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Anxiety and Work Avoidance among Intensive Care Workers during an Influenza A/H1N1 Outbreak

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Abstract

Background: Healthcare workers in intensive care units are particularly vulnerable to contracting influenza infection. This study explored the anxiety levels and work avoidance behaviors of healthcare workers in intensive care units within 2 weeks of admission of a patient with influenza A/H1N1 infection.

Methods: A cross-sectional questionnaire-based study was conducted between December 2, 2015 and December 12, 2015. Linear and logistic regression analyses were used to determine associations between levels of worry and relevant independent variables.

Results: Out of 238 healthcare workers (physicians, nurses, and allied health professionals) in pediatric and adult intensive care units, 169 responded. The mean worry level of respondents about contracting the disease or transmitting it to family members was 4.65 (standard deviation [SD] 1.8) out of 10. The level of worry about being assigned to care for an H1N1-infected patient was moderate (mean 4.8 [SD 2.6]) Higher levels of anxiety were associated with a higher general anxiety disorder 7-point score, lack of previous exposure to H1N1-infected patients, fear of vaccination side effects, working in units where patients had died of the disease, and younger age. Thirty (18%) respondents were willing to change their work shift, and 10 considered going off duty to avoid contact with infected patients. Over one-third reported a reduction in their interaction with H1N1-infected patients. This was lower in respondents who had previously cared for H1N1-infected patients (β=-1.186; odds ratio, 0.31; P=0.009) and those who perceived infection control measures to be adequate (β=-0.233; odds ratio, 0.79; P=0.019).

Conclusion: Healthcare workers in intensive care units reported moderate levels of anxiety and perception of threat during the recent influenza A/H1N1 epidemic, and some demonstrated work avoidance behavior. This highlights the need to address occupational stress among intensive care unit staff during viral outbreaks.

Keywords: Anxiety; H1N1; GAD score; Work avoidance

Abbreviations H1N1: Influenza A/H1N1; HCW: Health Care Worker; ICU: Intensive Care Unit; SD: Standard Deviation; GAD-7: Generalized Anxiety Disorder-7point scale

Introduction

The global influenza A/H1N1 (H1N1) pandemic in 2009 was associated with high morbidity and mortality [1,2]. Healthcare workers (HCWs) are identified as being at high-risk of being infected with influenza A/H1N1 during such epidemics [3,4]. This can translate into heightened anxiety among HCWs caring for the increased number of patients during outbreaks. High anxiety may lead to unwillingness to manage infected patients, and may be associated with increased levels of absenteeism in healthcare facilities. This is particularly important among HCWs in intensive care units (ICU), due to the severity of illness on the one hand, and the high demand for frequent patient care activities and close proximity to respiratory secretions on the other

hand [5]. The resultant work avoidance can potentially affect the preparedness of ICUs to deal with critically ill patients during viral outbreaks. Most of the reported literature on this subject looked at general hospital staff; a limited number of reports have focused on ICU staff.

In the influenza season of 2015–2016, an increase in the incidence of influenza A/H1N1 was noted at King Khalid University Hospital, Riyadh, Saudi Arabia, from June 1, 2015 to December 31, 2015. A total of 1594 nasopharyngeal swabs were tested for influenza A/H1N1 by polymerase chain reaction, and 157 (9.97%) yielded positive results: 129 adult and 28 pediatrics cases. Of these, 16 patients needed ICU admission, during which a notable level of anxiety was observed in HCWs dealing with these patients.

The objective of this study was to determine the self-reported anxiety level among HCWs in ICU and its relation to the perception of adequacy of available information, infection control and preventive measures carried out, and HCWs self-reported work avoidance behaviors.

Methods

Study design and participants

A questionnaire-based, cross-sectional study was conducted to explore anxiety levels among HCWs in adult and pediatric ICUs at King Khalid University Hospital, in the period between December 2, 2015 and December 12, 2015. The questionnaire addressed the level of anxiety the HCW experienced when assigned to care for an H1N1-infected patient, and how worried he/she was about contracting H1N1, or transmitting it his/her family members. In addition, factors potentially associated with a high level of anxiety and possible work avoidance behaviors were further explored.

