

Willingness to volunteer during an influenza pandemic: perspectives from students and staff at a large Canadian university

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Background A future influenza pandemic will require greater demand on numerous essential services and a reduced capacity to meet that demand. Recruitment of volunteers is an important issue for pre-pandemic planning.

Objectives To identify factors and attitudes towards volunteerism in the event of a pandemic of influenza.

Participants/methods A 42-item web-questionnaire was administered to all faculty, staff and students at the University of Alberta. Respondents indicated their willingness to volunteer. Responses were dichotomized and logistic regression models were developed to capture the association between willingness to volunteer and (i) demographic and information source variables, (ii) risk perception and general knowledge, and (iii) volunteering attitudes and priority access variables.

Results Many factors predicted willingness to volunteer and several involved interactions with other variables. Individuals who were older, relied on University Health Centre information and

who had past volunteerism experience were generally more likely to be willing to volunteer. Those willing to volunteer were more likely to think spread could be prevented by covering mouth when coughing/sneezing, and treatment would include drinking fluids. Those who thought influenza would be treated by antibiotics were less willing to volunteer. Likely volunteers thought that healthcare students should be encouraged to volunteer if there was a healthcare worker shortage.

Conclusion This study provides guidance for those who are preparing universities to deal with pandemic influenza. The results suggest factors that might be important in the recruitment of volunteers during an influenza pandemic and these factors might be relevant for other sectors as well.

Keywords Disease outbreaks [G03.850.290], hospital volunteers [M01.955.473], human influenza [C08.730.310], voluntary workers [M01.955].

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Introduction

Public health emergencies, such as a future influenza pandemic, create a greater demand on numerous essential services and a reduced capacity to meet that demand. Surge capacity in the healthcare system and elsewhere has been raised as a crucial issue to address before such a pandemic strikes. Among various options to deal with a reduction in manpower, recruitment of volunteers is an essential means which deserves attention in this pre-pandemic planning phase.¹ There has been considerable planning in Canada at the federal, provincial, municipal and health authority

levels for pandemic influenza; however, there has been very little planning for pandemic influenza at our nation's universities.

Universities have huge potential as a source of skilled volunteers during such a public health crisis. Health sciences faculties, for example, could provide skilled personnel to help combat the pandemic. Prior planning involves recruiting volunteers ahead of time and anticipating barriers. Attitudes of students towards volunteering can also influence their willingness to volunteer.² Thus, it is very important to understand the level of knowledge regarding pandemic influenza as well as

attitudes towards volunteerism amongst students, staff and faculty at our universities.

Methods

A web-based questionnaire³ on pandemic influenza was developed and distributed to all 40 086 students, support staff and academic staff⁴ at the University of Alberta in Edmonton, Canada. The University of Alberta's Public Health Response Committee has been developing a response plan in the event of a public health crisis and this study was intended to provide evidence that might assist the Committee in pandemic planning. In particular, it was thought that members of the University would be a source of volunteers during an influenza pandemic. An e-mail was sent on 20 September 2006, with a reminder e-mail circulated on 2 October 2006 to members of health sciences faculties. The data collection was closed on 2 November 2006. Thus, the study period was 20 September 2006 to 2 November 2006. Ethics approval for the study was obtained from the Human Research Ethics Board – Panel B, University of Alberta.

The questionnaire included items relating to demographic information; self-reported current health status; source and reliability of healthcare information (e.g. television, doctors); risk perception and general knowledge of pandemic influenza (e.g. prevention, treatment); allocation of healthcare resources during a pandemic (e.g. save children first); closure of the university during a pandemic; and volunteer issues during a pandemic.

Variables based on a 5-point scale were collapsed into two categories (e.g. 1, 2, 3 = unlikely, 4, 5 = likely). The primary outcome was willingness to volunteer if healthy and able to (unlikely, likely), called willingness to volunteer. The data were summarized by willingness to volunteer [frequency and odds ratio (OR), or mean and standard deviation (SD)]. Three separate multivariable logistic regression models were developed to capture the relationship between willingness to volunteer and (i) demographics and information sources; (ii) risk perception and general knowledge; and (iii) attitudes and priorities. Age and gender were considered for entry in each model and all other variables were entered using forward selection. Two-way interactions were added and removed from the model via backward selection. Variables significant in an interaction term were included as main effects. Models were assessed by Akaike Information Criterion (AIC)⁵ and Sommer's D. Bivariable ORs, unadjusted for the multivariable model, and multivariable ORs are provided with 95% confidence intervals (CIs). All *P*-values are two-sided and a *P*-value less than 0.05 was considered to be significant. Models included all subjects with complete data on the model variables. Statistical analyses were conducted in SAS⁶ and Splus.⁷

