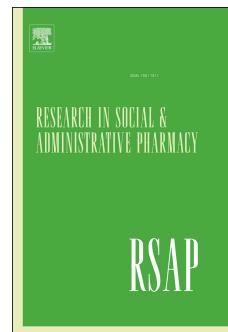


Accepted Manuscript

Pharmacy patron perspectives of community pharmacist administered influenza vaccinations

Mhd Wasem Alsabbagh, Dana Church, Lisa Wenger, John Papastergiou, Lalitha Raman-Wilms, Eric Schneider, Nancy Waite



PII: S1551-7411(17)30974-9

DOI: [10.1016/j.sapharm.2018.04.015](https://doi.org/10.1016/j.sapharm.2018.04.015)

Reference: RSAP 1048

To appear in: *Research in Social & Administrative Pharmacy*

Received Date: 19 December 2017

Revised Date: 20 April 2018

Accepted Date: 22 April 2018

Please cite this article as: Alsabbagh MW, Church D, Wenger L, Papastergiou J, Raman-Wilms L, Schneider E, Waite N, Pharmacy patron perspectives of community pharmacist administered influenza vaccinations, *Research in Social & Administrative Pharmacy* (2018), doi: [10.1016/j.sapharm.2018.04.015](https://doi.org/10.1016/j.sapharm.2018.04.015).

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The final publication is available at Elsevier via <https://doi.org/10.1016/j.sapharm.2018.04.015>. © 2018. This manuscript version is made available under the CC-BY-NC-ND 4.0 license <http://creativecommons.org/licenses/by-nc-nd/4.0/>

1 **Pharmacy patron perspectives of community pharmacist administered influenza vaccinations**

2 Mhd Wasem Alsabbagh^{a,b}, Dana Church^b, Lisa Wenger^b, John Papastergiou^{d,b}, Lalitha Raman-
3 Wilms^{c,b}, Eric Schneider^a, Nancy Waite^{a,b}

4
5 ^aSchool of Pharmacy, University of Waterloo

6 10 Victoria St S A, Kitchener, ON, Canada N2G 1C5

7 ^bOntario Pharmacy Evidence Network (OPEN), School of Pharmacy, University of Waterloo

8 10 Victoria St S A, Kitchener, ON, Canada N2G 1C5

9 ^cLeslie Dan Faculty of Pharmacy, University of Toronto

10 144 College St, Toronto, ON, Canada M5S 3M2

11 ^dShoppers Drug Mart, Store Number 500

12 1630 Danforth Ave, Toronto, ON, Canada M4C 1H6

13

14 **Corresponding author:**

15 Mhd. Wasem Alsabbagh

16 wasem.alsabbagh@uwaterloo.ca

17 School of Pharmacy, University of Waterloo

18 10 Victoria St S A, Kitchener, ON, Canada N2G 1C5

19

20

21

22

23

24

25

26

27

28

29

1 **ABSTRACT**

2 **Background:** One approach to boost influenza vaccination coverage has been to expand
3 immunization authority. In 2012, the province of Ontario gave community pharmacists the
4 authority to administer the influenza vaccine.

5 **Objective:** This study investigates the perspectives of Ontario pharmacy patrons, who had not
6 recently received this vaccine from a pharmacist, regarding this pharmacist service.

7 **Methods:** A survey was administered in six Ontario community pharmacies to pharmacy
8 patrons who had not received an influenza vaccination from a pharmacist during the previous
9 year. The instrument included questions about influenza vaccination, and knowledge of and
10 attitudes toward vaccines and pharmacist-administered immunization.

11 **Results:** A total of 541 pharmacy patrons completed the survey (53.9% response rate). About
12 one-third (30.5%) of respondents were not aware that pharmacists could give the influenza
13 vaccine, with younger individuals being less likely to be aware (OR 0.48, 95% CI 0.29–0.77,
14 $p < 0.05$) and less likely to receive the vaccine annually (OR 0.28, 95% CI 0.19–0.42, $p < 0.05$).
15 Leading reasons respondents gave as to why they did not receive their influenza vaccine from a
16 pharmacist included not wanting or feeling they needed to be immunized (41.6%) and being
17 used to receiving the vaccine from a physician (16.5%). Concerns about the experience and
18 training of pharmacists and lack of privacy in a community pharmacy were uncommon.

19 **Conclusion:** Reduced awareness of the availability of pharmacist-provided influenza vaccine is
20 still common. Pharmacists have a significant opportunity to address lack of awareness and
21 vaccine hesitancy issues. They can promote this service to increase influenza vaccination rates
22 among pharmacy patrons who do not utilize this professional service.

