identified. Effective advertising methods were linked to the primary obstacles faced by each vulnerable group.

In summary Narrowing the definition of vulnerability is not as important to pharmacists as lifecycle and clinical vulnerability. In pharmacies, certain vulnerable populations are also not given enough attention. Pharmacies may use a broad range of promotional strategies to get beyond the unique obstacles that different groups face.

Keywords: vulnerable populations, vaccination, pharmacy, healthcare inequities, and promotional tactics.



I. INTRODUCTION

The COVID-19 pandemic has shed light on vaccination discrepancy between and within countries as we had both the technical and financial means to vaccinate individuals of every country [1]. It is estimated that 234,000 deaths could have been prevented in the US between June 2021 and March 2022 with a primary series of vaccinations [2]. Low vaccination rates disproportionately affect communities commonly defined as “vulnerable”. According to the Center for Disease Control and Prevention, infants from families with income below the poverty line are 30% less likely to receive the 7 recommended vaccines (measle-mumps-rubella, diphtheria-pertussis-tetanus, polio) for children aged 19–35 months [3]. Revenue is not the only factor influencing access to vaccination. Vaccination underservice directly affects communities’ health; as Black, Indigenous and Hispanic individuals in comparison with non-Hispanic White individuals have higher influenza-related hospitalization rates [4]. Population health is directly linked to the upstream societal structures and institutions that shape communities, to the relationship between individuals and to health seeking behaviours [5]. Vulnerability to infectious diseases can be associated to individual characteristics (e.g. age, pregnancy, disease state, disability), to habits (e.g. sexual practices, use of alcohol, illicit drug use, travelling) or to wider determinants such as social status, physical environment or social support [6].

In recent years, vaccination in community pharmacies is gaining momentum and may present a solution to reduce vaccine disparity. Pharmacists are recognized as accessible, convenient, trustworthy and cost-effective vaccine providers [7–10]. Studies from various

jurisdictions show that allowing pharmacists to vaccinate increases uptake [11–14]. Pharmacies have surpassed medical offices in the provision of flu vaccines in the United States and in Canada [15, 16]. Prior reviews have focused on vaccine acceptability, accessibility and vaccine uptake following policy to allow pharmacists as immunizers [10, 17–20]. To our knowledge, no review has been conducted on how pharmacists reach eligible communities. Pharmacies are privately owned businesses and although pharmacists are dedicated to the well-being of their patients, some commercial practices may not be aligned with public health objectives of reaching those who need it the most. Certain pharmacies seem to adopt proactive methods to target vulnerable communities while others may rely on a “first come first serve basis” [21]. As key contributors to vaccination, pharmacists must revise their implicit and explicit assumptions since it impacts how they define and reach vulnerable populations through their vaccine services [22]. Indeed, public health research has shown that “vulnerable populations” are not fixed identities, but the result of a process, which should be questioned from the perspective of vaccine services delivery in community pharmacies.

Evidence on the characteristics of patients vaccinated in pharmacy settings suggests that pharmacies vaccinate a more privileged population during influenza mass campaigns. Pharmacies tend to vaccinate individuals with a higher income [23, 24], higher education [24, 25] and younger populations [14]. Other traits such as being immigrant [23, 26], having diabetes or hypertension [23] and having a high number of chronic diseases [25] meant individuals were more likely to obtain their vaccine in a physician’s office. As definitions of



vulnerable populations are multiple and go beyond clinical condition factors, understanding what characteristics pharmacists perceive as vulnerable remains key. The perception of vulnerability trickles down into how pharmacies target vulnerable populations, when they do, and may help finding solutions to vaccine discrepancy.

OBJECTIVE

Our objective is therefore to describe how vulnerability is defined and how vulnerable communities are targeted in community pharmacies within the published literature. More precisely, we seek to meet the following 4 objectives:

- 1) Describe the studies on the vaccination of vulnerable communities in pharmacies;
- 2) Identify which vulnerability characteristics are used to target underserved communities;
- 3) Document the barriers and facilitators towards vaccinating vulnerable communities in pharmacies;
- 4) Discuss which strategies are used by pharmacists and their team to target vulnerable communities.

