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REVIEW

Pharmacist's role in influenza immunisation: a scoping review

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Abstract

Background: Community pharmacists have become flu vaccine immunisers in several countries to increase vaccine uptake.
Aim: This study aimed to perform a scoping review to evaluate the pharmacist's role and contribution to flu immunisation coverage, satisfaction and promotion as vaccine providers.
Design: The framework proposed by Arksey and O'Malley and the PRISMA Extension for Scoping Reviews (PRISMA-ScR) were considered for this analysis. Two electronic databases (PubMed and Cochrane Library) were used to search for relevant peer-reviewed quantitative, qualitative and mixed-method studies published between 1990 and 2022.
Results: A total of 37 studies were included. These studies suggested that, over time, there was an increase in the rate of vaccine administration within community pharmacies across the various countries examined. Moreover, patients have consistently expressed their satisfaction with the convenience and accessibility of pharmacy-based vaccine services, with some expressing a preference for pharmacies over traditional visits to their general practitioner's office.
Conclusion: Several initiatives aimed at promoting flu vaccination have been rolled out in pharmacy settings, and a number of these initiatives have demonstrated positive outcomes. The flu vaccination service provided by pharmacists has proven to be an asset in public health by improving accessibility to immunisation services. Pharmacists should continue to take part in yearly flu vaccination programs as flu vaccine providers as they contribute to an increased uptake of immunisations by the population. Extending these services to other vaccines should be further considered.

Keywords: flu, immunisation, immunisation providers, pharmacists, community pharmacy.

INTRODUCTION

Influenza (also known as flu) is an infectious disease, caused by influenza virus, that mainly affects the respiratory system. Clinical features range from mild to severe or fatal illness. The most common symptoms include fever, headache, and myalgia. Older people and individuals with underlying chronic conditions are at higher risk.[1] Influenza vaccination is the most effective measure to prevent serious infection, especially in those at risk. The United States Centers for Disease Control and Prevention (CDC) estimated that in 2019–2020, 7.5 million influenza illnesses were avoided due to vaccination.[2] Recently, the World Health Organization (WHO) estimated that flu causes between 290 000 and 650 000 deaths each year.[3] Furthermore, there are secondary health impacts such as loss of productivity or enhanced pressure (and costs) on health and social care services.[4]

Pharmacists are highly accessible healthcare professionals as the wide distribution of community pharmacies (CPs) makes them the nearest and most frequently visited healthcare facility for many patients and the general public.[5] A 2020 International Pharmaceutical Federation (FIP) global survey pertaining to pharmacies' impact on immunisation coverage found that

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pharmacy-based vaccination is offered in at least 36 countries and territories.[6] Among these, 26 (72%) allow pharmacists to administer vaccines, while the remaining require other healthcare professionals to administer. Notably, there was an 80% increase (16 additional countries) compared to 2016 data.[6] At present, it is estimated that the number of pharmacists trained to administer vaccines exceeds 320 000 and that about 87% of CPs provide the inoculation service.[7]

In 2009, European Union (EU) members signed up to reach the 75% flu vaccination coverage target of older age groups as recommended by the WHO.[8] However, in 2021, only Ireland and Denmark had reached that goal.[9] Given pharmacists can participate in flu vaccine programs, it is of fundamental importance to review the existing literature to analyse and further evaluate pharmacists' contributions to leverage flu immunisation coverage, satisfaction, and promotion as flu vaccine providers.

METHOD

A scoping review was conducted to examine scientific literature regarding the impact of community pharmacists as flu vaccine providers on immunisation outcomes. The first community pharmacist-led flu vaccination initiatives in the United States began in the late 1990s, defining the study period for this review.[10] The five-stage framework proposed by Arksey and O'Malley[11] was adopted in the present study. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist and explanation were followed.[12] The main stages were as follows.

Identifying the Research Question

The following research questions were formulated: What is known about the influence that community pharmacists may have on flu vaccine uptake? What are the outcomes in terms of process and accessibility of this pharmacy-based service?

Identifying Relevant Studies

Pertinent keywords within the topic were identified in advance using the population, intervention, and outcome strategy (Table 1). These were then used to search for relevant peer-reviewed studies in two databases (PubMed and Cochrane Library), using Boolean Operators applied to the following keywords: 'influenza' OR 'flu' AND 'pharmacist' OR 'pharmacy'. Whenever a review was found, citation search was used. Duplicates were then removed, and the studies matching the inclusion criteria were further considered.

Table 1 Population, intervention, outcome strategy

PICO	Criteria
Population	Community pharmacists (CP)
Intervention	Flu immunisation in CP setting
Comparator	Not applicable
Outcome	Community pharmacists' role and contribution to flu immunisation as vaccination providers

Study Selection

To be included in this scoping review, studies needed to be focused on the pharmacist's role as a flu immuniser and on the outcomes of vaccination. Quantitative, qualitative, and mixed-method studies published in English between 1990 and April 2022 were included. After removing duplicates from the different databases, two authors individually screened the titles and abstracts of all records identified to remove articles that were clearly irrelevant; full-text articles were then examined to determine whether they met the criteria for inclusion in the review. Any divergences were resolved through discussion or the intervention of a third author. Studies were excluded if they did not match the scope of the research. Studies focusing on vaccines other than seasonal flu without addressing the CP setting or CPs were also excluded. Studies with a main objective to evaluate a certain action (e.g. sending nudges to encourage vaccination in pharmacies) were included if they met the aforementioned criteria.