23 **Keywords:** Pharmacist, immunization, influenza, patrons, patients, survey, awareness, vaccine
24 hesitancy

25 **Funding:** This study was conducted as part of the Ontario Pharmacy Evidence Network (OPEN)
26 and funded by the Government of Ontario. The views expressed in this article are those of the
27 authors and do not necessarily reflect those of the funder.

28 **Highlights:**

- 29 • The public's awareness of pharmacist-administered vaccinations can be further
30 enhanced
- 31 • Vaccine hesitancy is a common reason why individuals are not being vaccinated by
32 pharmacists
- 33 • Pharmacy patrons indicate they would get vaccinated if a health care professional
34 recommended it
- 35 • Enhanced advertising and accessibility might further attract the public to this pharmacist
36 service

37 **INTRODUCTION**

38 Pharmacist scope of practice has expanded greatly in North America over the past 20 years and
39 with it a gamut of professional services that community pharmacists can provide. These
40 services include renewal and extension of prescriptions as well as administration of vaccines.¹
41 In the United States, pharmacists have been allowed to vaccinate in some jurisdictions since the
42 mid-1990s. By 2009, all 52 states and territories had granted pharmacists the authority to
43 immunize. Nonetheless, the vaccine type, extent of authority, and restrictions on the age of
44 immunization recipients vary from one state to the next. However, regardless of jurisdiction, all
45 community pharmacists in the United States can administer the influenza vaccine.² An
46 increasing number of countries now allow pharmacists to administer influenza vaccinations.³ In
47 Canada, pharmacist immunization authority has grown from two provinces in 2009, driven in
48 part by a need to respond to the anticipated H1N1 pandemic,^{4,5} to nine of ten provinces as of
49 2016.¹ In Ontario — Canada's most populous province — pharmacists were granted the
50 authority to administer the influenza vaccine during the fall of 2012. Pharmacists gave some
51 250,000 influenza shots that year- a figure that tripled to 750,000 doses during the next
52 influenza season.⁶ Several studies and systematic reviews have documented the impact this
53 North American-wide expansion of pharmacist's immunization authority has had on increasing
54 influenza vaccination rates substantially.⁷⁻¹³ However, further enhancement of influenza
55 vaccination rates is still needed. The most recent estimates from the Canadian population in
56 2013 revealed that only 31% received seasonal influenza vaccine in the previous 12 months.¹⁴

57 Understanding the public's perception of the role of pharmacists as immunizers can enhance
58 uptake of this service and address concerns the public may have. Previous studies of clients
59 who had received a pharmacist-administered vaccine found high satisfaction levels, great
60 appreciation of the knowledge and professionalism of pharmacists, high levels of intent to
61 return to a pharmacist for future immunizations, and willingness to recommend pharmacists as
62 immunizers to others.¹⁵⁻²³ However, these studies did not explore the reasons of not receiving a
63 vaccination from a pharmacist among individuals who did not get this service. Blake et al¹⁵
64 documented that even among patients who received immunizations from their pharmacist

65 within a family health team, in a jurisdiction where the service was recently introduced, few
66 individuals were able to recall that pharmacists can administer vaccines. Patients also
67 expressed concerns that community pharmacies were not an appropriate venue to receive a
68 vaccine. Additionally, they questioned whether pharmacists were qualified to immunize. While
69 the literature offers insight into the experience of individuals who have been immunized by a
70 pharmacist, gaps remain in understanding why individuals have not participated in pharmacist-
71 administered influenza vaccinations, especially in a community pharmacy setting.

72 As the province of Ontario had recently granted pharmacists the authority to provide influenza
73 immunizations, we had an opportunity to capture the perspectives of pharmacy patrons about
74 this new professional service. Accordingly, the aims of this study were to determine (1) the
75 proportion of pharmacy patrons who were aware that pharmacists are able to administer the
76 influenza vaccine, (2) factors and changes that need to be made for pharmacy patrons to
77 increase willingness to access this service in the future, and (3) if the age of pharmacy patrons
78 affects their awareness and perceptions of pharmacist-administered influenza immunizations.

79 **METHODS**

80 This was a quantitative cross-sectional survey study conducted over a period of two weeks
81 (September 18th to October 1st) after the 2013/14 influenza season and prior to the 2014/15
82 influenza season (when influenza vaccines are usually administered) at six community
83 pharmacies in the Greater Toronto Area-Canada's most populous metropolitan region with
84 more than 2,400 pharmacies. These community pharmacies belong to the largest national retail
85 chain in Canada. The sample of six pharmacies was a convenience sample that was selected to
86 include both urban and suburban locations and had offered immunizations during the previous
87 influenza season. Pharmacy patrons aged 18 or older, can communicate in English, and who
88 had not received the influenza vaccination from a pharmacist during the past year were eligible
89 to be included in the study.

