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Perception of Medical and Nursing Personnel Regarding the Likelihood of Occurring Infectious Disease Disasters: Analysis of 2010 decade data

Αντιλήψεις Ιατρών και Νοσηλευτών για Πιθανότητα Εμφάνισης Καταστροφών από Μολυσματικές Ασθένειες: Ανάλυση Δεδομένων της Δεκαετίας του 2010

Abstract at the end of the article

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Introduction: Infectious diseases, such as the Novel 2019 Coronavirus SARS-CoV-2, with the potential of spreading internationally, continue to menace and shut down the health systems of weak, but also developed countries. Risk perception portrays a valid disaster preparedness behavior precursor variable. **Aim:** The objective of the study was the exploration of the medical and nursing personnel perception regarding the likelihood of occurring infectious disease disasters analyzing 2010 decade data, for explaining the current SARS-Cov-2 response. **Methods:** A cross-sectional research was conducted from February 2012 to April 2013. Three hundred and sixty-four physicians and nurses participated. A disaster preparedness questionnaire was used. Univariate and multivariate logistic regression analysis for the sociodemographic characteristics' parameters and their relation to the dependent variable of the likelihood perception of occurring infectious disease disasters were performed. **Results:** Eighty-two-point two percent of the responders perceived the likelihood of occurring infectious disease disasters in the future as "Likely". The univariate logistic regression analysis was significant (P≤0.05) for sex (reference category: men) (OR 3.24, 95% CI 1.74–6.04, P<.001) and for education level (reference category: undergraduate degree) (OR 0.50, 95% CI 0.28-0.91, P=.023). The responders with postgraduate degree perceived the likelihood of occurring infectious disease disasters as "Likely" at a lower percentage than those with only undergraduate one (74.2% versus 85.1%) ($x^2(1)=5.26$, P=.022). In relation to the sociodemographic characteristics' multivariate logistic regression analysis, only sex was significant (OR 4.42,

95% CI 1.01–19.44, P=.049). Conclusions: At the present research, it was detected that a high percentage of the Greek medical and nursing personnel (82.2%) perceived the likelihood of happening infectious disease disasters as "Likely". Furthermore, at the present study, it was found that the female physicians and nurses perceived the likelihood of occurring infectious disease disasters as "Likely" more frequently, a detection that indicates that might be more effective in disaster response planning. For the further enhancement of the perception that infectious disease disasters are likely to occur, and by extension for the infectious diseases-related disaster preparedness, appropriate adjustments in medicine and nursing undergraduate and postgraduate programs should be done.

Key-words: *Infectious disease disasters, COVID-19, medical and nursing personnel, likelihood perception, disaster preparedness.*

Introduction

In the last decades, there is a growing recognition of the threat that infectious disease disasters and other catastrophes bring on the global health-related security and the daily living of people, beyond their impact on public health per se.[1] Revival or emerging infectious diseases, such as the Novel 2019 Coronavirus SARS-CoV-2, with the potential of spreading internationally, continue to menace and shut down not only the countries, and their health systems, that are weak, but also the developed ones.[1,2]

According to the study of Bissell et al,[3] the highly prepared health systems, concerning the management of health-related disasters, are associated with lower case fatality rates. In consonance with Lindell and Perry at 1992 in Paton[4] and Sjöberg,[5] risk perception portrays a valid disaster preparedness behavior precursor variable.[4] Additionally, "the perception of the likelihood of the threat occurring in the near future",[6] comprises the first of the three essential components that are correlated with disaster preparedness.

Taking into account the above scholars[4–6] findings and the step approach of Forestal et al[7] regarding the composited concept of adherence, disaster preparedness, a composited concept too, could be divided in two steps:

- The motivation of an individual to demonstrate a disaster preparedness behavior, derived from their perception of the likelihood of a threat taking place in the future and
- The disaster preparedness behavior.

Until now, six studies[8–13] have been conducted including the examination of the first step of the infectious disease disasters-related preparedness. However, only three of them refer to professionals, with in-service healthcare experience with none incorporating inferential statistical analysis relevant to the likelihood of occurring infectious disease disasters.[8,12,13] Additionally, the healthcare is primarily a partnership between physicians and nurses, with the patient at the center of interest.[14]

Aim

The aim of this study was to explore concretely and systematically the perception of medical and nursing personnel regarding the likelihood of occurring infectious disease disasters analyzing 2010 decade data, for explaining the current SARS-Cov-2 response locally and globally.