Charting the Data

The studies of interest were uploaded to an Excel (Microsoft Corporation, Redmond, WA, USA) spreadsheet. Data extracted from the included studies comprised references and authors, title, study period, country where intervention was carried out, study design, and outcome measures.

Collating, Summarising, and Reporting Results

The studies were distributed by country of implementation and the year of publication and then grouped into three major categories according to the focus of our research:

- Flu vaccination trends and the CP setting: studies with a main objective to assess flu vaccination

trends (e.g. evaluate flu vaccine uptake by country, type of health professional, or season)
- Patient perceptions regarding service: focused on patient experiences regarding the service or on the added value that CPs can bring in terms of convenience and accessibility to populations
- Initiatives promoted by CPs involving flu vaccination: studies that described any CP initiative to promote flu immunisation.

RESULTS

A total of 1480 records were identified throughout the database search. After duplicate removal (n = 3), 1477 records were screened by title and abstract, of which 70 were eligible for full-text review. Four additional studies were also included via citation search. A final number of 37 studies were included in this scoping review (Figure 1).

The eligible studies were published between 2000 and 2021. The years 2006 and 2020 were identified as those with the greatest number of publications (n = 7 and n = 6, respectively). From the 37 identified studies, a large majority were from Northern America (n = 15 from the United States [USA], n = 9 from Canada). There were 8 studies from the United Kingdom (UK), 3 from Australia, 1 from Estonia, and 1 from New Zealand. Studies were then grouped into three major categories as previously described, distributed as follows: 23 studies in the first group (flu vaccination trends and the CP setting), 9 in the

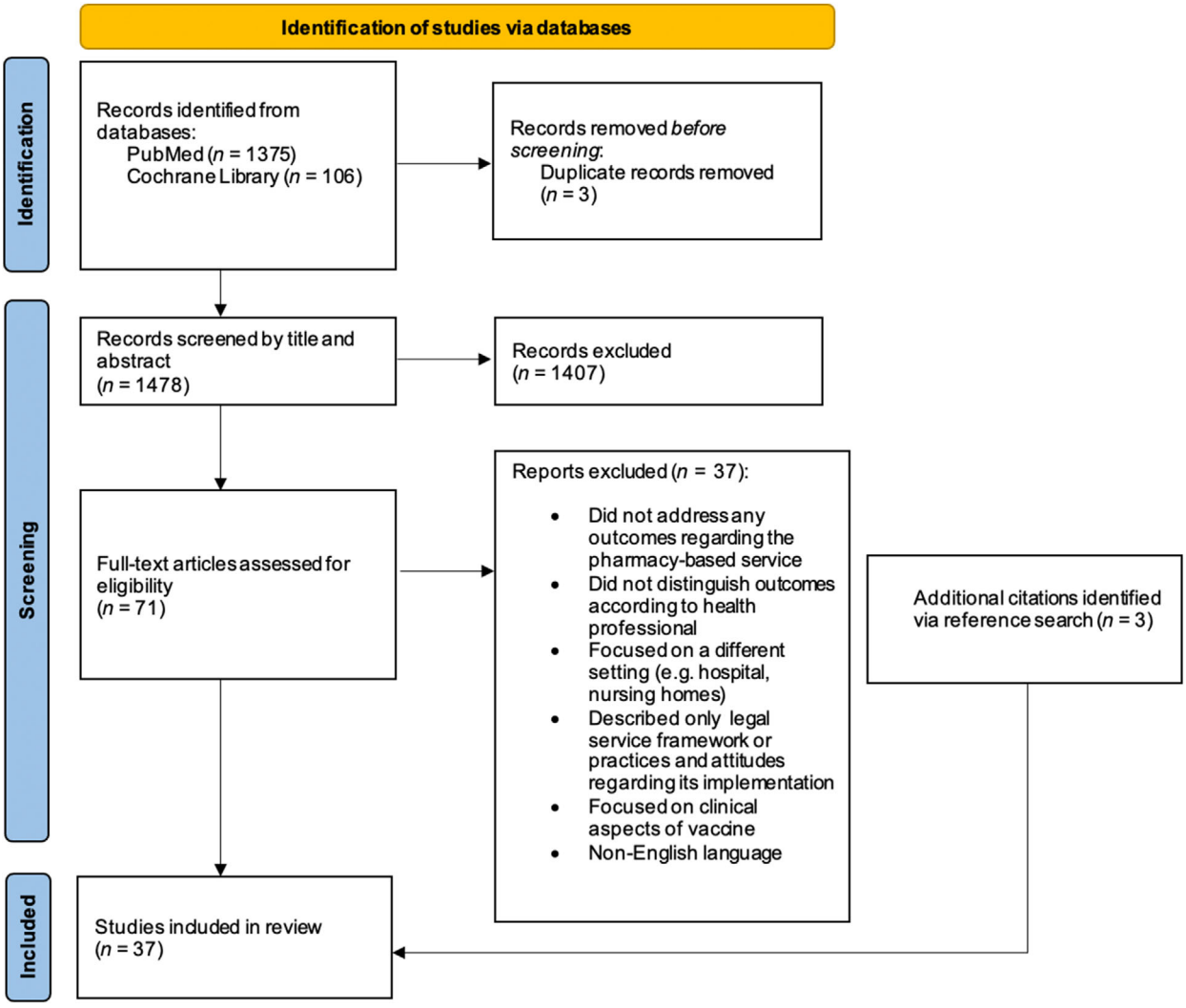

Figure 1 PRISMA flow diagram of study selection.

second group (patient perceptions regarding the service), and 5 in the third group (initiatives promoted by CPs involving flu vaccination).