90 The survey used in this study was developed specifically for this study. This survey sought to
91 assess awareness, experience, attitudes, and beliefs about pharmacists as immunizers among
92 pharmacy patrons who had not received the influenza vaccine from a pharmacist within the

93 past year. The survey included questions on knowledge of pharmacists as immunizers, influenza
94 vaccination experience (how often, from which healthcare providers in the past/future),
95 attitudes toward pharmacists as immunizers (willingness to receive the vaccine from a
96 pharmacist, changes that might increase the likelihood of receiving the vaccine from a
97 pharmacist), general attitudes toward vaccines, and personal demographics. Respondents could
98 choose one or more answers to the same question in the survey. Modifications to the survey
99 were made based on qualitative feedback obtained from pilot testing with five pharmacists,
100 pharmacy students and non-pharmacist research staff. Both face and content validity were
101 examined in this pilot testing. The modified survey was then used in the study.

102 As previous research has noted concerns regarding bias in pharmacist-administered surveys of
103 client perspectives,²⁴ a research assistant—who had not been in, employed by, or involved with
104 any of the six community pharmacies previously-administered the survey. The research
105 assistant spent two days at each community pharmacy. Adult pharmacy patrons who were in
106 the pharmacy but were not receiving a professional pharmacist's service were approached and
107 informed, using scripted words, of the purpose of the survey and asked if they would be willing
108 to answer an eligibility question. Those who met the inclusion criteria and agreed to participate
109 were given a handout outlining the study and consent details. Participants were offered the
110 option to complete a paper or iPad version of the questionnaire in the store, or to provide their
111 email address to complete the questionnaire by email within the next week. All versions of the
112 questionnaire were identical. Survey questions are available in Appendix 1. Both the iPad and
113 emailed versions of the survey were delivered using Qualtrics online survey software (Provo,
114 Utah, USA). All participants were thanked and offered nominal compensation (piece of candy)
115 in appreciation of their participation. The study received approval from human research ethics
116 boards at the University of Waterloo and University of Toronto.

117 Frequencies and percentages from survey responses were analyzed using SAS 9.4 (SAS Institute
118 Inc., Cary, NC, USA). Differences in frequency distributions between older participants (≥ 65)
119 and younger participants (<65) were assessed using the chi-square test, and relative risk was
120 estimated by calculating odds ratios (ORs) with 95% confidence intervals (95% CI).²⁵

121 **RESULTS**

122 In total, 1,004 individuals from six community pharmacies were invited to participate in the
 123 survey. Of these, 72 (7.1%) were ineligible because they had been vaccinated by a pharmacist in
 124 the past year and 391 (38.9%) either declined to participate immediately or did not respond to
 125 the email directing them to the questionnaire. In total, 541 (53.9% of invited individuals)
 126 completed the survey using the paper (n=433, 80.0%), iPad (n=93, 17.2%) or the emailed
 127 version (n=15, 2.8%). Of the 90 individuals who provided an email address, 82 emails were
 128 delivered (8 bounced back) and 15 (16.7%) responded to the survey invitation. Almost two-
 129 thirds of the survey sample (n=346, 64%) were female, 398 (73.6%) were less than 65 years old,
 130 and 262 (48.4%) were born outside Canada. Respondent characteristics are provided in Table 1.

131 **Table 1:** Survey participant demographics

Characteristic		Frequency (n=541)
Age	Missing	15 (2.8%)
	18–25	48 (8.9%)
	26–40	125 (23.1%)
	41–55	149 (27.5%)
	56–64	76 (14%)
	65–79	103 (19%)
	80+	25 (4.6%)
Gender	Missing	11 (2%)
	Man	182 (33.6%)
	Woman	346 (64%)
	Other	2 (0.4%)
Born in Canada?	Missing	13 (2.4%)
	Yes	266 (49.2%)
	No	262 (48.4%)
Ethnic origin	Missing	16 (3.0%)
	Aboriginal/First Nations/Metis	3 (0.6%)
	Latin/Central/South American	22 (4.1%)
	North American	176 (32.5%)
	Caribbean	31 (5.7%)
	Asian (includes Middle East, South Asia, etc.)	104 (19.2%)
	African	21 (3.9%)
	European	165 (30.5%)
Other	3 (0.6%)	