The questionnaire consisted of 23 questions related to 6 aspects: (i) Demographics and area of care; (ii) general anxiety score (measured using the Generalized Anxiety Disorder 7-item [GAD-7] scale) [6]; (iii) rating of anxiety level in relation to caring for a patient with H1N1 infection, worry about contracting the disease or transmitting it to family members; (iv) self-reported compliance with infection control measures, including being vaccinated against influenza; (v) work avoidance behaviors; and (vi) perception of adequacy of information and preventive measures provided in the institution. The questionnaire surveyed respondents on whether they considered taking off-duty days and whether they considered changing their work schedule or reducing the frequency of patient care activities because of H1N1 cases in their work areas (Appendix 1).

The GAD-7 scale was used to assess anxiety. The total score was computed by summing each respondent's responses according to the GAD author's recommendation [6]. The following cut-off points were used: 1-4, mild anxiety; 5-9, moderate anxiety; 10-14, severe anxiety; and ≥ 15, very high or pathological anxiety. The perceived sufficiency of information was computed by summing the ratings of the 4 items (information on signs and symptoms, treatment, prevention, and transmission) on a 5-point Likert-like scale, with a maximum possible score of 20. The knowledge score on H1N1 asked general questions about modes of transmission, fatality, signs and symptoms, and preventive measures. The responses to the general knowledge questions were rated based on the number of correctly answered questions, with a maximum possible score of 100. Self-reported changes in infection control habits were computed via a summative analysis, after considering the internal consistency of items that requested the respondents to rate their observed change in infection control habits related to 7 items on a 5-point Likert-like scale, with a maximum possible score of 35. Finally, the perceived efficiency of preventive measures in the work area, anxiety about contracting H1N1 or transmitting it to family members, anxiety about caring for a patient with H1N1 infection, and worry levels about the side effects of the influenza vaccine were all measured on a 10-point Likert-like scale, with higher reported scores denoting higher levels of worry.

The study was reviewed and approved by the Institutional Review Board of College of Medicine, King Saud University.

Statistical analysis

Descriptive statistics were reported with frequency and percentages for categorical variables (such as sex and work area), and means and standard deviations (SD) or medians, as appropriate, for continuous variables.

Variable	How worried you'll be if you were assigned to care for H1N1 patient today (1-10)	Self-reported preventive behavior	GAD Total Score	General information score on H1N1	Anxiety from Contacting H1N1 or family member	Worry score (1-10 Scr.) from taking Flu vaccine	Reported effectiveness of preventive measures at your work area	Was your frequency to care for patient with confirmed or suspected H1N1 reduced (as compared to other patients)?
How worried you'll be if you were assigned to care for H1N1 patient today (1-10)								
Self-reported preventive behavior	42							
GAD Total Score	215	-35						
General information score on H1N1		0.049						
Anxiety from Contacting H1N1 or family member	0.907**	0.049	0.344**					
Worry score (1-10 Scr.) from taking Flu vaccine	-108	-156	0.178	0.183	0.047			

Reported effectiveness of preventive measures at your work area	0.066	.355**	0.05	0.008	0.006	-111		
Was your frequency to care for patient with confirmed or suspected H1N1 reduced (as compared to other patients)?	-177*	0.013	-198*	0.207**	-2014**	0.178	0.161*	
**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed)								

Table 1: Correlations between all continuous scores and summative scores created from the questionnaire.

The Mann-Whitney U non-parametric test for independent groups was used to test differences between specific continuous variables, with the mean and SD used as a measure of central tendency, where appropriate, instead of the median or geometrical mean, assuming an equal spread of the variables among tested groups.