Flu Vaccination Trends and Community Pharmacy Setting

Access to flu vaccination and its success rate have been widely discussed topics in which pharmacies and pharmacists have been progressively included. In 2000, an American study found that pharmacists administered 5137 adult influenza vaccines in the first campaign developed, between September and December 1998.[13] This number grew to 18 000, between September 1999 and January 2000, due to the establishment of more vaccination sites.[13] Grabenstein et al.[14] compared data from two American states: Washington, where pharmacists are legally authorised to administer vaccines, and Oregon, where they were not authorised at the time of the study. In Washington, higher rates of vaccination were found among patients aged <65 years and taking medicines for chronic diseases and those who did not receive the vaccine in the previous year. Eventually, in 2011, Oregon law accepted pharmacists as immunisers of adolescents, resulting in this group being more likely to receive the vaccine (odds ratio [OR] 1.21, 95% confidence interval [CI] 1.19–1.22) than the reference group.[15] This aligns with the study of Steyer et al.,[16] which demonstrated that both individuals aged <65 years and ≥65 years were more likely to get an influenza vaccine in states where pharmacy-based vaccination existed (OR 1.27, 95% CI 1.19–1.36 and OR 1.22, 95% CI 1.07–1.39, respectively). More recent research showed that the odds of being immunised for influenza increased after exposure to the pharmacy-based service (i.e. each additional year of exposure was associated with an OR 1.023, 95% CI 1.012–1.034).[17] A more comprehensive study with data from 2009–2017 on older adult Medicare beneficiaries' flu immunisation showed that over the course of the seasons, the percentage of this group being vaccinated in traditional points (e.g. general practitioner's [GP] office) declined by up to 10.4%. Nevertheless, this was outweighed by the increase in older adult flu vaccination receipts at CPs, which increased from 16.6% in 2008–2009 to 34.8% in 2014–2015. In fact, CPs were the second most common place for older adults to receive the vaccine (mean 26.9%).[18] Murphy et al.[19] conducted a study to understand the role CPs have in the provision of flu vaccines in American communities defined as medically underserved. In the 2009–2010 influenza season, more than a third of all the flu vaccines were administered in pharmacies located in these medically underserved regions. Drodz et al.[20] studied the effect of nationwide policy changes allowing pharmacists to administer flu vaccines in the USA. These authors found a long-term increase of 2.2% to 7.6% in immunisation rates among individuals aged 25–59 years through pharmacy-based vaccination, however, there was no significant change for individuals aged under 25 or over 59 years. A study by McConeghy et al.[21] that also focused on this reform found an increase in *per capita* pharmacy influenza vaccine prescriptions, though not accompanied by an increase in adult influenza vaccination rates. Olatunji et al.[22] found that people not living in a metropolitan statistical area in Texas were less likely to receive an inoculation at the pharmacy than those who did (adjusted OR 0.67, 95% CI 0.53–0.84). Additionally, unemployed individuals had 40% increased odds of being vaccinated in a CP compared to those who were employed (adjusted OR 1.40, 95% CI 1.15–1.71). Neuner et al.[23] investigated accessibility aspects when it came to CPs and influenza immunisation. The authors aimed at identifying whether pharmacy access was associated with influenza vaccination in individuals newly diagnosed with breast cancer. They also concluded that living in census tracts where no pharmacies existed at acceptable driving distances had a modest association with lower vaccination in the year after diagnosis.[23] Finally, the impact of providing pharmacists with information related to patient history of influenza vaccinations based on both medical and prescription claims was also assessed. It was found that pharmacies which received this information were associated with higher odds (OR 2.18, 95% CI 1.37–3.46) of delivering flu vaccinations compared with those who did not.[24]

In Canada, Marra et al.[25] conducted a community cluster-randomised trial with the goal of assessing the reduced vaccine uptake in rural communities. In the intervention group, pharmacists were trained on how to give the vaccine, and the service was strongly promoted. Starting from the same baseline influenza immunisation rate, the 2010 mean influenza immunisation rate was 56.9% in the control communities and 80.1% in the intervention communities for individuals aged ≥65 years; however, no significant differences were found among those aged 2–64 years and with a chronic medical condition.[25] The expanded opening hours was the most reported reason for choosing a pharmacy as the vaccination point. Isenor et al.[26] aimed to identify differences in immunisation rates, in Nova Scotia, before and after pharmacists became a part of a publicly funded influenza vaccination program. Isenor et al. reported a 6% increase in the immunisation rates of those aged ≥5 years (from 35.8% in 2012–2013 to 41.8% in 2013–2014), a 9.8% increase for the group of

