

Reporting for Duty During Mass Casualty Events: A Survey of Factors Influencing Emergency Medicine Physicians

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Abstract

Background Academic medical centers play a major role in disaster response, and residents frequently serve as key resources in these situations. Studies examining health care professionals' willingness to report for duty in mass casualty situations have varying response rates, and studies of emergency medicine (EM) residents' willingness to report for duty in disaster events and factors that affect these responses are lacking.

Objective We sought to determine EM resident and faculty willingness to report for duty during 4 disaster scenarios (natural, explosive, nuclear, and communicable), to identify factors that affect willingness to work, and to assess opinions regarding disciplinary action for physicians unwilling to work in a disaster situation.

Methods We surveyed residents and faculty at 7 US teaching institutions with accredited EM residency programs between April and November 2010.

Results A total of 229 faculty and 259 residents responded (overall response rate, 75.4%). Willingness to report for duty ranged from 54.1% for faculty in a natural disaster to 94.2% for residents in a nonnuclear explosive disaster. The 3 most important factors influencing disaster response were concern for the safety of the family, belief in the physician's duty to provide care, and availability of protective equipment. Faculty and residents recommended minimal or no disciplinary action for individuals unwilling to work, except in the infectious disease scenario.

Conclusions Most EM residents and faculty indicated they would report for duty. Residents and faculty responses were similar in all but 1 scenario. Disciplinary action for individuals unwilling to work generally was not recommended.

Editor's Note: The online version of this article contains the survey instruments that were distributed to each site.

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Introduction

The process for managing a major emergency in health care follows a well-defined cycle: prevention, preparedness, response, and recovery.¹ Academic medical centers have a major role in every phase of the responses to mass casualties, and provider availability significantly affects the centers' capacity and capability to provide needed care. During the past decade, disasters, such as the 9/11 attacks, hurricanes Katrina, and more recently, Sandy, and the H1N1 flu epidemic, have raised questions about the willingness of health care workers to report for duty. Studies have shown widely variable response rates, ranging from 49% to 98% across a variety of providers.²⁻⁶

Although the emergency department is the front line for most mass casualty situations, appropriately prepared physicians from all specialties are necessary because patients often need ongoing or specialized care. Current data show that despite improvements in some areas,⁷ many specialties are still lacking in disaster preparation and

training.^{8–10} Unfortunately, those deficiencies may go unrecognized until a disaster occurs, and the skills are urgently needed.^{11,12} In addition, because resident physicians provide a large proportion of medical care in most academic centers, it is important to know whether the response of this group to a mass casualty situation differs from that of their faculty counterparts. Although there are well-established factors that have been found to affect faculty physicians’ decisions to respond to a disaster,² the factors that affect residents’ decision making have not, to our knowledge, been studied to date.

Finally, there are currently no guidelines for residency program directors regarding disciplinary action for residents who fail to respond/stay for duty during a crisis. Although many hospitals have implemented disciplinary policies regarding employee abandonment of their posts, resident physicians generally straddle a role between “student” and “staff member,” and may not be subject to employee guidelines.¹³ Analyzing physicians’ perceptions

What was known
Physicians’ willingness to report for duty during mass casualty events may affect the ability of teaching institutions to effectively respond to disasters.

What is new
A survey assessed factors influencing emergency medicine physicians’ willingness to provide care during mass casualty events.

Limitations
Likely respondent bias; reports may not reflect actual participation in a disaster event.

Bottom line
Concern for family safety, availability of protective equipment, and beliefs in professional duties influenced willingness to report for mass casualty events.

TABLE 1	DEMOGRAPHICS—OVERALL AND SPLIT BY REGION				
	Overall	Midwest	West	Southeast	Northeast
Responses, No. (%)					
Residents	259	81 (31.2)	42 (16.2)	57 (22.0)	79 (30.5)
Faculty	229	71 (31.0)	38 (16.6)	61 (26.6)	59 (25.8)
Female/male, ^{a,b} %					
Residents	46/54	42/58	45.2/54.8	49.1/50.9	48.1/50.6
Faculty	30/67	29.6/69	26.3/71.1	34.4/63.9	27.1/71.2
Age breakdown, % resident/faculty ^{a,b}					
<30 y	66.8/4.4	71.6/8.5	66.7/5.3	66.7/3.3	62.0/0
31–40 y	30.1/50.9	28.4/52.1	33.3/50.0	28.1/52.5	31.6/45.8
41–50 y	2.7/27.4	0.4/23.9	0/18.4	5.3/32.8	5.1/30.5
>50 y	0.4/17.3	0/14.1	0/23.7	0/11.5	1.3/22.0
Marital status, % married ^b					
Residents	66.4	71.6	81	56.1	60.8
Faculty	83.8	85.9	92.1	80.3	79.7
Have children, % (excluding grown children) ^b					
Residents	19.3	27.2	19	14	15.2
Faculty	61.1	69	57.9	63.9	50.8
Had formal disaster training, %					
Residents	48.3	45.7	23.8	54.4	59.5
Faculty	55.5	36.6	47.4	65.6	72.9