Correlations between all continuous scores and summative scores calculated from the questionnaire were assessed (Table 1). Multivariate linear regression was used to test how the respondent co-variates and predictors either worked individually or in combination to predict the reported level of worry of HCWs when assigned to an H1N1-infected patient. The model predictors were specified a priori based on theory, practice, relevance, and usefulness of items and subject characteristics to the topic of study; namely, worry derived from being assigned to care for a patient infected with H1N1.

Data was tested for the assumptions of linear regression; no contraindications were found. Twelve respondents were found to have missing values for some responses, so a pairwise analysis was used. A further 8 respondents were found to have bivariate outlier responses or high leverage points when considered either with the outcome variable or the other continuous independent variables; the data of these 8 respondents were excluded from the linear regression model. Most of these 8 respondents were nurse technicians and assistant nurses who worked in more than one clinical area. Therefore, the data from 149 out of 169 respondents were analyzed in the linear regression model, considering the pairwise deletion; this resulted in an acceptable overall variable to respondent ratio of 1:12.

Results

All available HCWs in adult and pediatric ICUs (n=238) were targeted in this survey. Each received a soft copy of the questionnaire by email in the period between December 2, 2015 and December 12, 2015. A total of 169 HCWs completed and returned the questionnaire within the allowed 10-day period, giving a response rate of 71%.

The majority of respondents were female (82.2%) and <40 years old (78%). The respondents comprised physicians (21.3%), nurses (70.4%), and allied health professionals (8.3%). Of the 169 HCWs, 56.8% worked in pediatric ICU (including pediatric ICU and neonatal ICU); the rest worked in adult critical care areas. Twenty-two (13%) had never received an annual vaccination against influenza. Almost two thirds (n=105) had been assigned to care for an H1N1-infected patient within the past month inside their clinical care areas. It is worth mentioning that the adult ICU in our hospital admitted 5 patients who were proven to have H1N1, 2 of whom died; the pediatric ICU admitted 3 confirmed H1N1-infected patients, all 3 survived. Thirty (18%) respondents reported that they considered changing their work shift and 10 (6%) considered going off duty in order to avoid contact with these patients. Over one-third of respondents (n=67) reported a reduction in the frequency of interaction with H1N1-infected patients, including a reduction in performing patient-care activities.

Overall, the HCWs reported a moderate level of worry about contracting H1N1 or transmitting it to family members. The mean worry level for all respondents was 4.65 (SD 1.8) out of 10. Similarly, the self-reported anxiety level from being assigned to care for an H1N1-infected patient on a scale from 0-10 was average (mean 4.8 [SD 2.6]).
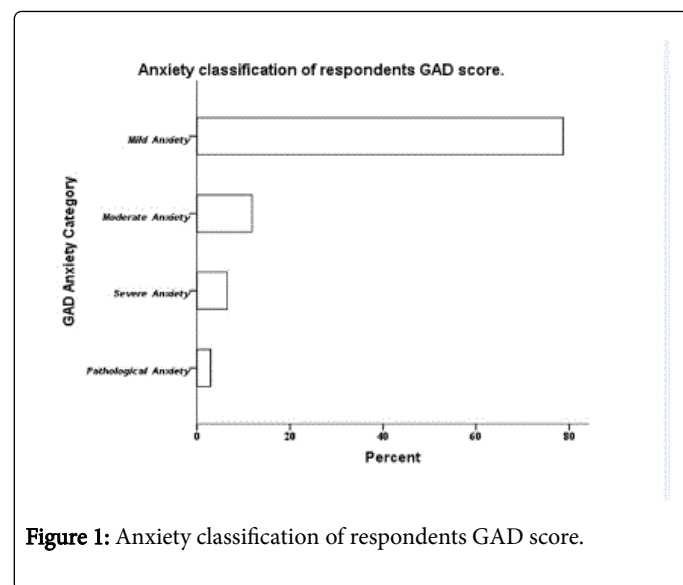

Figure 1: Anxiety classification of respondents GAD score.

There was strong correlation between the level of worry about caring for an H1N1-infected patient in ICU and the worry score of contracting H1N1 or carrying it home (Pearson's r=0.907, P<0.001). As there was collinearity between these 2 variables, only 1 was included in the linear regression model; we report on this later in this study.