individuals above 65 years of age (from 61.8% in 2012–2013 to 71.6% in 2013–2014), resulting in a 15.8% increase in total vaccination in 2013–2014 compared to 2012–2013.[27] Buchan et al.[28] also reported that flu immunisation rates remained modestly higher in provinces with a pharmacy policy. Looking at the 2006–2016 period, a decline in the immunisations provided by GPs was observed, despite being the number one site of vaccination in all seasons, and pharmacists provided more vaccination in rural areas.[29] Andrew et al.[30] surveyed older Canadians on their flu immunisation practices. A total of 67.9% in a sample of 5014 respondents confirmed that they had been immunised the previous season, of which 34.2% were at the pharmacy. The reasons for choosing not to be vaccinated were explored, and some were related to time constraints or inconvenience (i.e. 7.7% forgot to receive the vaccine, and 2.9% reported clinic logistic issues).

In 2013–2015 in the UK, a pilot conducted in London showed no significant change in vaccine uptake following the introduction of a pharmacy program. While some advantages were mentioned, problems were also identified, mainly in the reporting and registration systems, possibly leading to some loss of data.[31] A similar study took place in the Isle of Wight. A total of 9.7% of all people vaccinated on the island chose a pharmacy as the vaccination site.[32] In the first season in which pharmacists served as immunisers, the vaccination rates rose 6.2% and 4.8% for those aged at least 65 years and those under 65 years, respectively. The vast majority of people (98%) indicated they would repeat the experience, with convenience and accessibility the most commonly cited reasons.[32] Considering the 2014–2015 season, Anderson et al.[33] conducted a survey with the intention of profiling individuals who went to pharmacies for their vaccinations. The survey revealed that 30.8% of all respondents were eligible for free vaccination through the National Health Service (NHS), and of these, 25.6% chose to pay for it privately. About half of those vaccinated in pharmacies were aged between 45 and 64 years, and 38.9% suffered from a chronic medical condition. Convenience and accessibility were also identified as the most common reasons to choose the vaccination site. Rai et al.[34] used the Donabedian framework to evaluate the effectiveness of the pharmacy-based service in achieving an increased influenza vaccination uptake in the West Midlands. Despite having found an appropriate information system to support CPs, no increase in uptake rates was observed. However, patient satisfaction with the service was high (99.6% of the respondents would be willing to use the service in the future). Vaccine uptake in children was higher when commissioned through school-based programs and lower when commissioned through pharmacies.[35]

In 2014 in Wales, Evans et al.[36] conducted a mixed methods study to explore the challenges that must be addressed before pharmacies expand their role in flu immunisation. Although some pharmacies demonstrated that they could equal the number of vaccines administered in GP offices, most fell far short of that number. CPs, however, seemed to reach more young 'at-risk' individuals than other programs. Considering pharmacists' views, workload, vaccine costs, unforeseen delays, lack of public awareness, and GPs' views of the service restricted their contributions a longitudinal evaluation of the CP influenza vaccination service in Wales was undertaken. Throughout the six flu seasons covered by the study period (2012–2018), a total of 103 941 flu vaccinations were administered in pharmacies, with the number of vaccines increasing each season.[37] Pharmacies vaccinated proportionally more individuals aged <65 and at risk than the GPs (47.5% vs 28.6%, absolute difference 19.0%, 95% CI 8.6–29.3, $p < 0.01$). Nevertheless, most CP vaccines were given to people aged ≥65 years (59.9% of all vaccinations). Being 'close to home' and 'no need for an appointment' were the top reasons identified for choosing the pharmacy.[37]

Between March–October 2015, 15 621 influenza vaccinations were provided by 76 Western Australian CPs. Of these, 11.9% were administered to individuals eligible to receive a free vaccine. A high percentage of vaccines were delivered in rural and regional areas.[38] In 2019, Trent et al.[39] surveyed Australian adults in an attempt to identify their preferred vaccination place. Of all respondents, 13% stated that they had received the flu vaccine in the CP. Vaccination in the pharmacy was associated with being <65 years old and not having a high-risk comorbidity. Moreover, convenience (52%) was identified as the most reported reason for choosing the pharmacy.

The characteristics of the included studies in this category are presented in Table 2.

Patient Perceptions Regarding the Service

Over time, there have been scientific publications aiming to assess patients' perceptions regarding the organisation of the healthcare system, including vaccination services provided by CPs. From March–September 2012, a questionnaire was conducted in New Zealand CPs with individuals that had been immunised. Among respondents, 93% gave 5 (very satisfied) on the Likert scale regarding the quality of the pharmacists' explanations, and they also believed that the process was carried out in a safe and professional manner; in addition, 42% had

