

# Pre-pandemic planning survey of healthcare workers at a tertiary care children's hospital: ethical and workforce issues

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Accepted 19 May 2010. Published Online 15 June 2010.

**Background** Prior to the development of written policies and procedures for pandemic influenza, worker perceptions of ethical and workforce issues must be identified.

**Objective** To determine the relationship between healthcare worker (HCW) reporting willingness to work during a pandemic and perception of job importance, belief that one will be asked to work, and sense of professionalism and to assess HCW's opinions regarding specific policy issues as well as barriers and motivators to work during a pandemic.

**Methods** A survey was conducted in HCWs at The Children's Hospital in Denver, Colorado, from February to June 2007. Characteristics of workers reporting willingness to work during a pandemic were compared with those who were unwilling or unsure. Importance of barriers and motivators was compared by gender and willingness to work.

**Results** Sixty percent of respondents reported willingness to work (overall response rate of 31%). Belief one will be asked to work

(OR 4.6,  $P < 0.0001$ ) and having a high level of professionalism (OR 8.6,  $P < 0.0001$ ) were associated with reporting willingness to work. Hospital infrastructure support staffs were less likely to report willingness to work during a pandemic than clinical healthcare professionals (OR 0.39,  $P < 0.001$ ). Concern for personal safety, concern for safety of family, family's concern for safety, and childcare issues were all important barriers to coming to work.

**Conclusions** Educational programs should focus on professional responsibility and the importance of staying home when ill. Targeted programs toward hospital infrastructure support and patient and family support staff stressing the essential nature of these jobs may improve willingness to work.

**Keywords** Healthcare worker's attitudes, influenza, pandemic planning.

Please cite this paper as: Cowden *et al.* (2010). Pre-pandemic planning survey of healthcare workers at a tertiary care children's hospital: ethical and workforce issues. *Influenza and Other Respiratory Viruses* 4(4), 213–222.

## Introduction

Department of Health and Human Services' (DHHS) guidelines for pandemic planning encourage hospitals to have written policies and procedures for surveillance, communication, education and training of personnel, triage and clinical evaluation, infection control, occupational health (including non-punitive payment policies and mental health support), use and administration of vaccines and antivirals, surge capacity, access to critical inventory needs, and mortuary services.<sup>1</sup> As hospitals develop these plans for pandemic influenza, the complexity of the ethical issues upon which these policies must be founded becomes very apparent.

Ethical challenges are intrinsic to the treatment and control of communicable diseases. Caring for infected individuals juxtaposes the medical ethics principles of patient autonomy, non-maleficence, beneficence, and justice<sup>2</sup> with healthcare worker responsibility and duty (to work, to not become infected, and to not infect others).<sup>3</sup> Public health measures of surveillance, contact tracing, immunizations, forced therapy, isolation, and quarantine are critical to the control of communicable diseases, especially during an epidemic or pandemic; these measures are founded in the ethical principles of utilitarianism<sup>4</sup> and social justice<sup>5</sup> and focus on public good rather than on each individual. As these measures challenge privacy, autonomy, and freedom,

the degree to which they are employed must match the risk of the disease. The ethical challenges intrinsic to communicable diseases combine with those of public health preparedness in the event of a pandemic.<sup>6,7</sup> Hospital policies must reflect both traditional medical ethics as well as public health ethics; they must also exhibit the principles of proportionality, reciprocity, transparency, equity, solidarity, communication, and accountability.<sup>8</sup>

Fundamental policy and planning issues identified in the ethics literature include healthcare worker duty to provide care during a communicable disease outbreak and priority setting and allocation of resources. Planning is based on the assumption that the healthcare system will be overwhelmed and that there will be insufficient resources (hospital beds, ventilators, antiviral medications, and vaccines) and healthcare personnel to meet the need.<sup>9,10</sup> The issue of healthcare worker duty is a complicated one encompassing conflicting professional and personal obligations, professional challenges (liability, workplace conditions, and scope of practice),<sup>11</sup> and issues of excessive risk and futility.<sup>3</sup> Professionalism (defined as 'medicine's contract with society') demands that medical professionals have integrity, competence, respect for social justice, and devotion to patient welfare.<sup>12,13</sup> Traditionally applied to physicians, it is tied to the social contract extended by society of remuneration, autonomy, self-regulation, prestige, and social status in exchange for medical service and risk.<sup>14</sup>