The general anxiety level (GAD-7 score) of the 169 HCWs was low (mean 3.4 [SD 4.7]). However, at least 36 (21.3%) respondents reported

having underlying moderate-to-severe generalized anxiety levels (Figure 1).

Most HCWs responded that they had received sufficient information on H1N1, (mean score 16.5 [SD 3.4] out of 20 possible points). Likewise, the respondents rated their perception of the effectiveness of infection control measures in ICU to be higher than average (7.1 out of 10). An increased compliance with preventive measures was noted among HCWs during the influenza A/H1N1 epidemic (mean score 23.1 [SD 5.5] out of 25 possible points). This included compliance with hand hygiene and taking universal precautions (Table 2).

The multivariate linear regression model predicting the anxiety level of HCWs should they be asked to care for an H1N1-infected patient showed that concern about influenza vaccine side effects and working in the adult ICU were associated with higher levels of worry, all else considered equal (Table 3). Moreover, the underlying GAD-7 score converged significantly on the hypothetical worry level reported by HCWs. In fact, those who had higher GAD-7 scores tended to report higher worry levels about being assigned to a patient infected with H1N1. On the contrary, those who actually cared for H1N1-infected patients within the last month were predicted to have a lower level of worry about being assigned to another H1N1-infected patient. Additionally, older respondents tended to have lower worry levels about caring for an H1N1-infected patient than did younger respondents (aged 18-30 years).

Finally, the reported compliance with preventive practices coalesced with higher worry levels. The association between the score of improvement in compliance with preventive behavior and the level of worry about being assigned to an H1N1-infected patient was significant (t(137)=2.1, P=0.038), as shown in Table 3. A reduced level of interaction with an H1N1-infected patient's care approached significance for an increase in the level of anxiety when assigned to care for an A/H1N1-infected patient (P=0.059).

Compliance Items	No change	Little Improved	Moderately Improved	Improved a lot	Substantially Improved
Compliance with the Hand-Hygiene at the Hospital	21(12.4%)	9(5.3%)	50(29.6%)	71(42%)	18(10.7%)
Compliance with Universal Precautions (examples: Masks and gloves)	18(10.7%)	11(6.5%)	49(29%)	65(38.5%)	26(15.4%)
Avoidance of contact with flu affected people	41(24.4%)	20(11.8%)	37(21.9%)	58(34.3%)	12(7.1%)
Avoiding social activities to avoid catching flu (example: Visiting friends or malls)	42(24.9%)	30(17.8%)	41(24.3%)	45(26.6%)	11(6.5%)
Reduction in handshaking habits	38(22.5%)	21(12.4%)	35(20.7%)	67(39.6%)	8(4.7%)

Table 2: Questions on compliance with Infection preventive behavior.

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.918	1.334		4.437	0.000
General information Score on H1N1	-0.004	0.010	-0.030	-0.380	0.705
GAD total score	0.121	0.041	0.229	2.934	0.004
Sex (Female, ref: Male)	-0.355	0.521	-0.054	-0.681	0.497
ICU type (Adult, ref: Peds)	1.219	0.404	0.244	3.017	0.003
Worry score from taking Influenza Vaccine (1-2)	0.218	0.061	0.268	3.597	0.000
Perceived Sufficiency of Information Score	-0.091	0.061	-0.120	-1.487	0.139
Age					
Age: 31-40 Years old	-0.610	0.409	-0.122	-1.490	0.138
Age: 41-50 Years old	-0.779	0.551	-0.114	-1.415	0.159
Age: 51-60 Years old	-1.913	0.825	-0.174	-2.318	0.022
Self-reported preventive behavior	0.079	.038	0.175	2.096	0.038
Previously cared for H1N1 Patient	-1.309	0.439	-0.251	-2.984	0.003

Reduction in the frequency of interaction with H1N1 infected patient	-0.714	0.379	-0.141	-1.884	0.062

Table 3: Linear Regression Model Predicting subject reported anxiety if assigned to H1N1 infected patient.