^a Absolute percentages reported. 1 to 2 responses missing for each category, so percentages may not add up to 100.
^b Overall differences between residents and faculty for sex, age, marital status, and responders with children were statistically significant (*P* < .05).

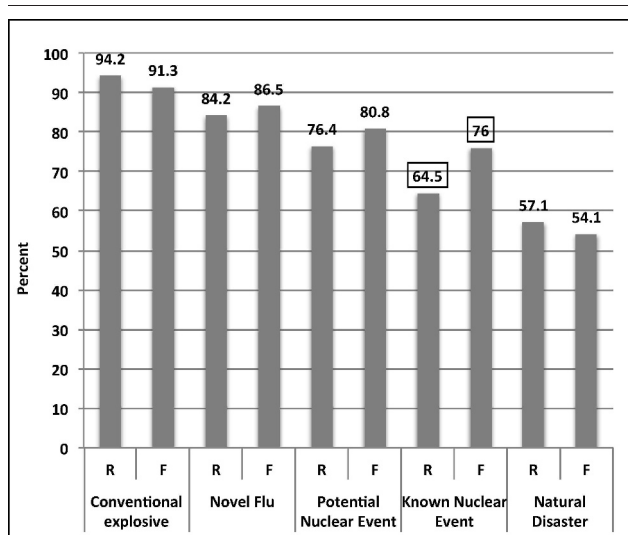


FIGURE 1 | **OVERALL PERCENTAGE OF RESIDENTS (R) AND FACULTY (F) WILLING TO RESPOND FOR VARIOUS DISASTER SCENARIOS**

Boxed numbers indicate statistically significant differences: faculty are more likely to work during a known radioactive event ($P = .02$).

on expectations for resident response could shed insight into developing effective incentives and policies.

Disaster medicine was initially created as a subspecialty of emergency medicine (EM).¹ During disaster management, EM physicians are expected to triage, rapidly assess, decontaminate, care for, and provide for the disposition of a potentially large influx of patients while interacting with fire and prehospital health care providers, law enforcement, consultants, hospital staff, and administrators. We believe evaluating the attitudes of EM faculty and residents regarding factors mitigating their likelihood of reporting for duty during a disaster is a natural first step in addressing some of these unanswered questions. Findings likely have implications for faculty and program directors in many other specialties, along with institutional officials who are involved in managing catastrophes.

Methods

Subjects

This study was a multicenter, prospective survey addressing willingness to respond to a disaster and factors affecting physician response. Participants included all active resident and attending physicians in 7 accredited EM residencies: University of Arizona, University of California–Davis, Emory University, Indiana University, Northwestern University Feinberg School of Medicine, New York University Bellevue Hospital Center and Temple University. The sites

were chosen based on willingness to participate and location to ensure representation from all major areas and climates throughout the United States. Each site was recruited through its respective residency director or department chair and agreed to pursue a 70% response rate. Between April and November 2010, a point person assigned to each site was responsible for distributing the survey link to residents and faculty at the site and communicating the total numbers of residents and faculty to the authors. The site was closed after a maximum of 5 solicitations or once a response rate of 70% was achieved.

Survey Design

Two surveys were created via an online survey platform (SurveyMonkey, Palo Alto, CA, www.surveymonkey.com), 1 for residents and 1 for faculty at each site. There was no available validated survey tool, so as a first step scenarios were created and piloted on 2 successive senior classes at Indiana University. Next, the pilot study was tested on a senior class with scenarios specific to our geographic location. From that, we developed the online survey and invited the targeted programs to review and refine. Minor adjustments based on the recommendations from the sites' point person were included in the final instrument. Both surveys presented separate, identical scenarios based on 4 types of disasters: natural (blizzard), explosive (nonnuclear), nuclear (rumored and confirmed), and communicable (novel flu virus). After willingness to respond, residents and faculty were questioned regarding the appropriateness of disciplinary measures for those resident physicians who were unwilling to respond. Finally, participants ranked 16 factors that most affected their decision. Factors were chosen according to a prior documented effect on willingness to respond,² as well as additional factors raised during the pilot phase of the study. Responses were recorded using a 5-point modified Likert scale (1 = strongly disagree; 5 = strongly agree).