Several surveys of public health workers, emergency first-responders, and healthcare workers (HCWs) (clinical professionals, administrators, and support staff) conducted in the United States since the SARS epidemic have shown that 48–54% of workers report willingness to work in a pandemic or natural disaster.<sup>15–17</sup> The current pre-pandemic planning study was performed when avian influenza (H5N1) was felt to be the most likely cause of an influenza pandemic and was designed to assess perceptions, expectations, and willingness to work among HCWs at a tertiary care children's hospital. The children's hospital has active infection control and employee health departments, ongoing seasonal influenza surveillance, and annual influenza vaccination uptake greater than the national average (healthcare worker vaccination rate was 56% during the season in which the survey was conducted). No formal educational or policy activities specific to pandemic influenza had been conducted at the institution prior to administration of the survey. Specific issues addressed by the survey include (i) barriers to working when asked and motivators to coming to work despite illness (when one should not work) during a pandemic, (ii) responsibilities and duties of the institution to its employees, specifically hazard pay and life insurance, (iii) healthcare worker scheduling, (iv) vaccine prioritization, and (v) distribution of resources such as ventilators and intensive care for

patients. No surveys have been published to address issues among HCWs working at pediatric institutions or free-standing children's hospitals. We hypothesized that the HCWs working in a pediatric institution would be more likely to report willingness to work during a pandemic and that willingness would be associated with their perception of job importance, belief that they will be asked to work, and sense of professionalism.

## Methods

From February to June 2007, an anonymous survey was conducted in HCWs at The Children's Hospital in Denver, Colorado, regarding pandemic influenza. This study was reviewed by the human subjects review board at the University of Colorado, Denver, and approved as exempt research with no requirement for informed consent.

### Study population

The Children's Hospital is served by 2480 staff members comprised of 55% direct care providers (966 full-time non-physician clinical providers, nurses, allied health professionals, and medical technicians and 407 hospital-based university physicians, pediatric residents, and pediatric subspecialty fellows who are not employed by the hospital), 37% (917) staff working in associated fields, 4% (107) staff in infrastructure support, and 3% (83) workers in patient and family support. A response rate goal of 30% (744) was established as the minimally acceptable response rate.

### Survey design

The survey instrument was designed focusing on the following conceptual areas with regard to pandemic influenza: healthcare worker knowledge, opinions, concerns, professionalism, behavioral intention, barriers and motivators in reference to both coming to work when asked and staying home when ill, and personal and professional preparedness. The questions were designed to fit these domains, and question types were varied between yes/no, Likert scale, and rating. The instrument was reviewed by experts in the field, revised based on their recommendations and then piloted with 25 people. The survey was then further revised based on feedback and questions (Appendix S1 Survey Instrument).

### Survey administration

The survey was initially created in English and Spanish written versions and as an Internet survey in English (Zoomerang; MarketTools Inc, Mill Valley, CA, USA). Owing to an initial low response rate (15%) to the Internet version, survey distribution was broadened using paper copies distributed at high traffic points and at department meetings with strict instructions given to only complete the survey

once (online or in paper form). Results from Internet and paper (English and Spanish) surveys were merged for all analyses.

### Variable definitions

The primary dependent variable assessed in the study was willingness to report to work during a pandemic. For analysis purposes, responses of 'No' and 'Unsure' were combined for comparison with responses of 'Yes' as data generated were to be used to help direct hospital policy and educational programs toward HCWs who are unwilling to work or unsure.

Perception of job importance was assessed using a 5-point Likert scale (strongly agree to strongly disagree). An answer of 'Strongly Agree' to either one of two questions regarding caring for children and hospital function was regarded as belief of that individual that his or her job is essential. All other responses were combined and regarded as perception that one's job is not essential. Belief that one will be asked to work during a pandemic was addressed directly. Answers of 'No' and 'Unsure' were combined for comparison with answers of 'Yes'.