132

133 Almost two-thirds of respondents (n=333, 61.6%) indicated they were either likely or very likely
134 to get a vaccine that had been recommended by a health professional. A small proportion of
135 individuals indicated that they were unlikely or very unlikely to get a vaccine that has been
136 recommended by a health professional (n=69, 12.8%). More than one-third of respondents
137 reported that they had never received an influenza vaccination (n=200, 37.0%), whereas 185
138 (34.2%) indicated they receive it every year. The remainder of respondents either received the
139 vaccine occasionally every 2 to 3 years (n=116, 21.4%), received it last year for the first time
140 (n=13, 2.4%), or planned on getting it for the first time this year (n=15, 2.8%).

141 Younger individuals (<65) were less likely to receive the vaccine every year than were
142 individuals 65 years or older (OR 0.28, 95% CI: 0.19–0.42, p<0.01). However, sex and place of
143 birth did not affect the likelihood of receiving the vaccine every year (OR 1.18, 95% CI: 0.81–
144 1.72, p=0.38 for male vs. female and OR 1.02, 95% CI: 0.71–1.46, p=0.91 for patrons born in
145 Canada vs. patrons born outside of Canada). The family physician's office was the most
146 common location to receive the vaccine (n= 183, 33.8%), followed by the workplace (n=32,
147 5.9%) and public health clinics (n=14, 2.6%). Few individuals indicated that they are at higher
148 risk of contracting influenza or experiencing influenza-related complications because of a
149 weakened immune system (e.g., due to illness or treatments) (n= 32, 5.9%), having a chronic
150 illness (e.g., diabetes or hypertension) (n=48, 8.9%), or being pregnant (n=7, 1.3%).

151 Slightly less than one-third of respondents (n=165, 30.5%) indicated that they were not aware
152 that pharmacists could administer the influenza vaccine. Younger individuals (<65) were even
153 less likely to be aware of the availability of vaccination through pharmacists (OR 0.48, 95%CI
154 0.29 to 0.77, p<0.01). Among respondents who were aware that pharmacists could administer
155 the influenza vaccine, individuals were made aware mainly by TV or radio advertisements
156 (n=147, 39.1%), or directly from the pharmacy itself (n=143, 38.0%). Other means of awareness
157 included word of mouth (n=62, 16.5%), newspaper ads (n=53, 14.1%), and doctors' offices
158 (n=34, 9.0%).

159 The most common reasons survey respondents provided for not receiving the vaccine from
 160 community pharmacists was not wanting or needing the influenza vaccine (n=225, 41.6%), not
 161 having the knowledge that pharmacists can administer the vaccine (n=98, 18.1%), being more
 162 accustomed to getting the vaccine from a doctor or nurse (n=89, 16.5%), or finding influenza
 163 vaccination to be more convenient from a doctor or a nurse (n=63, 11.6%). Pharmacy-specific
 164 concerns such as potential lack of privacy (n=7, 1.3%) or inadequate pharmacist experience
 165 (n=6, 1.1%), and training to provide the vaccine (n=2, 0.4%) were expressed uncommonly. Table
 166 2 provides all patron responses for not receiving the influenza vaccine from a community
 167 pharmacist.

168 **Table 2:** Pharmacy patron reasons for not getting the flu shot from a pharmacist in the past
 169 year

Reason (More than one reason could be chosen)	Frequency (n=541)
I did not want/need the flu shot	225 (41.6%)
I did not know pharmacists provided the flu shot	98 (18.1%)
I'm used to getting it from my doctor/nurse	89 (16.5%)
It's more convenient to get from my doctor/nurse	63 (11.6%)
Other	54 (10%)
No reason, it just did not happen	37 (6.8%)
I have more trust in my doctor/nurse	29 (5.4%)
I got elsewhere	26 (4.8%)
Not enough privacy at a pharmacy	7 (1.3%)
Pharmacists do not have enough experience in this area	6 (1.1%)
Pharmacists do not have enough training in this area	2 (0.4%)
The wait time is too long in a pharmacy	2 (0.4%)
It's difficult to get to the pharmacy	0 (0%)

170

171 The family doctor's office was the most common intended future location for influenza
 172 vaccination among respondents (n= 144, 26.6%), with community pharmacies at 11.5% (n=62).
 173 Work place (n=28, 5.2%) and public health clinics (n=6, 1.1%) being lower preference locations.