Research questions

1. What are the frequencies of the sociodemographic (sex, age -years-, marital status, having children status, having family members >65 years old status, years of work experience, education level, personnel type, work area, attendance of Disaster Nursing/Medicine program/course status, participation in any disaster management activity at workplace status) and of the perceptive (perception of the likelihood of occurring infectious disease disasters) characteristics of medical and nursing personnel?

2. Is there a linear relationship between the log odds of sex, age, marital status, having children status, having family members >65 years old status, years of work experience, education level, personnel type, work area, attendance of Disaster Nursing/Medicine program/course status and participation in any disaster management activity at workplace status and the perception of the likelihood of occurring infectious disease disasters?

Material and Method

Study design

The study was a cross-sectional research.

Setting

The research took place at various departments of general and special hospitals, as well as at postgraduate programs, in a large capital city. Ethics approvals were granted by the hospitals' and university departments' scientific committees.

Subjects

The study participants were 364 physicians and nurses.

Recruitment

This study is based on data from the Kossioris et al.[15] research. Three hundred and sixty-four physicians and nurses were conveniently approached by the head investigators at their workplace or postgraduate course, from February 2012 to April 2013. The sample size was determined by the guidelines of Creswell,[16] where, approximately 350 individuals for a cross-sectional survey study are needed. All participants were enrolled after providing written informed consent.

Data collection

For the collection of the data, a modified version of the Disaster Preparedness Questionnaire of Fung et al,[17] with the additional items of "Personnel type" (nurse or physician) at the questionnaire section of sociodemographic characteristics and of "Disaster Nursing/Medicine program/course" at the section regarding the courses that responders think is/are necessary for preparing for disaster was used. The principal investigators distributed to each participant the questionnaire and after a reasonable time they took it back completed gathering sociodemographic and perceptive data.

Measurements

The parameters that were measured were related to:

- Sociodemographic characteristics: sex, age -years-, marital status, having children status, having family members >65 years old status, years of work experience, education level, personnel type, work area, attendance of Disaster Nursing/Medicine program/course status, participation in any disaster management activity at workplace status and
- Perceptive characteristic: perception of the likelihood of occurring infectious disease disasters.

Instrumentation – procedures

For the measurement of sociodemographic characteristics, 11 items of the 2008 Fung et al[17] studied questionnaire sections were used. As regards the utilization and translation in Greek of the whole questionnaire, permission from its author was granted. The translation procedure was carried out according to the guidelines of Medical Outcomes Trust.[18] Given the fact that the items in question asked mainly objective information, they underwent validity examination only. The validity method that was applied, by experts in the field of disaster management, was the face validity one.

With reference to the perceptive characteristic, one item from the 2009 Fung et al[8] studied questionnaire sections was utilized ("likelihood of unfortunate events occurring in Hong Kong"8 – "Infectious disease outbreaks"8). The item underwent face validity examination by experts in the field of disaster management.

Data analysis

The item concerning the likelihood of happening infectious disease(s) disaster, from a five categories variable ("Absolutely No"/"Very Unlikely"/"Unlikely"/"Likely"/"Very Likely") in the questionnaire that Dr. Fung mailed to the head author (in the 2009 Fung et al[8] study is reported to have three categories -"Not possible"/"Unlikely"/"Likely"-), was transformed to a two categories one ("Unlikely"/"Likely").

Statistical analysis

Descriptive and inferential statistical analysis came about using the IBM SPSS 25 software package. In the context of descriptive analysis, the frequencies of the sociodemographic and perceptive characteristics were estimated.

In terms of the inferential statistical analysis, univariate and multivariate logistic regression analysis for the sociodemographic characteristics' parameters and their relation to the dependent variable of the likelihood perception of occurring infectious disease disasters were performed. For the multivariate logistic regression analysis, the "enter" variable selection method was utilized and 5% probability criterion was set for the variables to enter the model. Additionally, for clarification to the readers, the Chi-square test for the education level parameter and the likelihood perception outcomes was carried out.

Results

Descriptive

With respect to the sociodemographic characteristics, 80.1% of the participants were women, 52.1% were 18-35 years old, while 47.9% 36-60 years old. Seventy-four point one per cent had only undergraduate degree, 81.3% were nurses and 42.7% were working at surgery sector.

As for the perceptive characteristic, 82.2% of the responders perceived the likelihood of occurring infectious disease disasters in the future as "Likely" and "Very Likely". All the descriptive results are presented in detail in table 1.