A professionalism scale ranging from 0 to 12 was constructed to quantify professionalism (as a reflection of sense of professional responsibility and duty) using individual answers to three survey questions. Responses to a question regarding healthcare worker's right to refuse treatment of contagious patients were coded as 'Strongly disagree' equals 4 to 'Strongly agree' equals 0. Questions addressing healthcare worker's obligation to work during a pandemic and whether there should be a consequence for refusing to work when asked were coded as 'Yes' equals 4, 'Unsure' equals 2, and 'No' equals 0. Appropriateness of variable inclusion in a scale was verified using Cronbach's alpha; all three variables were left in the scale despite an alpha of 0.51 because each raised the alpha when included. The score was then divided into tertiles labeled 'Low' (professionalism score of 0–6), 'Moderate' (professionalism score of 7–9), and 'High' (professionalism score of 10–12) for analysis.

A similar scale ranging from 0 to 4 was created to assess personal preparedness including answers to four survey questions. Answers of 'Yes' were assigned a score of 1, while answers of either 'No' or 'Unsure' were assigned a score of 0. Scores of 3 or 4 were combined in a group entitled 'Very prepared'. Scores of 0, 1, or 2 were entitled 'Not prepared at all', 'Slightly prepared', and 'Moderately prepared', respectively.

Barriers to reporting to work during a pandemic and motivators to coming to work when one should stay home were assessed directly using a 4-point scale ('Not at all' coded as 1 to 'Very much' coded as 4). Concern for personal safety if working during an influenza pandemic

('High', 'Moderate', 'Low', and 'None') was also assessed independently in an additional survey question. Healthcare worker's obligation to work during a pandemic was assessed directly ('Yes', 'No', or 'Unsure'), and respondents were asked to select reasons why they chose 'Yes' or 'No'.

The following factors were considered possible confounders (covariates) in reporting willingness to work during a pandemic: age (18–30 years, 31–44 years, and 45+ years), gender, race/ethnicity (Hispanic, non-Hispanic white, or other), marital status (married/partner, divorced/widowed/separated, or never married), and occupational category. Occupational category was defined in the survey instrument as healthcare professional (physician, nurse, allied health professional, and medical assistant), patient and family support services (medical interpreter, financial services, case manager, and chaplain), healthcare-associated field (research, education, administration, laboratory, and pharmacy), and hospital support (facilities management, safety, sterile processing, and food services).

### Analytical methods

All statistical analyses were performed using the sas statistical software, version 9.1 (SAS institute, Cary, NC, USA). To evaluate the hypotheses, the covariates listed above for reporting willingness to work during a pandemic were evaluated using chi-squared analysis. Covariates with  $P < 0.2$  were included in a multiple logistic regression model. Covariates with suspected interaction terms among the model variables were formally tested. Interaction terms were retained in the model if the difference in the  $-2$  log likelihoods for the model with and without the interaction term was significant (using the chi-square statistic with appropriate degrees of freedom and  $P < 0.05$ ). Logistic regression was used to calculate unadjusted and adjusted odds ratio (OR) estimates and 95% confidence intervals (CI) for reporting willingness to work during a pandemic.

To explore the importance of barriers and motivators to HCWs, overall means/scores for each barrier were calculated. Means were also calculated for each barrier by both gender and reported willingness to work during a pandemic and were compared using a t-test analysis. The relationship between reporting willingness to work ('Yes', 'No', and 'Unsure') and concern for personal safety was also explored using Spearman correlation. Questions addressing policy issues and worker expectations were not associated with a specific hypothesis. Responses to these policy questions are reported as frequencies and are not adjusted because such policies must be institution-wide rather than targeted to specific demographic groups. HCW's duty/obligation to work during a pandemic and associated reasoning is also reported as frequency data.