The Indiana University–Purdue University Indianapolis Health Institutional Review Board granted a written-consent exemption, and a copy of that exemption was provided to all sites. Participation was voluntary, anonymity was assured, and submitting answers to the survey implied written consent.

Analysis

For the analysis, sites were grouped together by location to represent the Midwest (Indiana University and Northwestern University Feinberg School of Medicine), the West (University of California–Davis and University of Arizona), the Northeast (Temple University and NYU Bellevue Hospital Center School), and the Southeast (Emory University) regions of the United States. The primary outcome was

TABLE 2		RESPONSE RATES ^a DIVIDED BY SEX: MALE (M) VERSUS FEMALE (F)					
Scenario	Overall, %	Faculty: All Regions, %	Residents: All Regions, %	Midwest, %	West, %	Southeast, %	Northeast, %
Explosion: stay at work							
M	93.2	92.4	94.2	95.8	96	86.8	93.9
F	92.5	88.2	95	98.2	82.8	91.8	92.6
Explosion: work on day off							
M	82.8	82.8	82.7	87.5	84	78.5	81.7
F	78.6	75	80.7	89.1	65.5	73.5	79.6
Explosion: work with safety risk							
M	69.6	72.6	66.2	71.9	76	61.8	69.5
F	59.8	60.3	59.7	60	72.4	59.2	53.7
P	.02			.02			.03
Novel flu: work							
M	84.4	87.3	81.3	89.6	82	79.4	84.1
F	86.1	83.8	87.4	90.9	89.7	83.7	81.5
P			.03				
Novel flu: go to rural site							
M	4.7	4.5	5	2.1	4	7.4	6.1
F	0.5	0	0.8	0	0	0	1.9
P	.04						
Natural disaster: go to work							
M	60.5	55.4	56.8	62.5	54	55.9	50
F	54.5	48.5	58	65.5	37.9	59.2	48.1
Natural disaster: stay home							
M	17.2	19.1	15.1	18.8	12	16.2	19.5
F	16.6	23.5	12.6	16.4	10.3	18.4	18.5
Natural disaster: bring family to work							
M	56.4	54.8	58.3	61.5	52	61.8	48.8
F	53.4	69.1	44.5	49.1	75.9	55.1	44.4
P					.04		
Natural disaster: work with property risk							
M	66.2	66.2	66.2	70.8	70	61.8	62.2
F	61.5	73.5	54.6	61.8	51.8	69.4	59.3
P	.010			.001			
Natural disaster: work with safety risk							
M	63.5	59.2	68.3	78.1	55.2	48.5	61
F	68.8	48.5	52.9	52.7	60	55.1	44.4
P			.006				

TABLE 2 CONTINUED

Scenario	Overall, %	Faculty: All Regions, %	Residents: All Regions, %	Midwest, %	West, %	Southeast, %	Northeast, %
Unconfirmed nuclear disaster: stay at work							
M	79.7	81.5	77.7	81.3	84	72.1	81.7
F	75.9	77.9	74.8	80	82.8	71.4	72.2
Confirmed nuclear disaster: stay at work							
M	72	78.3	64.7	78.1	74	60.3	73.2
F	65.8	69.1	63.9	69.1	65.5	61.2	66.7
P		.03					
Confirmed nuclear disaster: work with health risk							
M	55.7	58.6	52.5	65.1	54	41.2	57.3
F	44.3	47.1	42.9	49.1	41.4	40.8	44.4
P				.016			

^a Starting on the left with overall responses, followed by responses split by faculty and residents, and then by US region. Bolded numbers indicate statistically significant results (*P* value). No other values were significant. Significance was calculated based on the mean Likert scale responses, whereas the percentages reported here are absolute percentages for those who agree and strongly agree.

EM faculty and resident willingness to report for duty. Secondary outcomes included factors influencing this decision and attitudes toward disciplinary action for individuals who fail to report for duty. We defined willingness to report for duty as agree or strongly agree and considered disagree or strongly disagree as unwillingness to report.