The multivariate logistic regression model explaining the factors associated with rescheduling shift duties to avoid contact with H1N1-infected patients is shown in Table 4. The model was statistically significant overall ($X^2(7)$=24.1, P=0.001), with 76.6% of classifications being correct overall using the model with its specified predictors (Hosmer-Lemeshow chi-square test=0.061, area under the receiver operating characteristic curve=0.76). The model showed that HCWs who had previously cared for an H1N1-infected patient were 69.5% less likely to reschedule their leave due to the presence of an H1N1 outbreak, all else kept constant.

This was followed by evaluation of HCWs perception of their individual unit's efficiency in terms of preventive infection control measures; this was found to be negatively associated with leave rescheduling intentions. In fact, for each additional unit increase in the workplace infection control efficiency rating, the odds of HCW's intentions to reschedule their annual leave decreased by 20.8%.

Respondent-reported worry level about the side effects of influenza A/H1N1 vaccine converged positively on the intent to re-schedule their leave; those who worried more were 19.3% more likely to consider a work shift reschedule than those who worried less, with all else considered equal. Moreover, the odds of considering rescheduling work shifts were 149% greater for staff who answered that they had decreased their physical interaction with H1N1-infected patients than those who answered that they had not. Furthermore, the GAD-7 score, worry level about contracting H1N1 or carrying it home to a family member, and worry level about being assigned to an H1N1-infected patient were found to converge on the intent to reschedule work duty shifts, with borderline statistical significance (Table 4).

Variable	Odds Ratio	95% C.I (Odds Ratio)		Sig.
		Lower	Upper	
Reduction in the frequency of interaction with H1N1 infected patient	2.49	1	6.24	0.051
Worry score from taking Influenza Vaccine (1-10)	1.19	1.01	1.41	**0.042**
Previously cared for H1N1 infected patient	0.31	0.12	0.75	**0.009**
GAD Score	1.08	0.98	1.20	0.113
Unit infection control rating (1-10)	0.79	0.65	0.96	**0.019**
Worry score from being assigned to H1N1 infected patient (1-10)	1.66	0.98	2.81	0.059
Worry for transmission to self and family (1-10)	0.70	0.48	1.04	0.077
Constant	1.02			0.983

Table 4: Multivariate logistic regression model explaining the predictors for re-scheduling work duties (n=161 HCW's).

Discussion

In this study, we found that HCWs in ICU experienced moderate levels of anxiety in relation to the perceived risk contracting H1N1 or transmitting it to a family member (feeling of vulnerability), and some reported work avoidance behaviors. The moderate level of anxiety could partly be related to previous familiarity with H1N1 during the 2009 epidemic, and the fact that most of the HCWs perceived that they had received sufficient information about the disease and thought that the infection control measures in their institution were effective. This is consistent with previous reports that showed moderate feelings of anxiety and stressor appraisal among the public during viral epidemics [5,7]. The concern about contracting H1N1 in one report was 12–25%, and about family members contracting the disease was 40% [8]. HCWs in an Australian ICU reported a considerable sense of fear about contracting the infection themselves or transmitting it to their children and family members at home. The fact that H1N1 can affect young healthy people contributed to their sense of fear [9]. A higher perception of threat was noted in individuals with intolerance to uncertainty about new life events. Those were found to adopt mainly emotion-focused strategies to cope with the threatening situation [10].

The moderate level of self-reported anxiety in our study cohort was translated into behavior change, as reported in the questionnaire. The majority of HCWs adopted problem-focused coping strategies in terms of better compliance with infection control precautions and avoiding potential exposure in the community (compliance improved by 66%). Similarly, a high compliance rate with infection control procedures (>80%) was reported in hospitals in Hong Kong, Singapore, and the UK-except for the use of masks during direct patient contact, which varied from 87.7% to 62% [11]. Nevertheless, many HCWs in our ICUs reported adopting work avoidance behaviors, such as decreased patient care activities and willingness to change duty days; some even considered going off duty. We found that previous exposure to and caring for an H1N1-infected patient was associated with less work avoidance behavior. Similarly, good staff perception of the infection control measures in their unit was associated with less rescheduling of shifts. This seems to be in accordance with the health belief model, which states that reactions to the threat of a viral infection depend on

the level of appraisal of the threat; therefore, high perception of risk is directly related to avoidance behavior [12-15].