**Table 1.** Demographics of survey respondents

	Survey respondents (%) ( <i>n</i> = 778)	Report willingness to work		
		Yes (%)	No (%)	<i>P</i> value
Gender				
Male	176 (23.1)	139 (79.0)	37 (21.0)	<0.0001
Female	587 (76.9)	325 (55.4)	262 (44.6)	
Age group (years)				
18–30	137 (18.0)	77 (56.2)	60 (43.8)	0.02
31–44	303 (39.7)	172 (56.8)	131 (43.2)	
45+	323 (42.3)	216 (66.9)	107 (33.1)	
Race/ethnicity				
Hispanic	97 (12.5)	48 (49.5)	49 (50.5)	0.05
Non-Hispanic white	581 (75.1)	363 (62.5)	218 (37.5)	
Other	96 (12.4)	58 (60.4)	38 (39.6)	
Marital status				
Married/partner	513 (67.5)	308 (60.0)	205 (40.0)	0.36
Divorced/widowed/separated	94 (12.4)	55 (58.5)	39 (41.5)	
Never married	153 (20.1)	101 (66.0)	52 (34.0)	
Occupational category				
Clinical healthcare professional	406 (53.0)	277 (68.2)	129 (31.8)	<0.0001
Patient and family support	67 (8.8)	26 (38.8)	41 (61.2)	
Health care-associated field	172 (22.5)	100 (58.1)	72 (41.9)	
Hospital infrastructure support	121 (15.8)	63 (52.1)	58 (47.9)	
Job is essential				
Yes	444 (57.4)	292 (65.8)	152 (34.2)	0.0006
No	330 (42.6)	177 (53.6)	153 (46.4)	
Believe will be asked to work				
Yes	463 (60.1)	342 (73.9)	121 (26.1)	<0.0001
No	307 (39.9)	125 (40.7)	182 (59.3)	
Professionalism scale				
Low	252 (32.6)	93 (36.9)	159 (63.1)	<0.0001
Moderate	299 (38.6)	191 (63.9)	108 (36.1)	
High	223 (28.8)	185 (83.0)	38 (17.0)	
Preparedness scale				
Not prepared at all	376 (48.6)	206 (54.8)	170 (45.2)	0.005
Slightly prepared	213 (27.5)	136 (63.8)	77 (36.2)	
Moderately prepared	105 (13.6)	68 (64.8)	37 (35.2)	
Very prepared	80 (10.3)	59 (73.8)	21 (26.2)	

\*Data missing in <2% of all variables.

## Results

### Survey response and characteristics of respondents

Of the 2480 staff working at The Children's Hospital, 778 (31%) completed and submitted surveys (338 Internet, 26 Spanish paper, and 416 English paper). According to respondent self-identification of occupational category, 29% of clinical healthcare professionals, 81% of patient and family support workers, 19% of workers in healthcare-associated fields, and 113% of hospital infrastructure support workers responded. An individual's perception of his or her occupational category may differ from that intended in the survey instrument (which may explain the response rate >100% in the hospital infrastructure support

occupational category). Among respondents, 60% (469) reported willingness to work during a pandemic, 6% (46) reported that they are not willing, and 34% (260) stated they are unsure. Table 1 presents demographic data as stated by respondents; those reporting willingness to work differed from those who are unsure or not willing by gender, age, race/ethnicity, occupational category, belief that job is essential, belief one will be asked to work, professionalism, and personal preparedness.

### Characteristics associated with reporting willingness to work

In the univariate analysis comparing HCWs who reported willingness to work during a pandemic with those who are

unwilling or unsure (Table 2), individuals who believe their job is essential, believe they will be asked to work, are men, non-Hispanic white, and 45 years of age or older were more likely to report willingness to work. Patient and family support staff, hospital infrastructure support staff, and workers in healthcare-associated fields were less likely to report willingness to work than clinical healthcare professionals. Individuals scoring ‘Moderate’ or ‘High’ on the Professionalism Scale were more likely than those scoring ‘Low’ (OR 3.08, 95% CI 2.16–4.40 and OR 8.15, 95% CI 5.25–12.67, respectively) and individuals who are very prepared personally were more likely than those who are not prepared at all (OR 2.15, 95% CI 1.24–3.74) to report willingness to work.

After adjusting for belief job is essential, belief one will be asked to work, professionalism scale, preparedness scale, gender, age, race/ethnicity, and occupational category,

belief one will be asked to work (OR 4.63, 95% CI 3.13–6.86), Professionalism Scale category ‘Moderate’ (OR 3.97, 95% CI 2.63–5.98) or ‘High’ (OR 8.62, 95% CI 5.25–14.16), Preparedness Scale category ‘Slightly prepared’ (OR 1.58, 95% CI 1.03–2.41), male gender (OR 3.14, 95% CI 1.94–5.08), and hospital infrastructure support staff (OR 0.39, 95% CI 0.22–0.69) were significantly associated with reporting willingness to work. The association between occupational category of patient and family support and willingness to work is significant (OR 0.34, 95% CI 0.18–0.63, *P* value 0.0005) when the belief that one will be asked to work is removed from the analysis.