II. METHODS

Based on the framework of scoping studies, our work seeks to describe, identify and synthesize the gaps in the existing literature [27]. Scoping reviews are useful to map out the existing literature on newer topics and orient future research. In our case, this review will allow us to better understand how pharmacists conceive vulnerability and how it impacts their implicit or explicit actions to address vaccine discrepancies. This scoping review will also determine the value of undertaking a full systematic review. We followed the checklist from the Preferred Reporting Items for Systematic reviews and

Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) [27]. With the help of an experienced librarian, we identified the relevant keywords and MeSH on the following 3 topics: 'vaccination', 'pharmacy' and 'vulnerable populations'. The search strategy was then elaborated for the Embase database and adapted according to the MEDLINE database.

Search strategy

The search was performed on 16 August 2021 to identify all articles in English, French or Spanish addressing vaccination of vulnerable communities in a pharmacy setting. We chose not to limit our study to a specific time period. This allowed gathering data from countries or states at different legislative stages regarding the status of pharmacists as prescribers and vaccinators. Inclusion criteria for this scoping review are the following: a) articles in a community pharmacy setting; b) articles where vaccination targets a population defined as vulnerable to an illness targeted by the vaccine; and c) peer-reviewed quantitative or qualitative studies or reviews studies. Exclusion criteria are: a) articles providing insufficient details on vaccination in a pharmacy setting; b) vaccination by a pharmacist that occurs outside of a community pharmacy setting; c) articles where vaccination was not the primary focus; d) vaccine guidelines for healthcare professionals.

III. RESULTS

Article overview

After performing the initial search, 1,039 articles were identified (Fig. 1). We found 614 articles originating from the Embase database and 425 from the MEDLINE database. We removed 227 articles due to duplication within or across databases. The 812 remaining articles titles were screened, and 444 articles were removed

because vaccination was not a central topic in the research. The remaining 368 articles were screened through their abstract and 295 articles were discarded because they did not address a population considered as vulnerable. The remaining 73 articles were fully read, and 10 articles were discarded since they occurred outside of a pharmacy setting, were not original research or focused insufficiently on vaccination or on a vulnerable population. The 63 included studies are presented in Table 1. Most of the articles obtained were current, as 44 articles were published after 2014 (69.8%) (Table 2). Studies become scarcer as the further we investigated back in time. Eleven articles date from 2010–2014 (18%), 3 articles from 2005–2009 (5%) and 5 articles were published before 2004 (8%). No article included in our scoping review was published before 2000. Most articles originated from North America ($n=53$, 84%) and a few articles came from Europe ($n=6$, 10%) and Oceania ($n=2$, 3%). Articles from North America collected data almost exclusively in the United States ($n=50$, 79%). Three articles were conducted in Canada (5%). In Europe, articles originating from the United Kingdom ($n=3$, 5%),

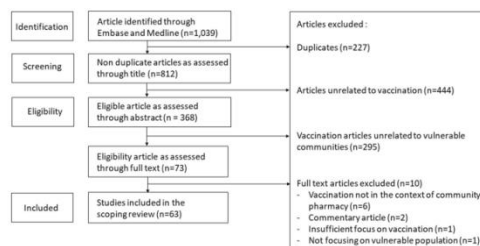


Fig. 1 Study Selection Process Flowchart

Belgium ($n=2$, 3%) and Spain ($n=1$, 2%) were reported. One article was published from Australia (2%) and one from New Zealand (2%). The studies showed a wide variety of study designs with a predominance for quantitative frameworks ($n=48$, 76%). A smaller portion of studies used qualitative design ($n=4$, 6%),