HCW's hesitation and avoidance to work during viral pandemics has been reported before [8,10,16,17]. A survey of randomly selected HCWs across 3 health care trusts in West Midlands in the UK suggested that absenteeism can reach up to 85%, especially among nurses and ancillary healthcare workers during influenza pandemics [16]. Imai et al. reported that 14.7% of hospital employees in 3 core hospitals in Japan were very hesitant to work during the H1N1 pandemic [17]. This unwillingness was even higher among community nurses. A cross-sectional study conducted among community nurses in Hong Kong reported that 76.9% were either not willing to or were not sure if they would accept having to care for a patient with H1N1. The main reasons given were psychological stress and fear of contracting the disease [18]. Despite their professional duties, 28% of hospital health care employees surveyed at a German university hospital considered it acceptable not to report for work during a viral pandemic [19]. Similarly, in a qualitative study that explored the views of 64 HCWs in the UK about working during an influenza pandemic, the perceived factors related to unwillingness to work included child care responsibilities, concern about the wellbeing of family members, lack of information about the risks of infection, no clear role during the crisis, and lack of trust in the health organization [20-22]. Our results were consistent with these previous reports [19,20,22], as we found that previously caring for patients with same disease and good perception of infection control measures were associated with a lesser tendency to adopt an escape behavior. On the other hand, the more worried the HWC was for self and family members, and the more fearful he/she was about vaccination side effects or being assigned to care for an infected patient, the more he/she was likely to avoid work and reschedule work shifts.

The study identified that younger age and lack of familiarity with the disease were predictors of a higher reported level of anxiety among HCWs about being assigned to care for an H1N1-infected patient. This could be related to the fact that gaining knowledge through actual involvement with patients with the condition can reduce uncertainty and encourage positive, problem-focused coping measures [20].

These factors need to be taken into consideration when assigning nurses to care for critically ill patients with highly infectious diseases. Additionally, the occurrence of death in the immediate vicinity of work, and realization of the condition's infectivity and potential fatality, can all increase the anticipated level of threat; this, then, increases the HCW's level of anxiety when assigned to care for an infected patient, as reported in this study.

Finally, the higher the individual's underlying general anxiety level, the more worried he/she becomes for self and family about contracting the disease and about being assigned to care for a patient with and infectious disease, as their overall perception of threat is higher [23]. This suggests a need for intensifying the measures taken by the institution to reduce occupational stress in HCWs, especially those working in ICUs [24].

This study has some limitations. First, it is a single center study with a small sample size. Second, as with any survey based on a self-administered questionnaire, the self-reported information on which the analysis and interpretations are based may not be entirely accurate, mainly because of possible recall bias and because HCWs may give a more positive response than would be revealed by other data-collection methods. Last, the study might be subjected to a selection bias due the possibility of not having all disciplines involved equally.

In summary, HCWs in adult and pediatric ICUs reported moderate levels of anxiety in relation to the care of patients infected with influenza A/H1N1. Some HCW expressed their willingness to take days off or to change their work shift duties, and many reported decreasing their patient care activities. This work avoidance behavior could affect their units' readiness to deal with H1N1-infected patients. Efforts need to be directed towards alleviation of general anxiety in ICU staff in order to minimize the psychological effect of the perceived risk of infection. These efforts include cognitive-behavioral interventions, counselling, and promotion of mental and physical relaxation [24]. In addition, better information on disease transmission, vaccination, adherence to personal-protection practices, possible change in work organization, and support from senior colleagues may help to reduce work absenteeism.

Acknowledgement

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