**Importance of barriers and motivators**

Table 3 presents mean values [Likert scale of 1 (‘Not important at all’) to 4 (‘Very important’)] for level of importance of barriers and motivators to working during a

**Table 2.** Relationship between modifiable and non-modifiable characteristics of healthcare workers and reporting willingness to work during a pandemic

Characteristic	Unadjusted OR		Adjusted OR*	
	OR	95% CI	OR	95% CI
Gender				
Male	2.96	1.98–4.43	3.14	1.94–5.08
Female	1.00	Ref	1.00	Ref
Age group (years)				
18–30	1.00	Ref	1.00	Ref
31–44	0.99	0.66–1.50	0.92	0.56–1.50
45+	1.53	1.01–2.31	1.56	0.94–2.58
Race/Ethnicity				
Hispanic	0.60	0.39–0.93	0.69	0.39–1.21
Non-Hispanic white	1.00	Ref	1.00	Ref
Other	1.04	0.65–1.67	1.33	0.75–2.39
Occupational category				
Clinical healthcare professional	1.00	Ref	1.00	Ref
Patient and family support	0.30	0.17–0.50	0.53	0.27–1.02
Health-care associated field	0.65	0.45–0.94	1.05	0.66–1.67
Hospital infrastructure support	0.53	0.35–0.82	0.39	0.22–0.69
Job is Essential				
Yes	1.71	1.27–2.30	0.99	0.69–1.44
No	1.00	Ref	1.00	Ref
Believe will be asked to work				
Yes	4.34	3.17–5.94	4.63	3.13–6.86
No	1.00	Ref	1.00	Ref
Professionalism scale				
Low	1.00	Ref	1.00	Ref
Moderate	3.08	2.16–4.40	3.97	2.63–5.98
High	8.15	5.25–12.67	8.62	5.25–14.16
Preparedness scale				
Not prepared at all	1.00	Ref	1.00	Ref
Slightly prepared	1.40	0.99–1.99	1.58	1.03–2.41
Moderately prepared	1.40	0.89–2.20	1.29	0.75–2.22
Very prepared	2.15	1.24–3.74	1.52	0.80–2.92

\*Variables adjusted for each other.

**Table 3.** Mean level of importance of barriers and motivators in healthcare worker's decision-making regarding working during a pandemic on a scale of 1 ('Not important at all') to 4 ('Very important')

	Overall mean	Mean by gender			Mean by willingness to work		
		Male	Female	<i>P</i> value	Yes	No	<i>P</i> value
<b>Barriers</b>							
Childcare issues	2.6	2.4	2.6	NS	2.3	3.0	<0.0001
Eldercare issues	2.0	1.9	2.0	NS	1.9	2.1	0.003
Concern for personal safety	2.6	2.4	2.7	0.001	2.3	3.1	<0.0001
Concern for safety of family	3.0	3.0	3.1	NS	2.8	3.5	<0.0001
Family concern for healthcare worker	2.7	2.5	2.7	0.01	2.4	3.1	<0.0001
Pet care issues	1.8	1.6	1.8	0.01	1.7	1.9	0.01
<b>Motivators</b>							
Responsibilities at work	3.0	3.1	3.0	NS	3.2	2.7	<0.0001
Financial concerns	2.7	2.6	2.7	NS	2.7	2.8	NS
Fear of loss of job	2.3	2.3	2.4		2.3	2.4	NS

pandemic. Overall means are highest for concern for safety of family and importance of responsibilities at work. Means are generally higher for women than for men with significantly higher importance of concern for personal safety, family concern for healthcare worker, and pet care issues. Means for all of the barriers in question were significantly greater in workers reporting they were unwilling to work or unsure than in those who reported willingness with the greatest difference seen for childcare issues, concern for personal safety, concern for safety of family, and family concern for the healthcare worker (*P* value <0.0001).

No difference was noted in motivators to work when one should stay home between male and female respondents. However, the mean importance of responsibility at work was significantly higher in those who reported willingness to work than in those who reported they were unwilling or unsure.

When assessed directly and independently, 39% of respondents report high concern and 45% report moderate level of concern for personal safety if working during a pandemic. High level of concern (high perception of risk) correlates with reporting unwillingness to work (Spearman coefficient  $-0.32$ ; *P* value <0.0001). However, 43% of respondents with high level of concern report willingness to work, and 44% report that they are unsure.