We used descriptive statistics to summarize the characteristics of the respondents and visualize the distribution of responses. All distributions were negatively skewed, except the questions about discipline, which were positively skewed. The 5-item Likert scale was collapsed into 3 items: agree, neutral, and disagree. We summarized the answers to the question, "What is the single most important factor that would guide your decision about responding," so they corresponded to 1 of the choices listed (eg, my children → family, my health → personal safety). If there was more than 1 response, we used the first response given.

We examined the bivariate associations between willingness to respond and demographics, training level, and disaster training status. The respondents were stratified by respondent type (eg, resident versus faculty), geographic area, as well as combined stratification by respondent type and geographic region using nonparametric independent samples Mann-Whitney *U* tests to compare means and Pearson correlations, where appropriate. All statistical tests were 2-sided with a significance level of *P* < .05. Signif-

icance (*P*) was adjusted down for multiple comparisons. All data manipulation and analyses were conducted using SPSS Version 19 (IBM Corp, Armonk, NY).

Results

Demographics

Responses were received from 259 EM residents (of 358 surveyed; 72.3%) and 229 EM faculty physicians (of 289 surveyed; 79.2%). Our goal response rate was met at 4 of the 7 sites (57%), with an overall response rate of 75.4%. TABLE 1 shows overall and regional demographics. The percentage of female residents was larger than the percentage of female faculty for each area. Overall, more faculty members reported having children (*P* < .05).

Although more female faculty reported being married than did male faculty, the 2 groups were comparable in the percentages who reported having children. Overall, 48.3% of residents (125 of 259) and 55.5% of faculty (127 of 229) reported they had received formal disaster training.

Respondents in the southeast and northeast groups reported higher rates of disaster training than did those in the other regions. Male faculty physicians were more likely to report having formal disaster training.

Willingness to Respond Overall, residents and faculty were most likely to respond to a conventional explosive disaster and least likely to respond to a natural disaster (FIGURE 1). Faculty were statistically more likely to report they would

TABLE 3

RESPONSE RATES^a DIVIDED BY THOSE WITH CHILDREN OR WITHOUT CHILDREN: PARTICIPANTS WITH CHILDREN (K) VERSUS WITHOUT (NK)

Scenario	Overall, %	Midwest, %	West, %	Southeast, %	Northeast, %
Explosion: stay at work					
K	92.6	97.2	90	85.1	95.2
NK	93.5	95.9	91.1	91.2	94.4
Explosion: work on day off					
K	82.1	91.5	76.7	70.2	83.3
NK	80.4	83.6	75.6	79.4	81.1
Explosion: work with safety risk					
K	62.1	63.4	73.3	61.7	50
NK	68.5	68.5	76.7	60.3	72.2
<i>P</i>					.041
Novel flu: work					
K	86.3	93	86.7	83	78.6
NK	84.4	86.3	84.4	79.4	86.7
Novel flu: go to rural site					
K	4.2	0	3.3	6.4	9.5
NK	2.5	2.7	2.2	2.9	2.2
Natural disaster: go to work					
K	49.5	57.7	50	51.1	33.3
NK	58.3	65.8	48.9	60.3	55.6
<i>P</i>	<.001	.014			.029
Natural disaster: stay home					
K	24.2	25.4	13.3	27.7	26.2
NK	13	12.3	11.1	10.3	16.7
<i>P</i>	<.001	<.001		<.001	= .003
Natural disaster: bring family to work					
K	68.4	70.4	76.7	74.5	52.4
NK	46.4	43.8	48.9	48.5	45.6
<i>P</i>	<.001	<.001	.006	<.001	.022
Natural disaster: work with property risk					
K	66.8	73.2	70	70.2	50
NK	63.4	61.6	62.2	61.7	66.7
Natural disaster: work with safety risk					
K	56.3	66.2	56.7	51.1	45.2
NK	60.1	68.5	60	51.5	60
Unconfirmed nuclear disaster: stay at work					
K	81.5	80.3	83.3	72.3	78.6

TABLE 3 CONTINUED

Scenario	Overall, %	Midwest, %	West, %	Southeast, %	Northeast, %
NK	84.2	82.2	84.4	72.1	80
<i>P</i>	.044				
Confirmed nuclear disaster: stay at work					
K	72.1	73.2	76.7	66	73.8
NK	67.8	73.9	66.7	57.4	71.1
Confirmed nuclear disaster: work with health risk					
K	57.4	67.6	50	46.8	57.1
NK	47.1	50.7	46.7	36.8	52.2

^a Those with adult children are excluded. Starting on the left, overall responses are followed by responses split by US region. Bolded numbers indicate statistically significant results (*P* value). No other results were significant. Significance was calculated based on mean Likert scale responses, whereas percentages reported are absolute percentages of agree and strongly agree.

work during a known radioactive event than were residents and were also more likely to bring their family to work (59.4% [136 of 229] versus 51.7% [134 of 259]; $P = .02$) or stay at home (20.1% [46 of 229] versus 14.3% [37 of 259]; $P = .007$) during a natural disaster.