174 When asked about future intention to be immunized, 55.7% (n=301) of respondents indicated
 175 they would be willing to receive the influenza vaccine from a pharmacist and 5.9% (n=32)

176 indicated they might be willing. About one-third of the respondents (n=186, 34.4%) stated that
 177 no specific factor would increase their willingness to get the influenza vaccine from a
 178 pharmacist. Of these respondents, two-thirds (65.6%, n=122) reported not wanting or needing
 179 the influenza vaccine as the primary reason for not getting vaccinated by a pharmacist and
 180 94.6% (n=176) expressed a complete lack of interest in influenza vaccination by indicating
 181 “Nowhere (will not get it)” to the question that asked “Where do you plan to get the flu shot
 182 this year?” Almost two-thirds of these individuals had never had an influenza vaccination
 183 before (n=116, 62.4%).

184 Slightly more than one-third of respondents (n=192, 35.5%) indicated that they visit their
 185 community pharmacy at least once a week, with younger individuals (<65) being less likely than
 186 their older counterparts to do so (OR 0.45, 95% CI: 0.30–0.67, p<0.01). Among respondents,
 187 42.1% (n=228) reported visiting their community pharmacy at least once a month and 20.5%
 188 (n= 111) reporting that they visit a few times a year. More flexible or extended hours (n=61,
 189 11.3%), shorter wait times (n=64, 11.8%), and more privacy at pharmacies (n=57, 10.5%) were
 190 reported as specific factors that would increase the willingness of individuals to get the flu shot
 191 from a pharmacist. Table 3 provides the factors respondents indicated would increase patron
 192 willingness to get the influenza vaccine from a pharmacist.

193 **Table 3:** Factors that would increase pharmacy patron willingness to get the flu shot from a
 194 pharmacist

Factor (More than one factor could be chosen)	Frequency (n=541)
Nothing, I will not get a flu shot	186 (34.4%)
Increased advertising/promotion	74 (13.7%)
More flexible or extended hours (evenings, walk ins)	64 (11.8%)
Shorter wait times	61 (11.3%)
A more private space to get the shot	57 (10.5%)
Increased pharmacists' experience	40 (7.4%)
More flu clinics in the pharmacy	40 (7.4%)
The option to make an appointment with the pharmacist	36 (6.7%)
Increased pharmacists' training	31 (5.7%)
More time to talk with the pharmacist about the flu shot	16 (3%)

195

196 **DISCUSSION**

197 We demonstrate in this cross-sectional survey study that, almost one year after the
198 introduction of influenza vaccination service by pharmacists in community pharmacies, two
199 barriers to immunization at a community pharmacy still exist: lack of awareness of pharmacist-
200 administered immunization and perceived lack of necessity (i.e. complacency) to be
201 vaccinated,²⁶ both in general and at pharmacies. Influenza vaccination is the most effective
202 public health measure to prevent influenza^{27,28} morbidity and mortality,²⁹⁻³¹ work absenteeism,
203 and lost productivity and earnings the illness causes.^{32,33} In 2000, Ontario's Ministry of Health
204 and Long-Term Care launched the Universal Influenza Immunization Program to provide free
205 influenza vaccinations in physician offices, public health clinics, and workplaces to all Ontarians
206 aged 6 months and older.³⁴ To increase immunization coverage, in 2012 the Ministry gave
207 injection-certified pharmacists the authority to immunize Ontarians aged 5 years or older.¹⁹
208 Pharmacists and community pharmacies were targeted, as both this healthcare profession and
209 the sites where many practice are highly accessible. Indeed, 91% of Ontario residents live
210 within 5 km of a pharmacy and 65% live within 800 meters.³⁵ Moreover, community pharmacies
211 typically have more convenient hours of operation than physician offices and public health
212 clinics. Some 51% of Canadians visit a community pharmacy at least once a month.³⁶ Most
213 pharmacies are open during evenings and weekends, and appointments are often unnecessary
214 for services pharmacists provide.

215 During the second year that Ontario's community pharmacists could offer influenza
216 immunizations, some 750,000 doses were administered during that influenza season, with
217 approximately 50% of community pharmacies offering this new service. Although studies have
218 found that recipients of pharmacist-administered vaccinations are very satisfied with the
219 service,¹⁵⁻¹⁹ our study demonstrated that increasing the public's awareness about this service is
220 required.