### Healthcare worker duty during a pandemic

Seventy-seven percent of respondents reported a belief that HCWs have an obligation to work during a pandemic. Most (88%) of the respondents selected 'they have training to care for sick people and others do not', followed by 'they took an oath of service' (42%) and 'society expects them to' (22%). A few respondents (3%) identified 'in

return for prestige and status in society' as an important reason. Of the remaining respondents, 8% reported belief that HCWs do not have any obligation (73% of these selecting 'healthcare workers should be able to make personal decisions' and 61% selecting 'healthcare workers have family obligations like anyone else'). The remaining 15% reported that they were unsure.

### Opinions about pandemic policy issues

HCWs' opinions regarding specific public policy and workforce issues during a pandemic are presented in Table 4. A majority of respondents believe that death and disability insurance should be provided to HCWs, that coverage should be extended to family members, and that all HCWs during a pandemic should receive supplemental hazard pay. Regarding allocation and triage of resources, 47% of respondents believe that people at high risk of death from influenza should be the first to receive vaccine, and 59% feel that providers should follow state or federal guidelines for allocation of ventilators. Nearly all respondents believe that HCWs should be scheduled for, and called to, work equally without regard to age, sex, or marital status; however, 36% believe that HCWs without children should be called to work before calling those with young children.

### Discussion

This survey of HCWs at a tertiary care children's hospital indicates that the most important factors associated with reporting willingness to work during a pandemic are a sense of professionalism and the belief that one will be asked to work. Interestingly, respondents who are slightly

**Table 4.** Opinions of healthcare workers regarding policy and workforce issues during a pandemic

	<i>n</i> (%)
Institutional Responsibility	
Should death and disability insurance be provided for HCWs?	
Yes	566 (73)
No	70 (9)
Unsure	138 (18)
Should death and disability insurance cover family-members of HCWs?	
Yes	460 (60)
No	104 (13)
Unsure	207 (27)
Should HCWs receive supplemental hazard/danger pay?	
Yes, for all employees	489 (64)
Only HCWs providing direct patient care	192 (25)
No	81 (11)
Prioritization of Scarce Resources	
Who should be first to receive vaccine once it becomes available?	
People at high risk of death from influenza	366 (47)
Health care workers	288 (37)
People living or working with high risk individuals	54 (7)
Workers in public safety and other critical infrastructure roles	70 (9)
How should ventilator recipients be prioritized?	
The people most likely to survive if they get a breathing machine	413 (54)
The patients who are most sick	246 (32)
First come, first serve	37 (4)
How should ventilators be allocated during a shortage?	
Providers follow state or federal guidelines	452 (59)
Providers at the bedside on a patient-by-patient basis	170 (22)
Hospital administrators at individual hospitals	59 (8)
Healthcare worker scheduling	
Should HCW scheduling be prioritized according to demographics?	
Age	
Older and younger people should be called equally	667 (87)
Sex	
Men and women should be called equally	726 (94)
Marital status	
Married and single HCWs should be called equally	699 (91)
Children	
HCWs with and without children should be called equally	471 (61)
HCWs without children should be called to come to work first	278 (36)
Should HCWs who refuse to come to work face some consequence?	
Yes	197 (25)
No	256 (33)
Unsure	321 (41)

HCW, healthcare worker.

prepared for a pandemic are more likely to report willingness to work than those who are not prepared, but individuals who are moderately or very prepared are not. Slightly prepared individuals may have thought about pandemic influenza and made a few plans but may not have a high concern for their personal safety and the safety of their family.

Despite the critical role of workers in hospital infrastructure support, individuals in this occupational category are

least likely to report willingness to work. This group benefits least from the social contract extended to clinical medical professionals (specifically physicians), did not take an oath of service, may not be fully educated regarding personal protective equipment to prevent acquisition of communicable diseases, and may not recognize that as an employee at a healthcare institution, one might be required to put him or herself at risk. Recent discussions of medical professionalism emphasize the importance of health care