Inferential

The univariate logistic regression analysis was significant (P≤0.05) for sex (reference category: men) (OR 3.24, 95% CI 1.74-6.04, P<.001) and for education level (reference category: undergraduate degree) (OR 0.50, 95% CI 0.28-0.91, P=.023). The Chi-square test, for the clarification of the univariate logistic regression result of the education level variable, showed a significant association between the whether the participants had only undergraduate or postgraduate degree and their perception of the likelihood of occurring infectious disease disasters in the future ($x^2(1)=5.26$, P=.022). The responders with postgraduate degree perceived the likelihood of occurring infectious disease disasters as "Likely" at a lower percentage than those with only undergraduate one (74.2% versus 85.1%) (table 2).

In relation to the sociodemographic characteristics' multivariate logistic regression analysis, only sex was significant (OR 4.42, 95% CI 1.01-19.44, P=.049) (tables 2 and 3).

Discussion

The most important finding of the study was the fact that a considerable percentage of medical and nursing personnel (82.2%) in the previous decade (in 2012–2013), perceived the likelihood of occurring infectious disease disasters in Greece as "Likely" and "Very likely". This finding is a bit far from the relevant finding of Lam et al,[13] who found that the 60.4% of Hong Kong's medical and nursing personnel perceived the likelihood of occurring infectious disease disasters as "Possible", "Likely" or "Very Likely" and from Fung et al[8] study, which conducted in 2007 in nursing personnel, in which the respective percentage was 61.0%, while similar to the detection of Vaughan,[12] with nurses as a study population, where the percentage in question was 78.8%. However, although the percentage of Fung et al[8] study is almost 20 percentage units less than that of the present's research, was second from the top in a list of 12 unfortunate events being considered highly rated. Furthermore, the same researchers[8] concluded that

Table 1. *Frequencies of medical and nursing personnel characteristics.*

Characteristics	N	Results*
Sociodemographic		
Sex	(361)	Women=80.1%; Men=19.9%
Age (years)	(361)	18-35=52.1%; 36-60=47.9%
Marital status	(355)	Single=51.5%; Married=44.2%; Divorced=4.2%
Having children	(355)	No=59.7%; Yes=40.3%
Having family members >65 years old	(358)	Yes=60.6%; No=39.4%
Years of work experience	(360)	1-5=30.3%; >15=27.2%; 6-10=21.1%; 11-15=12.8%; <1=8.6%
Education level	(363)	Undergraduate degree=74.1%; Postgraduate degree=25.9%
Personnel type	(363)	Nurse=81.3%; Physician=18.7%
Work area	(295)	Surgery sector=42.7%; Pathology sector=30.8%; ICU/ED**=26.4%
Attendance of Disaster Nursing/Medicine program/course	(177)	No=83.1%; Yes=16.9%
Participation in any disaster management activity at workplace	(356)	No=87.9%; Yes=12.1%
Perceptive		
Perception of the likelihood of occurring infectious disease disasters	(330)	Likely=55.2%; Very likely=27.0%; Unlikely=14.2%; Very unlikely=3.0%; Absolutely no=0.6%;

*Results are % , **Intensive care unit/Emergency department

Table 2. Univariate *and multivariate logistic regression analysis for the likelihood perception of occurring infectious disease disasters determining factors and a two categories likelihood perception variable.*

	Univariate analysis		Multivariate analysis	
Variable*	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**
Sex (women)	3.24 (1.74–6.04)	<.001	4.42 (1.01–19.44)	.049
Age (36–60)	1.17 (0.66–2.07)	0.58		
Marital status				
Single	Reference category			
Married	0.68 (0.38–1.21)	0.19		
Divorced	1.03 (0.22–4.92)	0.97		
Having children (yes)	0.90 (0.51–1.60)	0.71		
Having family members >65 years old (yes)	0.94 (0.53–1.70)	0.84		
Years of work experience				
<1	Reference category			
1–5	0.61 (0.19–1.94)	0.40		
6–10	0.63 (0.19–2.10)	0.45		
11–15	0.59 (0.16–2.13)	0.42		
>15	1.14 (0.33–3.95)	0.84		
Education level (postgraduate degree)	0.50 (0.28–0.91)	.023		
Personnel type (nurse)	1.67 (0.86–3.25)	0.13		
Work area				
Pathology sector	Reference category			
Surgery sector	0.82 (0.39–1.74)	0.60		
ICU/ED	0.96 (0.41–2.25)	0.92		
Attendance of Disaster Nursing/Medicine program/ course	0.57 (0.21–1.59)	0.28		
Participation in any disaster management activity at workplace	0.65 (0.29–1.46)	0.30		