221 Our survey revealed that about one-third of respondents were unaware of the service, even
222 among individuals who visit the pharmacy. Awareness was lower among younger individuals,
223 which may reflect their reduced interest in influenza vaccination in general, as these individuals

224 were also less likely to receive the vaccine every year regardless of vaccination venue. Chain,
225 franchise, and independent community pharmacies may be able to overcome lack of awareness
226 by improving their promotional efforts. Our survey revealed that a similar proportion of
227 respondents became aware of the availability of pharmacist immunization through radio and
228 TV advertisements as from in-pharmacy contact and promotion. Increased advertisement was
229 reported as the factor with the highest potential to increase willingness to receive a vaccination
230 from a pharmacist. The next two most important factors were extending hours and shortening
231 wait times, both of which underscore the importance of highlighting the convenience of
232 community pharmacies when developing influenza immunization promotional materials.

233 As the collective public health goal of influenza immunization is to have everyone immunized
234 each season, the venue where they are immunized is less important than that they get immunized.
235 Knowing that some clients will value pharmacist-provided vaccination based on convenience
236 and that previous research shows that recipients are highly satisfied with pharmacist-
237 administered immunizations,¹⁵⁻¹⁹ public health officials and other primary care providers (i.e.
238 family physicians and nurse practitioners) should promote pharmacist-administered vaccination
239 to increase public awareness and uptake of this service. Vice versa, with some survey
240 respondents indicating that they prefer to get vaccinated in their physician's office, in the
241 workplace or with public health, it is important for pharmacists to support and encourage these
242 immunization venues.

243 The SAGE working group states that "vaccination complacency exists where perceived risks of
244 vaccine-preventable diseases are low and vaccination is not deemed a necessary preventive
245 action".³⁷ In our survey, more than one-third of respondents (n=225, 41.6%) indicated not
246 wanting or needing the influenza vaccine as the reason for not receiving the vaccine from a
247 pharmacist, a finding consistent with the published literature across all HCPs who provide the
248 vaccination.³⁸ About one-third of respondents indicated they would not receive the influenza
249 vaccine anywhere, yet 61.6% of respondents indicated that if a healthcare provider
250 recommended a vaccine they would get vaccinated. These findings highlight the need for
251 healthcare providers to distinguish the outright refusal from those who could be persuaded to

252 receive the vaccine. Research is limited regarding pharmacist's training, role, strategies and
253 successes in overcoming vaccine hesitancy. However, given the high level of public trust
254 pharmacists enjoy,³⁹ and the frequent opportunities they have to talk to the public and those at
255 high risk of getting influenza, pharmacists could be quite successful in overcoming vaccine
256 hesitancy.

257 Understanding the perspectives of different age groups could help pharmacists better target
258 their efforts. Although younger individuals visit pharmacies less often, they indicated they were
259 more likely to receive the influenza vaccine from a pharmacist in the future than were
260 individuals 65 years of age or older. In contrast, older individuals reported they valued
261 convenience and being accustomed to receiving the influenza vaccination from their physician
262 or nurse and identified few factors that would increase their willingness to get the influenza
263 vaccine from a pharmacist.

264 When asked why they did not get the influenza vaccine from a pharmacist, few respondents
265 expressed concerns about inadequate privacy or pharmacists not having sufficient experience
266 or training to immunize. However, pharmacists should be prepared to address privacy concerns
267 and reassure clients that they are professionally competent to provide immunizations.

268 The study has several limitations. Although pharmacy patrons were surveyed at six community
269 pharmacies, individuals who completed the survey were customers in a single retail pharmacy
270 chain. Surveys at other pharmacies or pharmacy chains could have yielded different findings.
271 Moreover, the survey was conducted using a small convenience sample of six pharmacies in the
272 Greater Toronto Area, Canada's most diverse and populous city. Thus, our findings may not be
273 generalizable to smaller, rural communities.

274 **CONCLUSION**

275 Lack of public awareness about the availability of influenza vaccine administration by
276 pharmacists is common, especially among younger patrons. It is essential for pharmacists to
277 promote this service to increase influenza vaccination rates and for other healthcare
278 professionals to support pharmacists as one of several healthcare providers who offer this

279 important public health service. Pharmacists have an opportunity to address vaccine hesitancy
280 issues, both in general and those that are pharmacy specific, and to promote influenza
281 vaccination to pharmacy patrons who have not taken advantage of this recent professional
282 service.

283 **Acknowledgements:** We would like to thank Jane Sharpe and the pharmacy students for
284 recruiting pharmacy patrons to complete the survey and Richard Violette and Joe Petrik who
285 supported the review and editing of the manuscript.

286 **Declaration of conflicting interests:** The authors declare no conflicts of interest with respect to
287 the research, authorship and/or publication of this article.

288 **Author contributions**

289 DC and LW were responsible for the design and delivery of the survey. MWA was responsible
290 for the data analysis and drafting of the manuscript. All other authors conceptualized the
291 project, designed the survey, and contributed to the completed manuscript.