mixed-methods design ($n=6$, 10%) and literature reviews methodologies ($n=5$, 8%). When looking more into the methodology of quantitative studies, cross-sectional surveys were the most common ($n=16$, 25%), followed by quasi-experimental studies pre-post design ($n=9$, 14%), implementation studies ($n=7$, 11%), cohort studies ($n=6$, 10%) and randomized control trials ($n=5$, 8%). Other quantitative designs such as comparison quasi experimental studies, case-control studies and geospatial analysis were less frequent ($n\leq 3$). Qualitative studies all used semistructured interviews to collect their data. Most of the mixed-methods studies were implementation studies ($n=4$, 6%). Out of the 5 review articles (8%), 2 were systematic reviews (3%) and 3 were narrative reviews (5%). The objectives and outcomes of various studies differed greatly. Almost a third of the studies evaluated the vaccination uptake generated by different interventions in community pharmacies ($n=20$, 32%). The influenza vaccine was reported in almost half of the studies ($n=29$, 46%). Herpes zoster, pneumococcal and human papilloma virus vaccines were each discussed in 14 studies ($n=22\%$), followed by tetanus-pertussisdiphtheria ($n=6$, 10%) and travel vaccines ($n=2$, 3%). Other vaccines figured in lower frequencies such as meningococcal vaccines, hepatitis A and B, measlesmumps-rubella or other children's vaccinations ($n\leq 2$). Thirteen studies investigated more than one vaccine at a time (21%). All but one combined the influenza vaccine with one or many other vaccines ($n=12$, 19%). The combinations were influenza-pneumococcal ($n=4$, 6%), influenza-pneumococcal-herpes zoster ($n=2$, 3%), influenza-pertussis ($n=1$, 2%) or a combination of more than 3 vaccines ($n=6$, 10%).



Vulnerability categories

We divided the various vulnerable populations into 5 categories of vulnerability: lifecycle vulnerabilities (n=48, 76%), clinical factors (n=18, 29%), socio-economical determinants (n=16, 25%), geographical vulnerabilities (n=7, 11%) and others (n=6, 10%) (Table 3). A total of 22 articles combined more than one vulnerability category (35%). First, within the lifecycle category, age-related criteria were the most prevalent such as being elderly (n=25, 40%), adolescent (n=12, 19%), of childbearing age (n=3, 5%) or being a child (n=2, 3%). Other subcategories within the lifecycle category include vulnerabilities around pregnancy and parenthood such as pregnant women (n=4, 6%) and parents of children (n=2, 3%). Second, the clinical factors category regrouped a wide range of illnesses that increase the risk for complications such as pulmonary conditions (n=4, 6%), diabetes (n=3, 5%), cancer (n=1, 2%), cardiovascular disease (n=1, 2%) or a combination of at-risk illnesses or an immunocompromised status (n=9, 14%). Illness status was identified via medical databases, insurance databases, pharmacy databases and self-reported medical history. One study defined its vulnerable population

Table 1 Frequency of vulnerability characteristics

Vulnerability Characteristics	Frequency	% (n=63)
Lifecycle		
Elderly	25	39.7%
Adolescent	12	19.0%
Pregnancy	4	6.3%
Women of childbearing age	3	4.8%
Parents of children	2	3.2%
Children	2	3.2%
Clinical Factors		
Combination of chronic conditions and/or immunodepression	9	14.3%
Pulmonary condition	4	6.3%
Diabetes	3	4.8%
Cardiac condition	1	1.6%
Cancer	1	1.6%
Socio-Economic Determinants		
Race	8	12.7%
Income	7	11.1%
Education	3	4.8%
Geographical Factors		
Geographical	9	14.3%
Other		
Occupation	3	4.8%
Lifestyle	2	3.2%
Incompleted vaccination	2	3.2%

IV. DISCUSSION

This scoping review identifies a wide variety of studies targeting different populations considered as vulnerable by community pharmacists. Vaccinating vulnerable communities is dominantly studied in the United States where health discrepancy between race, economic status and geographical location are wide [4]. American pharmacists also benefit from decades of expanded scope of practice [90] which correlates with the wide body of articles published after 2014 (n=44, 69.8%). We suspect that other regions of the world were underrepresented due to the language inclusion criteria and since pharmacists are predominantly involved in medication dispensing activities rather than clinical activities such as vaccination. Vaccination has been a traditional activity of public health instances and pharmacists feel pressured to justify their value as efficient



immunizers [10]. This has been observed in our review as more than a third of the studies have evaluated the vaccination uptake of pharmacists' led interventions (n=20, 31%). Qualitative and mixed method studies provided a rich understanding of the dynamic of vaccination within the dispensing-centered mindset of pharmacies.