Table 3. *Crosstabulations between the "education level" and the "perception of the likelihood of occurring infectious disease disasters" variables categories.*

		Unlikely	Likely	P
Education level	% Undergraduate degree	14.9	85.1	.022
	% Postgraduate degree	25.8	74.2	

as close in time a disaster is, there is a higher possibility to be rated as "Likely" to occur by the responders and this may explain the substantially higher percentage, than both the two other investigations,[8,12] of the Greek study, which conducted two to three years after the 2009–2010 influenza pandemic. In accordance with the Oxford COVID-19 Government Response Tracker (OxCGRT),[19] a tool that "systematically collects information on several different common policy responses governments have taken, records the stringency of each policy on a scale to reflect the extent of government action, and aggregates these scores into a suite of policy indices",[19] with "100" being the strictest response, considering the first wave of the pandemic, South Africa's highest value, between March 26 and April 30, 2020, was 88.0, Greece's respective value, between March 23 to May 3, 2020, was 84.3, while China's separate value, on March 26 and 27, 2020, as well as between May 10 to May 23, 2020, was 81.9.

Interestingly, since the health sector had a primary role in the worldwide governmental responses,[20] the highest response values for the three countries it could be said that are associated to their medical and/or nursing personnel perception in terms of the likelihood of occurrence infectious disease disasters (South Africa's and Greece's medical and/or nursing personnel with a frequency of the "Likely" and/or "Very likely" likelihood response >78.0% had government responses of value >84.0, while China with a frequency of the "Possible", "Likely" or "Very Likely" likelihood response by its medical and/or nursing personnel 60.4 and 61.0%, had less government response value than both the other two countries -81.9-).

The second most valuable discovering of the research was the identification of female sex as likelihood of occurring infectious disease disasters perception positive determinant by the multivariate logistic regression analysis (OR 4.42, 95% CI 1.01-19.44, P=.049). Comparable was the detection of Bodas et al[21] where, in a study regarding the "threat perception and public preparedness for earthquakes in Italy",[21] it was found that women tended to perceive the likelihood of occurring an earthquake, also a potential health-related disaster, as higher (2.13 -Standard deviation=0.77-, on a five-point Likert scale, versus men's 1.99 -Standard deviation=0.77- for a major earthquake happening in one year -Mann-Whitney U=-2.67, P=.008- and 2.35 -Standard deviation=0.85- versus men's 2.20 -Standard deviation=0.88- for a major earthquake happening in five years -Mann-Whitney U=-3.01, P=.003-). Furthermore, according to the recent COVID-19-related literature,[22] the countries under female leadership, took measures against the pandemic earlier and communicated better with the public suffering lower death rates. However, there are only preliminary explanations, which need further examination, until now for the fact that women performed relatively well in the COVID-19 crisis.[22]

By the univariate logistic regression analysis, it was found that having a postgraduate degree was a likelihood of occurring infectious disease disasters perception negative determinant (OR 0.50, 95% CI 0.28–0.91, P=.023). Considering the fact that the "Attendance of Disaster Nursing/Medicine program/course" as likelihood of occurring infectious disease disasters perception determinant was not statistically significant (OR 0.57, 95% CI 0.21–1.59, P=0.28), it could be said that the health-related postgraduate programs in Greece, at least in the early 2010 decade, were disorientative with reference to the likelihood of occurring infectious acth disease disasters, and hence to the infectious diseases-related disaster preparedness.[4–6]

Conclusions

At the present research, was detected that a high percentage of the Greek medical and nursing personnel (82.2%) perceived the likelihood of happening infectious disease disasters as "Likely". Furthermore, at the present study, was found that the female physicians and nurses perceived the likelihood of occurring infectious disease disasters as more likely, a detection that indicates that might be more effective in disaster response planning. For the further enhancement of the perception that infectious disease disasters are likely to occur, and by extension for the infectious diseases-related disaster preparedness, appropriate additaments in medicine and nursing undergraduate and postgraduate programs should be done.