Results

The e-mail inviting completion of the web questionnaire was distributed to 40 086 individuals and 5225 (13.0%) participated. Females responded more frequently (15.9%, 3657/23 044) than males (8.9% 1521/17 029). Nearly 95% (4967/5225) of the respondents answered the willingness to volunteer question and 49.2% (2444/4967) were likely volunteers. The proportion of females and males willing to volunteer was nearly identical (49.8% versus 47.7%). Those who expressed a willingness to volunteer were willing to volunteer in a variety of activities: 60.8% (1424/2343) would help feed hospital patients, 79.0% (1859/2353) would provide refreshments in hospital to staff, 73.7% (1781/2418) would volunteer wherever needed in the hospital, 76.0% (1838/2418) would staff community phone lines and 78.6% (1903/2420) would check on neighbours in the community.

Demographics, information sources and past history of volunteerism

The most important predictors of willingness to volunteer were age, reliance on information sources, past volunteering activities and Faculty (Table 1, *n* = 4106). Older respondents were more willing to volunteer (OR for a 25-year old was 1.4). Respondents who relied on newspapers/magazines or the University Health Centre for health news were also more likely to be willing to volunteer (ORs 1.3 and 1.2 respectively). Individuals with past volunteerism experience with social services were also more likely to be willing to volunteer (OR = 1.5).

The two-way interactions in the model require careful examination (Table 2). Among individuals who placed little reliance on television for health news, respondents with confidence in information from nurses were 1.4 times more likely to be willing to volunteer than respondents with little confidence in nurses. Among business students or academic staff, those who relied on courses/textbooks for health news were 6.8 times more likely to be willing to volunteer than similar individuals who did not rely on such sources.

Past volunteerism (or lack thereof) was an important aspect. Business students or academic staff with past sports and recreation volunteer experience were 3.3 times more likely to be willing to volunteer than those without this experience. Of the respondents without past sports and recreation volunteerism, those who had previously volunteered with schools were more likely to volunteer (OR = 1.3). The same could be said of those without past hospital/healthcare volunteerism. Individuals with a past history of religious volunteerism were 2.6 and 1.4 times more likely to be willing to volunteer for nursing and non-nursing students and academic staff respectively.

Table 1. Multivariable model based on demographic and information sources variables (model A)

Variable	Willingness to volunteer		Bivariable*		Multivariable†	
	Unlikely (n)	Likely (n)	OR	95% CI	OR	95% CI
Age, mean (SD) (X ₁)	23.9 (7.7)	24.4 (8.4)	1.25‡	1.03–1.52	1.38	1.12–1.70
Student or academic staff in business						
No	1967	1991	1.00			
Yes (X ₂)	96	52	0.54	0.38–0.75	Interaction [§]	
Student or academic staff in nursing						
No	1922	1741	1.00			
Yes (X ₃)	141	302	2.36	1.92–2.92	Interaction	
Student or academic staff in public health						
No	2060	2026	1.00			
Yes (X ₄)	3	17	5.76	1.69–19.68	Interaction	
Live off campus with family						
No	1165	1261	1.00			
Yes (X ₅)	898	782	0.81	0.71–0.91	Interaction	
Reliance on television for health news						
Little	1158	1234	1.00			
Much (X ₆)	905	809	0.84	0.74–0.95	Interaction	
Reliance on newspapers/magazines for health news						
Little	1,328	1,218	1.00			
Much (X ₇)	735	825	1.22	1.08–1.39	1.27	1.10–1.46
Reliance on course/textbooks for health news						
Little	1437	1183	1.00			
Much (X ₈)	626	860	1.67	1.47–1.90	Interaction	
Reliance on University Health Centre for health news						
Little	1645	1518	1.00		1.00	
Much (X ₉)	418	525	1.36	1.18–1.58	1.19	1.01–1.39
Confidence in information received from nurses						
Little	471	401	1.00			
Much (X ₁₀)	1592	1642	1.21	1.04–1.41	Interaction	
Past volunteerism with sports and recreation						
No	1217	1078	1.00			
Yes (X ₁₁)	846	965	1.29	1.14–1.46	Interaction	
Past volunteerism with hospital/health care						
No	1547	1211	1.00			
Yes (X ₁₂)	516	832	2.06	1.80–2.35	Interaction	
Past volunteerism with schools						
No	962	747	1.00			
Yes (X ₁₃)	1101	1296	1.52	1.34–1.72	Interaction	
Past volunteerism with religious institutions						
No	1578	1384	1.00			
Yes (X ₁₄)	485	659	1.55	1.35–1.78	Interaction	
Past volunteerism with social services						
No	1585	1327	1.00		1.00	
Yes (X ₁₅)	478	716	1.79	1.56–2.05	1.50	1.29–1.73