and support service providers,<sup>13</sup> and educational efforts directed at all HCWs must stress the value and responsibility of each member of the healthcare team. Targeted education of hospital support staff (environmental and food services) should focus on the critical and essential nature of their jobs and the use of personal protective equipment to mitigate risk and prevent acquisition of communicable diseases as well as encouraging professional pride and responsibility. Patient and family support staffs are also less likely to report willingness to work than clinical healthcare professionals; the association is not statistically significant in the adjusted analysis but becomes significant when belief that one will be asked to work is removed. This change suggests that believing one will be asked is a confounder for patient and family support staff and that these individuals will likely report to work if asked. Fewer workers will likely be asked to come to work (in conditions of social distancing), but provision of mental health support by patient and family support staff will be indispensable in the event of a severe pandemic with scarce resources, high mortality, and high patient, family, and staff stress. Education and plans must include these workers (not necessarily in direct patient care roles) so that they recognize their important role in supporting stressed staff and families. The goal of such education programs is increasing willingness to work among HCWs of all types and job descriptions so that when they are needed and asked to work, they will come if they are able and not ill themselves.

Consistent with data from previous studies of HCWs (including direct care providers, support staff, administrators, and technical support staff),<sup>15–17</sup> concerns for personal safety and the safety of one's family are very important. These concerns rank highest as important barriers to reporting to work during a pandemic. A moderate or high concern for personal safety does correlate with reporting that one is unwilling to work; however, high concern does not appear to influence whether one reports he or she is willing to work or unsure. This concern for personal safety and the safety of one's family, in conjunction with the high rate of respondents who feel they should be given death and disability insurance and supplemental hazard pay, reflects the reciprocal obligations of healthcare organizations to provide a safe environment for patients and staff. It may also reflect whether the respondents have health insurance (either through employment or purchased independently), which is an issue not addressed in the survey. Institutional obligations include training, protecting, supporting, and informing HCWs while also taking adequate precautions to prevent illness, providing care for those who become ill while working, reducing malpractice threats for those working in high-risk emergency situations, and providing reliable compensation for those who die fulfilling this duty.<sup>8</sup> The issue of childcare is also likely an important

issue for working parents and is ranked higher by respondents who report they are unwilling to work or unsure. This survey was not designed to determine which of these is most important to HCWs, given limited institutional resources and cannot directly guide policy. Further studies of HCW's preference and expectations are needed, and institutions must assess whether such policies are financially feasible and what impact they would have on employee and staff (report of) willingness to work. Committees evaluating and making recommendations on such policies should be open to all staff, and policy decisions and reasoning must be clearly communicated by the institution.

Responsibility at work was the sole motivating factor significantly more important to respondents reporting willingness to work. HCWs are highly motivated, and this finding is in accordance with previous reports of HCW's behavior during seasonal influenza showing that between 50% and 75% of health care workers with influenza-like illness continue to work while ill.<sup>18,19</sup> Educational programs must stress the importance of staying home when ill and the ethical responsibility of HCWs to not put others at risk. In addition, employee health policies and procedures for staff screening (i.e. fever screening) must be in place to prevent HCWs from working while ill and potentially contagious.

Interestingly, the majority of respondents prioritized vaccine administration as it has traditionally been prioritized by the Advisory Committee on Immunization Practices (ACIP) and DHHS for seasonal influenza. However, recent discussion and ethical evaluation have favored a risk-based approach to vaccination during a potential pandemic, which prioritizes high-risk individuals and those working in critical infrastructure roles. Many state health departments, including Minnesota<sup>10</sup> and Colorado,<sup>20</sup> have adopted such an approach to prioritization. The recently released ACIP recommendations for influenza A H1N1 vaccination recommend this approach.<sup>21</sup> The decreased surge capacity in intensive care units in the United States (ICU bed capacity decreased 20%) between 1995 and 2001<sup>9</sup> led to the publication of several guideline documents for when intubation and mechanical ventilation should not be offered or should be withdrawn.<sup>22–24</sup> Regional adoption of tiered criteria will ensure fair and efficient triage and allocation of ventilatory support and ICU care, consistency between facilities in a region, protection of HCWs from liability. Over 40% of respondents indicated that they do not support utilization of state or federal guidelines for ventilator triage. These responses indicate that many healthcare workers have not been educated regarding shifting ethical paradigms from care and advocacy of an individual patient (patient autonomy, non-maleficence, beneficence, and justice) to focus on protection and promotion of the public good (public health principles of



utilitarian<sup>4</sup> implementation of measures challenging privacy, autonomy, and freedom for social justice<sup>5</sup>) during a pandemic.<sup>2,6–8,11</sup> Although prioritization of scarce resources is not the focus of this survey, responses can be used to guide the development of educational programs. Education regarding the resource limitations expected during a pandemic, the purpose of state and federal guidelines, and the necessity of shifting one's paradigm during a pandemic is critical.