292

293 **References**

- 294 1. Canadian Pharmacists Association (CPhA). Pharmacists' scope of practice in Canada,
295 [http://www.ocpinfo.com/regulations-standards/policies-](http://www.ocpinfo.com/regulations-standards/policies-guidelines/administering_a_substance_injection/inhalation/)
296 [guidelines/administering a substance injection/inhalation/](http://www.ocpinfo.com/regulations-standards/policies-guidelines/administering_a_substance_injection/inhalation/). Accessed 2016.
- 297 2. American Pharmacists Association and NASPA. Pharmacist authority to administer influenza
298 vaccine . Accessed 2016.
- 299 3. International Pharmaceutical Federation (FIP). An overview of current pharmacy impact on
300 immunisation: A global report 2016. 2016.
- 301 4. First flu season for pharmacists immunizing in Alberta: "Bumps along the road" but a valuable
302 public health contribution. *Can Pharm J*. 2010;143:72.
- 303 5. Marra F, Kaczorowski JA, Marra C. Assessing pharmacists' attitudes regarding delivery of the
304 pandemic influenza vaccine in British Columbia. *Can Pharm J*. 2010;143:278-84.
- 305 6. Office of the Auditor General of Ontario. 2014 Annual Report. Chapter 3: Reports on value-
306 for-money audits, section 3.04 Immunization, Ministry of Long-Term Care. 2014:176.
- 307 7. Buchan SA, Rosella LC, Finkelstein M et al. Impact of pharmacist administration of influenza
308 vaccines on uptake in Canada. *CMAJ*. 2017;189:E-146-E152.
- 309 8. Baroy J, Chung D, Frisch R, Apgar D, Slack MK. The impact of pharmacist immunization
310 programs on adult immunization rates: A systematic review and meta-analysis. *J Am Pharm*
311 *Assoc (2003)*. 2016;56:418-26.
- 312 9. Chun GJ, Sautter JM, Patterson BJ, McGhan WF. Diffusion of pharmacy-based influenza
313 vaccination over time in the United States. *Am J Public Health*. 2016;106:1099-100.
- 314 10. Drozd EM, Miller L, Johnsrud M. Impact of pharmacist immunization authority on seasonal
315 influenza immunization rates across states. *Clin Ther*. 2017;39:1563-1580.
- 316 11. Hogue MD, Grabenstein JD, Foster SL, Rothholz MC. Pharmacist involvement with
317 immunizations: A decade of professional advancement. *J Am Pharm Assoc*. 2006;46:168-179.
- 318 12. Isenor JE, Edwards NT, Alia TA, Slayter KL, MacDougall DM, McNeil SA, Bowles SK. Impact of
319 pharmacists as immunizers on vaccination rates: A systematic review and meta-analysis.
320 *Vaccine*. 2016;34:5708-23.
- 321 13. Isenor JE, Alia TA, Killen JL et al. Impact of pharmacists as immunizers on influenza
322 vaccination coverage in Nova Scotia, Canada. *Hum Vaccin Immunother*. 2016;12:1225-8.