Table 2 Flu vaccination trends and community pharmacy setting

Study	Study year	Location	Population	Study design	Outcome measure	Effect measure
Weitzel et al.[13]	1998–2000	USA	Patients of pharmacies affiliated with a supermarket conglomerate	Case study	Number of adult influenza vaccinations administered by pharmacists	23 137 CP vaccinations
Grabenstein et al.[14]	1997–1998	USA	4403 adults divided into two strata: ≥65 years old who received any medication; 21–64 years old who received medicines of interest	Before and after study	Vaccination rates	10.8% increase (95% CI 3.5%–18.1%)
Robison et al.[15]	2007–2014	USA	Adolescents aged 11–17 years old	Before and after study	Vaccination practices	Adolescents aged 11–17 years were more likely to receive a flu vaccine compared with the reference population (OR 1.21, 95% CI 1.19–1.22)
Steyer et al.[16]	1995–1999	USA	Adults divided into two subgroups: 18–64 years old and ≥65 years old	Before and after study	Vaccination rates	3.9% increase (18–64 years) 3.7% increase (≥65 years)
Patel et al.[17]	2006–2010	USA	664 010 respondents of the BRFSS	Before and after study	Vaccination practices	OR 1.023 (95% CI 1.01–1.034)
Liao et al.[18]	2008–2017	USA	Adults (≥65 years old) who answered community section of MCBSe	Multiple cross-sectional studies	Vaccination rates, vaccination behaviour	5.4% increase in vaccination rates from 2008–2017 10.4% decrease in GP vaccinations, 18.2% increase in CP vaccinations
Murphy et al.[19]	2009–2010	USA	6936 CPs located in 50 American states and that were operating September 2009–February 2010	Cross-sectional study	Location of CP vaccinations	1 753 693 of all Walgreens vaccinations were administered by pharmacies located in MUAs
Drozd et al.[20]	2003–2013	USA	1 966 880 adults (≥18 years old) registered in BRFSS database	Before and after study	Vaccination rates	2.2% (50–54 years) to 7.6% (35–39 years) increase
McConeghy et al.[21]	1996–2010	USA	Respondents of BRFSS survey	Before and after study	Vaccination rates, preventive care utilisation and *per capita* pharmacy prescriptions	No significant absolute increase in adult vaccination rates (AD 0.9%, 95% CI −0.3–2.2); increased *per capita* prescriptions by an AD of 2.6% (95% CI 1.1–4.2); no difference in receipt of preventive health services (AD −1.9%, 95% CI −4.9–1.1)
Olatunji et al.[22]	2014–2018	USA	58 682 adults (≥18 years old) who were vaccinated for influenza	Multiple cross-sectional studies	Vaccination behaviour	A higher likelihood for people aged 45–64 years (AOR 1.78, 95% CI 1.25–2.55) and people aged >65 years (AOR 3.09, 95% CI 2.14–4.47) to receive influenza vaccination at CP compared to those 18–29 years was observed; those who did not live in a

Table 2 (*continued*)

Study	Study year	Location	Population	Study design	Outcome measure	Effect measure
						MSA (AOR 0.66, 95% CI 0.52–0.83) were less likely to receive influenza vaccination at pharmacy compared to those who lived in MSAs; unemployed (AOR 1.36, 95% CI 1.11–1.66) were more likely to receive flu vaccination at CP
Neuner et al.[23]	2011–2016	USA	45 722 women (≥66 years old) with first diagnosis of breast cancer	Retrospective cohort study	Association between pharmacy access and flu vaccination	>11% of cohort lived in very low access census tracts where no CPs were within recommended driving distances; patients living in very low access census tracts were less likely to receive vaccine (OR 0.92, 95% CI 0.86–0.96)
Sheer et al.[24]	2017	USA	2798 adult patients (19–89 years old) with Medicare Advantage and Prescription Drug plan covering medical care and prescription drugs and who obtained medicines from participating pharmacies	Randomised controlled trial	Vaccination rates	Intervention pharmacies were associated with higher odds of flu (OR 2.18, 95% CI 1.37–3.46) vaccinations than control pharmacies
Marra et al.[25]	2009–2010	Canada	Adults ≥65 years old and people aged 2–64 years with one chronic condition (1216 people in 2009; 1998 people in 2010)	Randomised controlled trial	Vaccination rates	80.1% (SD 18.4) versus 56.9% (SD 28), p = 0.01
Isenor et al.[26]	2010–2014	Canada	Nova Scotian residents	Before and after study	Number of CP vaccinations	78 102 in 2013–14; 15.8% increase in total vaccinations in 2012–2013
Isenor et al.[27]	2013–2015	Canada	Nova Scotian residents	Before and after study	Immunisation coverage	35.8% in 2012–13 versus 41.8% in 2013–2014 (≥6 months); 61.8% in 2012–13 versus 71.6% in 2013–14 (≥65 years)
Buchan et al.[28]	2007–2014	Canada	481 526 people (≥12 years old) contacted by telephone or interviewed by Statistics Canada	Before and after study	Vaccination rates	30.4% (provinces with a pharmacist policy) versus 28.2% (provinces without a policy)
Isenor et al.[29]	2003–2016	Canada	Nova Scotian residents (≥6 months of age)	Before and after study	Coverage rates between vaccination provider groups	30.6% coverage corresponding to physician group in 2010–2011 and 27.2% in 2013–2014; 6.2% coverage corresponding to pharmacist group in 2013–2014
Andrew et al.[30]	2017	Canada	5014 Canadian residents (≥65 years old)	Cross-sectional study	Vaccination behaviour	67.9% were immunised in 2016–2017 (36.8% at GP and 34.2% at CP)

Table 2 (*continued*)