ABSTRACT

Αντιλήψεις Ιατρών και Νοσηλευτών για Πιθανότητα Εμφάνισης Καταστροφών από Μολυσματικές Ασθένειες: Ανάλυση Δεδομένων της Δεκαετίας του 2010

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Εισαγωγή: Οι μολυσματικές ασθένειες, όπως είναι και ο νέος κορωνοϊός SARS-CoV-2, δύνανται να εξαπλωθούν παγκοσμίως, όπως επίσης απειλούν και διακόπτουν τη λειτουργία όχι μόνο των συστημάτων υγείας των αδύναμων χωρών, αλλά και των ανεπτυγμένων. Η αντίληψη πιθανότητας ενδεχομένου, αποτελεί μια έγκυρη μεταβλητή πρόδρομο της

συμπεριφοράς ετοιμότητας για την αντιμετώπιση καταστροφών. **Σκοπός:** Σκοπός της παρούσας μελέτης ήταν η διερεύνηση της αντίληψης του ιατρονοσηλευτικού προσωπικού, ως προς την πιθανότητα να συμβούν καταστροφές λόγω μολυσματικών ασθενειών, αναλύοντας δεδομένα της δεκαετίας του 2010, για την επεξήγηση της τρέχουσας απόκρισης στον SARS-CoV-2. **Υλικό και Μέθοδος:** Πρόκειται για μια συγχρονική μελέτη που διεξάχθηκε από τον Φεβρουάριο του 2012 μέχρι τον Απρίλιο του 2013. Συμμετείχαν 364 ιατροί και νοσηλευτές, οι οποίοι συμπλήρωσαν το ερωτηματολόγιο "Disaster Preparedness Questionnaire" των Fung et al του 2007. Πραγματοποιήθηκε μονομεταβλητή και πολυμεταβλητή λογιστική παλινδρομική ανάλυση για τις παραμέτρους των κοινωνικοδημογραφικών χαρακτηριστικών και της σύνδεσής τους με την εξαρτημένη μεταβλητή της αντίληψης σχετικά με την πιθανότητα να συμβούν καταστροφές από μολυσματικές ασθένειες. **Αποτελέσματα:** Το 82.2% του δείγματος, αντιλαμβάνονταν το ενδεχόμενο να συμβούν καταστροφές από μολυσματικές ασθένειες στο μέλλον ως «Πιθανό». Η μονομεταβλητή λογιστική παλινδρομική ανάλυση ήταν σημαντική (P≤0.05) για το φύλο (κατηγορία αναφοράς: άνδρες) (OR 3.24, 95% CI 1.74-6.04, P<.001) και για το επίπεδο εκπαίδευσης (κατηγορία αναφοράς: βασικός τίτλος σπουδών) (OR 0.50, 95% CI 0.28-0.91, P=.023). Οι συμμετέχοντες με μεταπτυχιακό τίτλο σπουδών αντιλαμβάνονταν το ενδεχόμενο να συμβούν καταστροφές από μολυσματικές ασθένειες ως «Πιθανό» σε μικρότερο ποσοστό από όσους είχαν βασικό τίτλο σπουδών (74.2% versus 85.1%) ($x^2(1)=5.26$, P=.022). Όσον αφορά στην πολυμεταβλητή λογιστική παλινδρομική ανάλυση των κοινωνικοδημογραφικών χαρακτηριστικών, μόνο το φύλο ήταν σημαντικό (OR 4.42, 95% CI 1.01-19.44, P=.049). **Συμπεράσματα:** Στην παρούσα μελέτη, βρέθηκε ότι ένα μεγάλο ποσοστό ιατρών και νοσηλευτών (82.2%) αντιλαμβάνονταν το ενδεχόμενο να συμβούν καταστροφές από μολυσματικές ασθένειες ως «Πιθανό». Επιπλέον, στην παρούσα έρευνα, βρέθηκε ότι οι γυναίκες ιατροί και νοσηλευτές ήταν πιο πιθανό να αντιλαμβάνονταν το ενδεχόμενο να συμβούν καταστροφές από μολυσματικές ασθένειες ως «Πιθανό», ένα εύρημα που καταδεικνύει ότι μπορεί να είναι πιο αποτελεσματικές στον σχεδιασμό της απόκρισης σε ενδεχόμενες καταστροφές. Για την περαιτέρω επαύξηση της αντίληψης ότι είναι πιθανό το ενδεχόμενο καταστροφών από μολυσματικές ασθένειες και κατ' επέκταση για την ετοιμότητα αντιμετώπισης αυτών, θα πρέπει να γίνουν κατάλληλες προσθήκες στα ιατρικά και νοσηλευτικά, προπτυχιακά και μεταπτυχιακά, προγράμματα σπουδών.

Λέξεις ευρετηρίου: *Μολυσματικές ασθένειες, COVID-19, ιατροί και νοσηλευτές, αντιλήψεις πιθανότητας ενδεχομένου, ετοιμότητα αντιμετώπισης καταστροφών.*

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