The challenges of defining vulnerable communities

Pharmacists and their team target vulnerable communities in the included studies mainly based on life cycle criteria and clinical factors. They rely on the information that is available to them to assess eligibility. Age remains the most convenient method to target individuals but may oversimplify the rationale on risk prevention. On one hand, age provides a good statistical predictor of developing an illness such as influenza or pneumonia complication [91, 92]. Therefore, it appears fair to allocate more resources to better protect elderly populations. On the other hand, age may be a flawed indicator as life expectancy varies according to geographical localization or socio-economic determinants. Indeed, the gap in life expectancy varies according to income [93], education [94] and race [95] in the US. Disparities in life expectancy between rural and urban areas is however growing in the last 20 years and is attributable to cardiovascular and drug-overdose death [96]. Deciding on a cut-off to recommend a vaccine becomes a difficult exercise as years saved vary greatly according to the circumstances of each individual. Moreover, geriatric medicine is moving towards frailty score rather than age as means to aid in clinical decisions [97]. Many frailty scales provide a more detailed understanding of life expectancy

or risk of complications, but have not been used in the field of vaccination.

Elderly people are also affected by the immunosenescence phenomenon which can be described as the waning of innate and cellular immunity [98]. The capacity to generate immunity is also affected by the clinical profile of a person. Some chronic diseases such as depression, cardiovascular diseases or conditions such as malnutrition, femur fracture or stress may decrease our capacity to generate immunity for a certain period of time [98–100]. Vaccinating while younger or prior to developing stress inducing conditions may be advantageous. Although scientific evidence on vaccination is complex, generating vaccination guidelines must remain simple for clinicians and easy to communicate to the public.

The list of chronic conditions affecting patients is not always easy to obtain in the community setting as diagnoses are seldom shared with the pharmacist. Pharmacists document in the patient's pharmacological profile according to patients' self-reported illnesses or by inference based on the patient's medication. This process remains imperfect. One study directly used the number of medications as a mean to identify at-risk patients [79]. Correlating the number of medications provides a flawed view of vulnerability as some conditions such as single pathology like diabetes may require a combination of four or more oral treatments, while several other conditions may be targeted by a single tablet that contains a combination of drugs (e.g. antihypertensive and cholesterol lowering). Technological advancements and better diagnosis sharing between health professionals are ways to spend less on assessing a patient's eligibility and more on promoting vaccination. As examples, suggestions range



from a universal vaccine registry, to sharing the accesses to the pharmacological and medical fle, to simplifying the eligibility criteria [50, 53, 63].

V. CONCLUSION

Pharmacists have been more actively engaged in immunization campaigns during the last 20 years. At the risk of limiting the definition of vulnerability and its procedure, our scoping study emphasizes the use lifecycle and clinical factors to define vulnerability and to target patients identified as susceptible. Geographical location, economic level, and race are some of the social determinants of health that significantly contribute to vaccination inequity. In fact, many vulnerable populations—such as intravenous drug users, members of the LGBTQ community, and the homeless—are not included in the pharmacy's vaccination marketing materials. In order to effectively target these populations, one must have a thorough understanding of the many challenges that prevent immunization, such as lack of access, misunderstandings, and financial constraints. Pharmacists used a range of active, passive, and indirect targeting strategies in connection with different immunization campaigns.

We connected them to the primary obstacles that various groups face. It is the duty of pharmacists, who are regarded as reliable medical experts and important partners in achieving public health objectives, to include vulnerability principles into their targeted campaigns.

This review ought help encourage scientists to learn more about identifying vulnerable populations for immunization in order to better assist them. In this regard, a discussion between representatives of community pharmacy and public health is very necessary. Studies mostly

focus on the vaccination against influenza, but further study is required to fully comprehend the factors that encourage and support vaccination campaigns for other vaccine-preventable illnesses, including industry-driven initiatives.

Pharmacists' target audience is affected by vaccination organizations, which differ according on the province and kind of pharmacy. Policy makers and public health advocates will be better able to match incentives with desired results if they have a greater grasp of the ways in which pharmacists work and engage with other organizations.

It takes a team effort from all pharmacy staff members to raise stagnated immunization rates, as well as ongoing reflection on the efforts made to draw in underprivileged groups. By using their status as approachable, knowledgeable, and reliable medical practitioners, pharmacists may contribute even more to vaccination campaigns.

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