*Unadjusted for other variables.

†Adjusted for all other variables in the model.

‡OR calculated for a person aged 25 years.

§Variable involved in an interaction. OR provided in Table 2.

Other interaction terms were required for model fit but did not achieve statistical significance. There were few respondents in the Public Health group, although most were willing to volunteer if they did not live off campus with family.

Risk perception and general knowledge

When examining the relationship between willingness to volunteer and risk perception and general knowledge variables, the final model ($n = 4623$) included 13 variables and

Table 2. Interactions for model A

First variable	Second variable	Willingness to volunteer		Multivariable	
		Unlikely (n)	Likely (n)	OR	95% CI
Student or academic staff in business No	Reliance on course/textbooks for health news				
	No	1348	1144	1.00	
	Yes (X ₈)	619	847	1.25	1.08–1.44
	Yes (X ₂)				
Student or academic staff in business Yes (X ₂)	No	89	39	1.00	
	Yes (X ₈)	7	13	6.84	2.28–20.57
	Past volunteerism with sports and recreation				
	No	1148	1056	1.00	
Student or academic staff in business Yes (X ₂)	Yes (X ₁₁)	819	935	0.90	0.72–1.13
	No	69	22	1.00	
	Yes (X ₁₁)	27	30	3.27	1.46–7.33
	Past volunteerism with religious institutions				
Student or academic staff in nursing No	No	1464	1198	1.00	
	Yes (X ₁₄)	458	543	1.41	1.16–1.72
	Yes (X ₃)				
	No	114	186	1.00	
Student or academic staff in nursing Yes (X ₃)	Yes (X ₁₄)	27	116	2.59	1.54–4.35
	Past volunteerism with sports and recreation				
	No	700	536	1.00	
	Yes (X ₁₁)				
Past volunteerism with sports and recreation No	Yes (X ₁₃)	517	542	1.26	1.03–1.53
	No	262	211	1.00	
	Yes (X ₁₃)	584	754	1.71	0.90–3.22
	Past volunteerism with hospital/health care				
Past volunteerism with hospital/health care No	No	786	486	1.00	
	Yes (X ₁₃)	761	725	1.26	1.03–1.53
	Yes (X ₁₂)				
	No	176	261	1.00	
Past volunteerism with hospital/health care Yes (X ₁₂)	Yes (X ₁₃)	340	571	0.90	0.47–1.73
	Live off campus with family				
	No	1164	1246	1.00	
	Yes (X ₄)				
Student or academic staff in public health No	Yes (X ₅)	896	780	0.90	0.77–1.05
	No	1	15	1.00	
	Yes (X ₅)	2	2	0.06	0.00–1.10
	Past volunteerism with religious institutions				
Past volunteerism with religious institutions No	No	909	836	1.00	
	Yes (X ₅)	669	548	0.90	0.77–1.05
	Yes (X ₁₄)				
	No	256	425	1.00	
Past volunteerism with religious institutions Yes (X ₁₄)	Yes (X ₅)	229	234	0.64	0.35–1.16
	Confidence in information received from nurses				
	Little	312	251	1.00	
	Much (X ₁₀)	846	983	1.42	1.16–1.74
Reliance on television for health news Little	Little	159	150	1.00	
	Much (X ₆)				
	Little	159	150	1.00	
	Much (X ₁₀)	746	659	0.94	0.49–1.81

five interactions (Table 3). Respondents who believed that they would recover without missing school/work if they developed influenza were more likely to be willing to volunteer than those who believed some school/work would be missed (OR = 1.3). Respondents who thought that the spread of pandemic influenza could be prevented by covering one's mouth when coughing or sneezing were 1.3 times more likely to be willing to volunteer than those who did not. Those who thought pandemic influenza could be treated by antibiotics were less likely to be willing to volunteer

(OR = 0.8) than those who did not think antibiotics were a treatment option. Individuals who believed drinking fluids was a treatment option were 1.2 times more likely to be willing to volunteer than those who did not believe in such treatment.