- 323 14. Buchan SA, Kwong JC. Trends in influenza vaccine coverage and vaccine hesitancy in
324 Canada, 2006/07 to 2013/14: Results from cross-sectional survey data. *CMAJ Open*.
325 2016;4:E455-62.
- 326 15. Blake EW, Blair MM, Couchenour RL. Perceptions of pharmacists as providers of
327 immunizations for adult patients. *Pharmacotherapy*. 2003;23:248-54.
- 328 16. Bounthavong M, Christopher ML, Mendes MA et al. Measuring patient satisfaction in the
329 pharmacy specialty immunization clinic: A pharmacist-run immunization clinic at the Veterans
330 Affairs San Diego healthcare system. *Int J Pharm Pract*. 2010;18:100-7.
- 331 17. Grabenstein JD, Guess HA, Hartzema AG, Koch GG, Konrad TR. Attitudinal factors among
332 adult prescription recipients associated with choice of where to be vaccinated. *J Clin Epidemiol*.
333 2002;55:279-84.
- 334 18. Hess KM, Dai CW, Garner B, Law AV. Measuring outcomes of a pharmacist-run travel health
335 clinic located in an independent community pharmacy. *J Am Pharm Assoc*. 2010;50:174-80.
- 336 19. Papastergiou J, Folkins C, Li W, Zervas J. Community pharmacist-administered influenza
337 immunization improves patient access to vaccination. *Can Pharm J (Ott)*. 2014;147:359-65.
- 338 20. Weitzel KW, Goode JV. Implementation of a pharmacy-based immunization program in a
339 supermarket chain. *J Am Pharm Assoc*. 2000;40:252-6.
- 340 21. Taitel M, Cohen E, Terranova B, Baloun L, Kirkham H, Duncan I, Pegus C. Pharmacists as
341 immunization providers: Patient attitudes and perceptions. *Pharm Times*. 2011;23:248-54.
- 342 22. Ernst ME, Bergus GR, Sorofman BA. Patients' acceptance of traditional and nontraditional
343 immunization providers. *J Am Pharm Assoc*. 2001;41:53-9.
- 344 23. Cheung W, Tam K, Cheung P, Banh HL. Satisfaction with student pharmacists administering
345 vaccinations in the university of Alberta annual influenza campaign. *Can Pharm J*.
346 2013;146:227-32.
- 347 24. Frishman WH. Importance of medication adherence in cardiovascular disease and the value
348 of once-daily treatment regimens. *Cardiol Rev*. 2007;15:257-63.
- 349 25. Mehta CR, Patel NR, Gray R. Computing an exact confidence interval for the common odds
350 ratio in several 2x2 contingency tables. *Journal of the American Statistical Association*.
351 1985;80:969-73.
- 352 26. Dubé E, Bettinger J, Fisher W, Naus M, Mahmud S, Hilderman T. Vaccine acceptance,
353 hesitancy and refusal in Canada: Challenges and potential approaches. *Can Comm Dis Rep*.
354 2016;42:246-51.

- 355 27. World Health Organization (WHO). Fact sheet N°211. Influenza (seasonal). 2014.
- 356 28. National Advisory Committee on Immunization (NACI). An Advisory Committee Statement
357 (ACS) from the National Advisory Committee on Immunization (NACI). Statement on seasonal
358 influenza vaccine for 2014-2015. 2014.
- 359 29. Kwong JC, Crowcroft NS, Campitelli MA, Ratnasingham S, Daneman N, Deeks SL, Manuel DG.
360 *Ontario burden of infectious disease study advisory group; ntario burden of infectious disease*
361 *study (ONBOIDS): An OAHPP/ICES report*. Ontario Agency for Health Protection and Promotion,
362 Institute for Clinical Evaluative Sciences: Toronto, ON, 2010.
- 363 30. Haydon E, Roerecke M, Giesbrecht N, Rehm J, Kobus-Matthews M. Chronic disease in
364 Ontario and Canada: Determinants, risk factors and prevention priorities. Prepared for the
365 Ontario Chronic Disease Prevention Alliance and the Ontario Public Health Association. 2006.
- 366 31. Schanzer DL, Tam TW, Langley JM, Winchester BT. Influenza-attributable deaths, canada
367 1990-1999. *Epidemiol Infect.* 2007;135:1109-16.
- 368 32. Molinari NA, Ortega-Sanchez IR, Messonnier ML, Thompson WW, Wortley PM, Weintraub E,
369 Bridges CB. The annual impact of seasonal influenza in the US: Measuring disease burden and
370 costs. *Vaccine.* 2007;25:5086-96.
- 371 33. Li S, Leader S. Economic burden and absenteeism from influenza-like illness in healthy
372 households with children (5-17 years) in the US. *Respir Med.* 2007;101:1244-50.
- 373 34. Kwong JC, Stukel TA, Lim J et al. The effect of universal influenza immunization on mortality
374 and health care use. *PLoS Med.* 2008;5:e211.
- 375 35. Law MR, Dijkstra A, Douillard JA, Morgan SG. Geographic accessibility of community
376 pharmacies in ontario. *Healthc Policy.* 2011;6:36-46.
- 377 36. Abacus Data. Pharmacists in Canada. A national survey of Canadians on their perceptions
378 and attitudes towards pharmacists in Canada. Prepared for the Canadian Pharmacists
379 Association. February 2015.
- 380 37. MacDonald NE, SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition,
381 scope and determinants. *Vaccine.* 2015;33:4161-4.
- 382 38. Schmid P, Rauber D, Betsch C, Lidolt G, Denker ML. Barriers of influenza vaccination
383 intention and behavior - A systematic review of influenza vaccine hesitancy, 2005 - 2016. *PLoS*
384 *One.* 2017;12:e0170550.
- 385 39. IPSOS Reid. What do pharmacists, doctors, soldiers, pilots and teachers have in common?
386 they're among the most trusted professions in Canada. Accessed 2016.