Study	Study year	Location	Population	Study design	Outcome measure	Effect measure
Atkins et al.[31]	2011–2015	England	1230 CPs and 1406 GPs	Before and after study	Vaccination rates	No difference
Warner et al.[32]	2010	England	45 647 adults (≥65 years old) or people belonging to a risk group assessed by a pharmacist	Cross-sectional study	Number of CP vaccinations, vaccination behaviour and experience	2837 CP vaccinations (9.7%); 69.5% were people aged ≥65 years; 8.2% were first-time recipients; 98% would use the CP service again, and 91% rated the service as excellent
Anderson et al.[33]	2014–2015	England	1741 were vaccinated between October 2014 and March 2015	Cross-sectional study	Vaccination behaviour	25.6% paid privately despite being NHS eligible; 50.4% were aged 45–64 years; 38.9% had a chronic condition
Rai et al.[34]	2013–2015	England	376 CPs	Multiple cross-sectional studies	Vaccination rates, vaccination experience	No difference in vaccination rates; 95.8% stated vaccine administered as well as a GP or nurse; 99.6% would be willing to use service in future; 78.3% cited convenience as main reason for choosing CP
Christensen et al.[35]	2015–2016	England	Children born between 1 September 2008 and 31 August 2010, as determined by their age on 1 September 2015	Cross-sectional study	Vaccination rates and vaccination behaviour of children aged 5 and 6 years	50.2% uptake when commissioned through school- based programs, and 23.1% through CPs
Evans et al.[36]	2013–2014	Wales	6 pharmacists who took part in the Welsh national pharmacy influenza service during 2013–2014	Cross-sectional study, Review	Number of CP vaccinations, vaccination behaviour, and vaccination rates	7861 CP vaccinations; mean proportion of vaccinations which were <65 years and in a clinical (95% CI:at-risk' group: 35.8% versus 12.4%; extended opening hours and urban locations were positively associated with no. of vaccinations given
Deslandes et al.[37]	2012–2018	Wales	People <65 years old at risk and people ≥65	Before and after study	No. of CP vaccinations, vaccination behaviour and vaccination rates	103 941 CP vaccinations; mean proportion of vaccinations which were <65 years and in a clinical 'at-risk' group: 47.5% versus 28.6%; 0.3% CP vaccinations in 2012–2013 to 5.7% in 2017–2018; 'did not need an appointment' and 'pharmacy is near home' were most popular reasons for choosing CP
Hattingh et al.[38]	2015	Australia	Immuniser pharmacists	Cross-sectional study	No. of CP vaccinations, vaccination behaviour	15 621 CP vaccinations; 11.9% were eligible to receive free vaccine; 23.1% of CP vaccinations were given in rural area

Table 2 (*continued*)

Study	Study year	Location	Population	Study design	Outcome measure	Effect measure
Trent et al.[39]	2019	Australia	745 Australian adults	Cross-sectional study	Vaccination behaviour	13% received vaccine at CP; a greater proportion of pharmacy vaccinations occurred in those <65 years and not having a high-risk chronic comorbidity; 'convenience' was most common (52%) reason for choosing CP

AD = absolute difference; AOR = adjusted odds ratio; BRFSS = Behavioural Risk Factor Surveillance System; CI = confidence interval; CP = community pharmacy; GP = general practitioner; MAPD = Medicare Advantage and Prescription Drug; MCBS = Medicare Current Beneficiary Survey; MSA = metropolitan statistical area; MUAs = medically underserved areas; NHS = National Health Service; No. = number; OR = odds ratio; SD = standard deviation.

not been vaccinated in the previous year and 80% stated that they would repeat the experience.[40] Through the 2012–2013 flu season, in England, data were obtained from 89 011 privately paying patients across 479 pharmacies. In the survey, 6% of respondents were eligible to receive a free NHS vaccination. Of 13 CPs, 921 patients completed a survey, of which 199 (22%) patients were eligible to receive their flu immunisation for free. Half of them had been contacted by their GP but kept choosing a CP because of accessibility, convenience, and preference for the pharmacy environment.[41]

In 2015, 133 Western Australian pharmacies introduced pharmacist-administered flu vaccinations. A 2016 study, involving a 10% sample, received 434 completed questionnaires (66.8%) from 13 pharmacies. The study revealed that 99.5% of consumers were satisfied, 97.2% expressed future willingness for vaccinations from community pharmacists, and over 60% supported expanding services to cover additional health conditions, emphasising convenience and professionalism.[42]

In four Canadian CPs, during an 8-week period, survey data were collected after the immunisation process. Individuals showed a high degree of satisfaction regarding the service: 92% were very satisfied with the injection technique, 86% were very comfortable with being vaccinated by a pharmacist, and 99% would recommend it to others.[43] Overall, 28% of total vaccinated and 21% of at-risk patients stated that they would not have been immunised if the pharmacy-based service had not been available.[43] Also in Canada, Nova Scotians were asked where they preferred to get the inoculation, and around 72% selected the pharmacy, with convenience being the most popular reason for that choice. Other key topics, such as 'environment', 'staff', and 'time', were also greatly appreciated in the service.[44]

Finally, in Estonia, a cross-sectional survey was conducted to understand customers' experiences of being vaccinated in a CP setting. Among respondents, 54.9% received the flu vaccine for the first time, and 96.8% were satisfied with the quality of the service. The most commonly reported reasons for choosing this setting were accessibility and convenience, as well as fear of getting an infection in other settings.[45]

Table 3 presents the characteristics of the studies mentioned in this category.