The openness of the university, and a respondent's own decision to stay home and avoid public places during an influenza pandemic were linked to likelihood of volunteerism (Table 4). Those who thought that coworkers/colleagues/family members becoming ill would not stop them

Table 3. Multivariable model based on risk perception and general knowledge (model B)

Variable	Willingness to volunteer		Bivariable*		Multivariable [†]	
	Unlikely (n)	Likely (n)	OR	95% CI	OR	95% CI
Age, mean (SD) (Z ₁)	25.6 (9.5)	26.2 (10.2)	1.16 [‡]	(1.00, 1.35)	Interaction [§]	
If you developed influenza during pandemic, would you recover without missing school/work?						
Unlikely	2027	1871			1.00	
Likely (Z ₂)	309	416	1.46	1.24–1.72	1.30	1.10–1.53
When pandemic hits, would nothing stop you from going to school/work?						
No	2190	2010	1.00			
Yes, (nothing would stop me) (Z ₃)	146	277	2.07	1.68–2.55	Interaction	
When pandemic hits, would coworkers/colleagues/family becoming ill stop you from going to school/work?						
No	1334	1188	1.00			
Yes (Z ₄)	1002	1099	1.23	1.10–1.38	Interaction	
When pandemic hits, should the university remain open?						
No, close it	685	479	1.00			
Yes, only necessary operations (Z _{5.1})	1210	1242	1.47	1.28–1.69	Interaction	
Yes, all faculties/departments as possible (Z _{5.2})	441	566	1.84	1.55–2.18	Interaction	
Is pandemic influenza spread by touching doorknobs (etc.) previously handled by an infected person?						
No	634	707	1.00			
Yes (Z ₆)	1702	1380	0.83	0.73–0.95	Interaction	
Can pandemic influenza be prevented by covering mouth when coughing or sneezing?						
No	455	358	1.00			
Yes (Z ₇)	1881	1929	1.30	1.12–1.52	1.28	1.08–1.51
Can pandemic influenza be prevented by vaccination?						
No	713	633	1.00			
Yes (Z ₈)	1623	1654	1.15	1.01–1.30	Interaction	
Can pandemic influenza be prevented by quarantine?						
No	817	965	1.00			
Yes (Z ₉)	1519	1322	0.74	0.65–0.83	Interaction	
Can pandemic influenza be prevented by moving to a province/country with no outbreak?						
No	1983	2020	1.00			
Yes (Z ₁₀)	353	267	0.74	0.63–0.88	Interaction	
Can pandemic influenza be treated by antibiotics?						
No	1722	1762	1.00		1.00	
Yes (Z ₁₁)	614	525	0.84	0.73–0.96	0.84	0.73–0.97
Can pandemic influenza be treated by drinking fluids?						
No	601	484	1.00		1.00	
Yes (Z ₁₂)	1735	1803	1.29	1.13–1.48	1.22	1.05–1.41
Do you think a vaccine can be developed before the strain causing the pandemic is known?						
No	1424	1422	1.00		1.00	
Don't know (Z _{13.1})	651	567	0.87	0.76–0.998	0.86	0.75–0.99
Yes (Z _{13.2})	261	298	1.14	0.95–1.37	1.11	0.92–1.34

*Unadjusted for other variables.

[†]Adjusted for all other variables in the model.[‡]OR calculated for a person aged 25 years.[§]Variable involved in an interaction. OR provided in Table 4.

from going to school/work were 1.5 times more willing to volunteer if they believed that the university should remain open with necessary operations only and two times more willing if they believed that all faculties/departments should remain open, compared to those who felt the university should be closed. Similarly, those who thought that something would stop them from going to school/work during a pandemic were 1.5 and two times more willing to volun-

teer if they believed that the university should remain open with necessary operations only or that all faculties/departments should remain open respectively.