This investigation is subject to several limitations, perhaps the most important being the inability to predict whether healthcare workers who report willingness to work during a pandemic actually will. No previous studies have reported correlation between behavioral intentions reported by HCWs prior to a disaster or emergency and actual behavior during such an event. Additionally, this survey was conducted when the next influenza pandemic was expected to be H5N1 influenza, which has had high mortality and morbidity in addition to documented nosocomial transmission to healthcare workers.<sup>25</sup>

There is potential for bias in the study as responders are self-selected, there was only a 31% response rate, and no demographic information is available for non-responders. The initial low response rate for the Internet survey with improved rates when using other methods was not unexpected as e-mail surveys have been shown to have lower response rates than other survey methods [e.g. 26% (e-mail) versus 41% (postal) and 47% (fax)].<sup>26</sup> The occupational categories presented in the survey are broad and group individuals together who might have quite different levels of education and training as well as different senses of professional duty, job importance, remuneration, and social contract. An individual's perception of his or her occupational category may differ from that intended in the survey instrument, which could potentially bias the analysis. Response rates within the different categories differed from the overall demographics of the study population (patient and family support and hospital infrastructure report workers were over-represented comprising 8.8% and 15.8% of respondents, respectively, instead of their correspondent 3% and 4% of staff). Whether HCWs have young children at home was not ascertained by the survey instrument; this is a potential confounder in reporting willingness to work and should be included in future studies addressing this issue. This survey was conducted at a free-standing tertiary care children's hospital, and the opinions of the healthcare workers working there may not be generalizable to other pediatric institutions in the United States.

People often postulate that HCWs working primarily with adults and those working primarily with children are fundamentally different although there is no prior literature to support this. Sixty percent of respondents in this study at a children's hospital reported willingness to work during

a pandemic, while only 48% of HCWs surveyed by Qureshi *et al.*<sup>15</sup> reported willingness. Although this is an interesting finding, a basic comparison of overall rates is likely too simple for this complex question. Further studies are needed to compare sense of professionalism and responsibility as well as reporting willingness to work between these two potentially distinct populations. Future studies should also ask HCWs explicitly which policies would most influence their ability and willingness to work during a pandemic, so that costly policies and interventions could be prioritized and analyzed for cost effectiveness.

## Conclusion

Sixty percent of employees and staff at a free-standing tertiary care children's hospital who responded to the survey report willingness to work during an influenza pandemic. Individuals who believe they will be asked to work and those with a high level of professionalism are more likely to report to work; workers in hospital infrastructure support are less likely than clinical healthcare professionals to report willingness to work. Important barriers to coming to work include concern for personal safety, concern for safety of family, family's concern for safety of healthcare worker, and childcare issues.

Lessons learned from the H1N1 pandemic experience in spring 2009 will be studied to complement this survey and to study how to further elaborate and refine our pandemic planning efforts post-event. Future educational efforts should focus on professional responsibility, education regarding how to reduce occupational exposure and the risk of transmission of influenza to patients through appropriate infection control measures and vaccination, the importance of staying home when ill, the role of vaccination and antivirals in an influenza pandemic and how they should be allocated when supply is limited, and the ethical paradigm shift from a patient-centered to a public health and population-centered focus necessary during a severe pandemic. Targeted programs toward hospital infrastructure support and patient and family support staff stressing the essential nature of these jobs may improve willingness to work in these groups. Institutions should evaluate whether specific policies to mitigate barriers would increase HCW willingness to work during a pandemic, determine which policies are feasible, and communicate these decisions openly to employees and staff.

## Acknowledgements

This investigation was funded by the National Institute of Allergy and Infectious Diseases. This funding was obtained and administered through the Rocky Mountain Regional Center of Excellence for biodefense and emerging infectious

diseases research. Technical support and design of the online survey was provided by Swan Ellert and Jeff Magouirk at the University of Colorado Pediatric Clinical Translational Research Center (CTRC).

## Financial disclosure/Conflict of interest

The authors have no financial relationships relevant to this article or conflicts of interest to disclose.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article:

### Appendix S1. Survey instrument.

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