Initiatives Promoted by Community Pharmacies Involving Flu Vaccination

CPs have launched several initiatives aimed at raising immunisation rates. In 2014, Klassing et al.[46] conducted a study with the goal of evaluating whether a pharmacy-initiated intervention would improve flu vaccination rates among individuals with asthma and/or chronic obstructive pulmonary disease. All adults with a dispensing history of medication for the conditions were randomly distributed to one of three arms: control (no intervention), phone call group (where participants would receive a phone call from the pharmacy recommending the flu vaccine), and mailed letter intervention that included a written recommendation. No improvement in the vaccination rates was found for the intervention groups. It was shown that mailed letter interventions resulted in a higher number of inoculations than phone call interventions.

In 2021, a similar initiative was carried out in Canada. Individuals ≥65 years old who did not receive the vaccine in the previous year were contacted by the CPs to be encouraged to take it and were also informed about the flu vaccine.[47] Among the unvaccinated individuals, 67% agreed to receive the vaccine by the end of the

Table 3 Patient perceptions regarding service

Study	Study year	Location	Population	Study design	Outcome measure	Effect measure
Windle et al.[40]	2012	New Zealand	213 immunised individuals submitted to questionnaire conducted in pharmacies administering the vaccine	Cross-sectional study	Vaccination experience	42% had not been immunised the previous year; 93% scored 5 on the Likert scale to satisfaction; >80% indicated they would be immunised in a CP again and that they would recommend it to others; 'monitoring of individuals after immunisation' was the only area identified that could potentially be improved
Anderson et al.[41]	2012–2013	England	89 011 patients who privately paid for getting vaccinated in British chain of CPs	Cross-sectional study	Vaccination behaviour, vaccination experience	6% were eligible to get vaccine free on NHS; from survey respondents: 22% were eligible to get flu vaccination for free, and of these, 50% had been contacted by their GP; the reasons given have mostly to do with accessibility and convenience
Burt et al.[42]	2018	Australia	434 survey respondents who got their influenza vaccine administered in a CP	Cross-sectional study	Vaccination experience	91.9% chose the pharmacy for influenza vaccination due to its convenient location, 75.1% mentioned ease of making an appointment as a deciding factor; 68.2% appreciated the friendly environment of the pharmacy; 65% considered the pharmacy's convenient opening hours; trust in pharmacist was identified as significant reason for choosing vaccination; 60.4% were positive about pharmacists administering wider range of vaccines in future; overall consumer satisfaction was exceptionally high, 99.5%
Papastergiou et al.[43]	2013	Canada	1502 patients (average age of 48.7 years) who got vaccinated in four participating CPs	Cross-sectional study	Vaccination experience	86% reported being very comfortable with being vaccinated by pharmacist and 92% were very satisfied; 7% were first-time vaccine recipients, 28% (and 21% of high-risk patients) indicated that they would not have been vaccinated this year if pharmacist-administered vaccination was not available
Isenor et al.[44]	2013–2014	Canada	6530 individuals surveyed who were vaccinated at pharmacies	Cross-sectional study	Vaccination experience	6% had not previously received flu vaccination; > 90% reported that quality of service to be as good as or better than that received in past by other immunisers; 72% prefer CPs to receive their vaccine; convenience, environment, staff and time were appreciated key topics
Sepp et al.[45]	2018	Estonia	257 adults (≥18 years old) who were vaccinated for influenza in a CP	Cross-sectional study	Vaccination behaviour, vaccination experience	54.9% received flu vaccination for first time; 96.8% were satisfied with quality of service; CP described as accessible and convenient by costumers

CP = community pharmacy; GP = general practitioner; NHS = National Health Service.

Table 4 Initiatives promoted by community pharmacies involving flu vaccination

Study	Study year	Location	Population	Study design	Outcome measure	Effect measure
Klassing et al.[46]	2014	USA	210 adult patients (≥18 years old) with asthma and/or chronic obstructive pulmonary disease (COPD), based on pharmacy dispensing records	Randomised controlled trial	Vaccination rate in adult patients with asthma and/or COPD	No difference; 6 (72.7%), 55 (87.3%), and 62 (88.6%) patients were vaccinated in the phone call intervention group, letter intervention group, and control group respectively
Strain et al.[47]	2019–2020	Canada	643 adults (≥65 years old) not vaccinated for influenza	Case study	For those contacted, how many arranged by end of telephone consultation	67% agreed to receive vaccine by end of telephone consultation
Milkman et al.[48]	2020	USA	689 693 pharmacy patients not yet vaccinated against influenza during study period	Randomised controlled trial	Whether patients received flu vaccine at Walmart pharmacy	Mean treatment effect was 2.0-percentage-point increase in flu vaccinations relative to business-as-usual control condition; the best and 2nd best performing messages repeatedly reminded patients to get vaccine and stated that a flu shot was 'waiting for you'
Singh et al.[49]	2015–2017	USA	662 957 patients who exchanged voucher for flu vaccine during 2015–2016 and 2016–2017 influenza seasons	Multiple cross-sectional studies	Voucher redemption rate, potentially averted cases	52.3% in 2015–2016 (n = 314 033) and 87.2% (n = 348 924) in 2016–2017; 11 537 and 13 347 in 1st and 2nd seasons respectively

phone call, and three of those individuals who originally rejected were convinced after a myth-deconstructing discussion. At the end of the study, those 67% of individuals got vaccinated.[47] In the United States, CPs sent text-based reminders to encourage flu vaccination.[48] There were 22 different messages and they significantly increased vaccination rates by an average of 2.0% over a no-intervention situation. Reminders delivered on numerous days and messages saying that 'a flu shot was waiting for them' were the most effective.[48]