Attitudes towards volunteering and priority access to scarce resources

Those who would assign high priority access to scarce resources to the very young (newborns to 2 years) and to

Table 4. Interactions for model B

First variable	Second variable	Willingness to volunteer		Multivariable		
		Unlikely (n)	Likely (n)	OR	95% CI	
Age (Z ₁)	Is pandemic influenza spread by touching doorknobs (etc.) previously handled by an infected person?					
	No	24·94 (8·71)	26·15 (10·12)	25 years: 1·00 35 years: 1·00		
	Yes (Z ₆)	25·81 (9·71)	26·23 (10·22)	25 years: 0·81 35 years: 0·70	0·56–1·17 0·49–1·02	
	Can pandemic influenza be prevented by vaccination?					
	No	27·47 (10·58)	27·47 (11·03)	25 years: 1·00 35 years: 1·00		
	Yes (Z ₈)	24·74 (8·79)	25·72 (9·81)	25 years: 1·17 35 years: 1·37	0·82–1·67 0·96–1·96	
Can pandemic influenza be prevented by quarantine?	Can pandemic influenza be prevented by moving to a province/country with no outbreak?					
	No	781	916	1·00		
	Yes (Z ₁₀)	36	49	1·28	0·82–2·01	
	Yes (Z ₉)	No	1202	1104	1·00	
	Yes (Z ₁₀)	317	218	0·75	0·32–1·74	
When pandemic hits, would nothing stop you from going to school/work?	When pandemic hits, should the university remain open?					
	No	No, close it	679	460	1·00	
		Yes, only necessary (Z _{5·1})	337	394	1·53	1·27–1·85
		Yes, all facs/depts. (Z _{5·2})	1174	1156	1·98	1·41–2·80
	Yes (Z ₃)	No, close it	6	19	1·00	
		Yes, only necessary (Z _{5·1})	104	172	0·75	0·23–2·38
	Yes, all facs/depts (Z _{5·2})	36	86	0·50	0·15–1·69	
When pandemic hits, would coworkers/colleagues/family becoming ill stop you from going to school/work?	When pandemic hits, should the university remain open?					
	No	No, close it	508	304	1·00	
		Yes, only necessary (Z _{5·1})	181	261	1·53	1·27–1·85
		Yes, all facs/depts (Z _{5·2})	645	623	1·98	1·41–2·80
	Yes (Z ₄)	No, close it	177	175	1·00	
		Yes, only necessary (Z _{5·1})	260	305	1·10	0·59–2·05
	Yes, all facs/depts (Z _{5·2})	565	619	1·20	0·54–2·66	

people vulnerable because of pre-existing illness were 1·3 and 1·2 times more likely to be willing to volunteer (Table 5, $n = 4429$). Of the respondents who disagreed that volunteers should not be compensated (Table 6), those who felt the government was justified in requiring people to work were 1·5 times more likely to be willing to be volunteers than those who did not believe in such government action.

Respondents willing to volunteer were more likely to agree that healthcare students have a moral/ethical/professional obligation to volunteer during a pandemic (OR = 1·2), healthcare students should be strongly encouraged to volunteer if there is a healthcare worker shortage (OR = 2·8), and that families of volunteers should be compensated only if death results (OR = 1·2). Those willing to volunteer were 1·7 times less likely to feel that jail time was the penalty that should be imposed on those unwilling to volunteer.

Discussion

Past experience in emergency planning shows that the biggest challenge may be the identification and recruitment of volunteers.⁸ As a result, a key objective of the questionnaire was to assess the attitudes and associated factors with willingness of the University community towards volunteering during a pandemic. Our first model suggested that willingness to volunteer increased with age (Tables 1 and 7). The literature both supports and contradicts this (Zweigenhaft *et al.*⁹ – the best volunteers were older females; Fothergill *et al.*¹⁰ – more likely to volunteer if younger). This is important to assess in terms of where to focus recruitment efforts as well as steps that may be taken to alter attitudes in other age categories. Recruitment strategies work better if aimed at the age of a particular group.¹¹

Table 5. Multivariable model based on attitudes and priorities (model C)