During two consecutive seasons, an American pharmacy chain distributed vouchers for no-cost flu vaccination. Redemption rates of 52.3% and 87.2% were observed in the first and second seasons respectively. It was estimated that 11 537 flu cases were averted in the first year and 13 347 in the second due to the flu voucher program, thereby reducing overall mortality and costs.[49] Table 4 presents the characteristics of the included studies in this category.

DISCUSSION

Our review contributes a comprehensive assessment of the pharmacist's role in immunisation coverage, satisfaction, and promotion. Over time, an increasing trend in vaccination rates within CPs has been observed across multiple countries, with patients expressing satisfaction regarding the convenience and accessibility of pharmacy-based vaccine services as suggested by some of the reviewed studies. Therefore, these results underscore the awareness of pharmacies and pharmacists regarding their role in this public health endeavour, and the several initiatives implemented in pharmacy settings to promote flu vaccination further corroborate this finding.

Most studies selected for this review suggest that involving pharmacists in flu vaccination generally led to higher vaccination rates.[18–20, 22–25, 28, 33–35] An adequate and effective policy framework was crucial to the establishment of the pharmacist as a flu vaccine provider in

recent decades. In fact, in recent years, many other countries have revised their policies to allow vaccines to be administered in CPs by pharmacists. With the collaboration of various stakeholders, this observed expansion would, in turn, likely play a role in augmenting influenza vaccination coverage.[12] Overall, it is estimated that around 1.8 billion people can access a vaccination service at CPs.[6] In some cases, pilot projects to evaluate the impact of the introduction of flu vaccination by pharmacists have been carried out. For instance, in Estonia (one of the countries with the lowest flu vaccination rates), such an experiment, in 2018, increased vaccination rates in older people (aged ≥65 years) by 114%.[45] Pharmacies have also proven to reach new people who, had the vaccination pharmacy-based service not existed, might not have been protected.[40]

CPs also offer convenience: they usually can be accessed during extended opening hours, with no need for prior booking and with reduced waiting times.[36] Overall, results showed that those who get the flu vaccine at the pharmacy reported being very satisfied with the service and intended to get their vaccination in the same setting in the following season.[37–40] Some patients even chose to pay to receive the vaccine at the pharmacy, despite being eligible to receive it for free in a primary care facility.[38]

Beyond the convenience factor, pharmacists promote vaccination, supplementing the contributions of other healthcare professionals.[50] These findings demonstrate that pharmacies have initiated certain efforts in this regard, whether through straightforward text messages or calls dispelling misconceptions.[42–44] Nevertheless, the results suggest that the aforementioned initiatives showed only modest success in the included studies. Therefore, novel and inventive strategies may be needed to achieve more substantial impacts.

Since pharmacists have shown they add value to the flu vaccination process as immunisers while relieving pressure on the healthcare systems, they should continue to take part in the flu vaccination process and possibly extend this service to other vaccines. In countries both with and without pharmacy-based vaccination, limited acceptance by governments and other healthcare professionals, limited financial support from health systems, and a lack of training opportunities are the major barriers to the full pharmaceutical activity within the vaccination scope.[6] More recently, the need to vaccinate large portions of the population for optimal public health outcomes in the wake of the COVID-19 pandemic has given pharmacists to a more prominent role in immunisation. This global imperative has led to the coordination of existing services on a large scale and the development of innovative vaccination strategies to achieve widespread inoculation quickly.[51–53]

Despite the value of this research, some limitations must be acknowledged. This review was performed using two databases; searching other databases and including grey literature might have yielded other relevant published papers. In addition, as this review was limited to papers published in English, it is possible that other relevant studies were omitted. A quality assessment of the studies included in the review was not undertaken; however, this aligns with the aims of a scoping review.[12]

Flu vaccination coverage is a significant public health objective embraced by all healthcare stakeholders. Pharmacists play an active role in this critical process. While studies suggest that pharmacist interventions hold potential in increasing vaccination rates, the quantitative impact varies across different contexts. Nevertheless, the convenience of receiving vaccinations at pharmacies seems to be appreciated by patients.

Therefore, pharmacists should continue participating in flu vaccination programs as promote higher immunisation rates amongst the population. The development and implementation of innovative initiatives must also be encouraged to highlight the specific contributions of pharmacies and pharmacists in this matter. Furthermore, it would be beneficial to investigate the expansion of these services to cover additional vaccines, thereby widening the reach of preventive healthcare delivery.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

AUTHORSHIP STATEMENT

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