Variable	Willingness to volunteer		Bivariable*		Multivariable†	
	Unlikely (n)	Likely (n)	OR	95% CI	OR	95% CI
Volunteers should be given monetary compensation						
Disagree	1426	1614	1.00			
Agree (W ₁)	825	564	0.60	0.53–0.67	Interaction‡	
Volunteers should be given monetary compensation only if ill						
Disagree	1851	1677	1.00			
Agree (W ₂)	400	501	1.38	1.19–1.60	Interaction	
Families of volunteers should be compensated only if death results						
Disagree	1753	1582	1.00		1.00	
Agree (W ₃)	498	586	1.30	1.13–1.49	1.18	1.01–1.37
Volunteers should not be compensated						
Disagree	1970	1681	1.00			
Agree (W ₄)	281	497	2.07	1.77–2.43	Interaction	
Should healthcare students be strongly encouraged to volunteer if health care worker shortage?						
No	682	258	1.00		1.00	
Yes (W ₅)	1569	1920	3.23	2.76–3.79	2.80	2.35–3.29
Do healthcare students have a moral/ethical/professional obligation to volunteer during a pandemic?						
No	811	502	1.00		1.00	
Yes (W ₆)	1440	1676	1.88	1.65–2.15	1.21	1.04–1.41
If not enough volunteers, government justified in requiring people to work?						
No	800	583	1.00			
Don't know (W _{7.1})	520	415	1.10	0.93–1.30	Interaction	
Yes (W _{7.2})	931	1180	1.74	1.52–2.00	Interaction	
If penalty for refusing to aid, should jail time be a penalty?						
No	2167	2120	1.00		1.00	
Yes (W ₈)	84	58	0.71	0.50–0.99	0.58	0.41–0.83
Access to scarce resources for newborns to 2 years						
Low priority	632	461	1.00		1.00	
High priority (W ₉)	1619	1717	1.45	1.27–1.67	1.25	1.07–1.47
Access to scarce resources for vulnerable people due to pre-existing illness						
Low priority	982	794	1.00		1.00	
High priority (W ₁₀)	1269	1384	1.35	1.20–1.52	1.21	1.05–1.38

*Unadjusted for other variables.

†Adjusted for all other variables in the model.

‡Variable involved in an interaction. OR provided in Table 6.

Likely volunteers also relied on various sources of health information, although the confidence in these sources did not generally contribute to the willingness to volunteer. One exception was the increased willingness by those who relied on the University Health Centre. This might also provide useful information regarding education efforts and recruitment.

Most of our study participants have a history of volunteering. Past volunteerism was an important predictor and pandemic planners might liaise with existing volunteer organizations. This is supported by the study of Zakour *et al.*,¹² suggesting that planning should include liaising with organizations such as churches.

A belief in preventive measures (such as covering one's mouth when coughing) was associated with increased will-

ingness. Those respondents also believed in keeping the university open or closing it only to the extent necessary. As household quarantine is effective at reducing attack rates in the community but only if compliance is high, this might indicate a need for education. This is also the case given that school closure causes a small reduction in cumulative attack rates but a more substantial reduction in peak attack rates of up to 40%.¹³

Most of the likely volunteers also felt that health sciences students should be strongly encouraged to volunteer during a pandemic. Indeed, a high percentage felt that there was a moral/ethical/professional obligation on the part of healthcare students to volunteer. Future research should look at whether education regarding such a duty would lead to an increased willingness to volunteer. The ethics of volunteering

Table 6. Interactions for model C

First variable	Second variable	Willingness to volunteer		Multivariable	
		Unlikely (n)	Likely (n)	OR	95% CI
Volunteers should be given monetary compensation Disagree	Volunteers should be given monetary compensation only if ill				
	Disagree	1098	1210	1.00	
	Agree (W ₂)	328	404	1.11	0.93–1.33
	Agree (W ₁)	753	467	1.00	
Volunteers should not be compensated Disagree	If not enough volunteers, government justified in requiring people to work?				
	Disagree				
	Agree (W ₂)	72	97	1.89	0.97–3.67
	Agree (W ₄)				
Volunteers should not be compensated Disagree	No	698	431	1.00	
	Don't know (W _{7,1})	454	355	1.15	0.95–1.39
	Yes (W _{7,2})	818	895	1.53	1.30–1.79
	No	102	152	1.00	
	Don't know (W _{7,1})	66	60	0.53	0.26–1.10
Agree (W ₄)	Yes (W _{7,2})	113	285	1.44	0.76–2.74

Table 7. Mathematical formula for multivariable models

For all models, $p = \Pr(Y = 1)$ where $Y = 1$ if willing to volunteer and $Y = 0$ otherwise

$$\ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = -1.258 + 0.013X_1 - 1.199X_2 + 0.593X_3 + 2.583X_4 - 0.106X_5 + 0.092X_6 + 0.240X_7 + 0.22X_8$$

$$\text{Model A: } + 0.174X_9 + 0.350X_{10} - 0.108X_{11} + 0.731X_{12} + 0.230X_{13} + 0.345X_{14} + 0.403X_{15} + 1.703X_2X_8 \\ + 1.292X_2X_{11} + 0.606X_3X_{14} + 0.306X_{11}X_{13} - 0.33X_{12}X_{13} - 2.687X_4X_5 \\ - 0.340X_{14}X_5 - 0.407X_6X_{10}$$

$$\text{Model B: } \ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = -0.881 + 0.009Z_1 + 0.259Z_2 + 1.620Z_3 + 0.497Z_4 + 0.427Z_{5,1} + 0.685Z_{5,2} + 0.148Z_6 + 0.244Z_7 \\ - 0.238Z_8 - 0.218Z_9 + 0.250Z_{10} - 0.172Z_{11} + 0.196Z_{12} - 0.147Z_{13,1} + 0.106Z_{13,2} - 0.014Z_1Z_6 \\ + 0.016Z_1Z_8 - 0.541Z_9Z_{10} - 0.720Z_3Z_{5,1} - 1.376Z_3Z_{5,2} - 0.336Z_4Z_{5,1} - 0.502Z_4Z_{5,2}$$

$$\text{Model C: } \ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = -1.565 - 0.386W_1 + 0.104W_2 + 0.163W_3 + 0.823W_4 + 1.029W_5 + 0.192W_6 + 0.141W_{7,1} \\ + 0.423W_{7,2} - 0.544W_8 + 0.225W_9 + 0.186W_{10} + 0.533W_1W_2 - 0.774W_4W_{7,1} - 0.057W_4W_{7,2}$$

during a pandemic lead necessarily to a debate regarding an ethical duty to care. It is important to engage in this debate before a pandemic occurs and to make societal expectations explicit.¹⁴ This is particularly so as there is evidence of the erosion of this sense of duty.¹⁵ Such a duty was much more explicit in previous decades during infectious disease outbreaks.¹⁶ It has been asserted that immediate action is required to make such a duty explicit to healthcare professionals and set it out once again in codes of ethics.¹⁷ This might affect not only the attitudes of healthcare workers, but also those who will be asking them to volunteer in the midst of such an outbreak. During the 1918 pandemic, senior medical students were pressed into service;¹⁸ by contrast, medical students at the University of Toronto were removed from clinical service rotations during the SARS outbreak (D. Low, personal communication).

While our results identified key factors influencing the decision to volunteer, further study is needed. Some of the most interesting results were factors that did not provide evidence of an effect on willingness to volunteer (i.e. gender, children). While the respondents were predominantly female, each gender was nearly equal in terms of willingness to volunteer. Crucial to education and recruitment strategies is knowledge about factors that motivate individuals and groups. The answer is clearly complex. Functions that may provide an incentive to volunteer include values (one's values provide the motivation); understanding (volunteer seeks to gain knowledge); enhancement (the individual can grow and develop psychologically); career (volunteering to gain career-related experience); social (volunteering promotes social relationships); and protective (volunteering addresses feelings of guilt or personal issues).¹⁹ A psychological sense of community can enhance

willingness to volunteer.²⁰ These are important factors for post-secondary institutions to be aware of.

The study limitations include respondent self-selection and focus on one university. Our response rate of 13% provided 5225 responses. Mailed questionnaires tend to have higher response rates than questionnaires provided by e-mail,^{21–23} and often have better response rates than Internet-based questionnaires.^{24,25} This questionnaire was Internet based and the e-mail sent to students and staff contained a link to the web questionnaire. There is some evidence that web-based questionnaires might have response rates similar to that of mailed questionnaires and be more effective than the latter in settings where the study population has access to e-mail and the Internet.^{26,27} The large number of responses provided a sample size sufficient for narrow confidence intervals and model development; however, the non-responders might differ from the responders on important characteristics and these characteristics are not captured in the study. The aspects surrounding volunteerism are complex and this study was not specifically designed to assess all factors or a specific conceptual model of volunteerism. A model was fit with all significant main effects and two-way interactions, but was not easily interpretable and understandable. The results are based on an expressed willingness to volunteer and, in the event of an influenza pandemic, it is not clear how many individuals would become actual volunteers. The specific circumstances of an influenza pandemic would likely influence whether or not respondents indicating a willingness to volunteer would actually volunteer. The likelihood of volunteering might diminish with an increasing mortality rate. Studies have shown that self-predictions in this regard are often overly optimistic.²⁸ The model coefficients are not adjusted for multiple testing; however, with the large sample size most of the coefficients are highly significant.

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