We divided responses by sex to determine whether differences existed (TABLE 2). Overall, men were more likely to work during an explosion if they felt either their personal safety or property were at risk; however, they were more likely to take their family to a secure location during a novel flu epidemic. Within the resident group, women were less likely than men to respond to a natural disaster if they felt their personal safety was at risk, but more likely to respond to a novel flu outbreak. The only gender difference found for faculty was for a nuclear disaster: men were more likely to respond to a confirmed radioactive catastrophe.

We also found differences by region of the country. Combining residents and faculty, we found participants from the Midwest were statistically more likely to stay at work or to come in from home during an explosion than were those in other regions (Midwest 96.7% [147 of 152], West 91.3% [73 of 80], Southeast 88.9% [105 of 118], Northeast 92.8% [128 of 138]; $P < .05$). Midwest physicians were also less likely to leave town (Midwest 1.4% [2 of 152], West 2.6% [2 of 80], Southeast 5.2% [5 of 118], Northeast 4.3% [6 of 138]; $P < .05$) and were more likely to respond if they felt their health may be at risk in a flu outbreak (Midwest 82.2% [122 of 152], West 73.8% [59 of 80], Southeast 63.6% [75 of 118], Northeast 68.1% [94 of 138]; $P < .05$).

All participants with children, excluding those who did not have children in the home, were less likely to work during a natural disaster (TABLE 3). Respondents with

children were more likely to bring their family to work during a natural disaster. This was statistically significant for the overall sample as well as for each region.

Respondents with children in all regions, except the West, were also more likely to stay at home during a natural disaster. Respondents with children residing in the Northeast were less likely to work during an explosion if they felt their personal safety was at risk. Combining all regions, respondents without children were more likely to work during an unconfirmed nuclear disaster; however, that statistical difference was not found separately in any of the regions.

Factors Affecting Willingness to Respond Overall, the 3 most important factors affecting response rates were, in decreasing order, concern for their family, duty to care, and availability of personal protective equipment. These were also the top 3 factors when responses were broken down by type of responder or by region. When asked to choose the single most important factor, participants overwhelmingly chose family, regardless of location, age, or faculty/resident status.

The least important factor across all participants was lack of compensation for the additional work. Following compensation, concern for the physician's personal property and concern for pets were also unlikely to affect the decision to respond. FIGURE 2 delineates the importance, or lack thereof, for each factor.

Disciplinary Action Participants overall felt that, for a conventional explosion, a natural disaster, or a novel flu outbreak, the most appropriate disciplinary action for residents who fail to report for duty would be an informal meeting with the residency program director. Most physicians felt that no disciplinary action was needed for residents unwilling to report for duty during a nuclear disaster. Respondents from the Northeast region were more

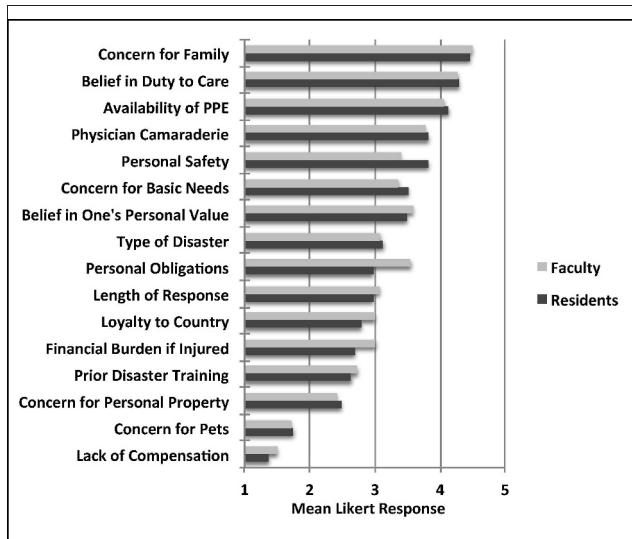


FIGURE 2 | **FACTORS AFFECTING WILLINGNESS TO RESPOND**

Faculty and residents rated each factor on a modified Likert scale (1 = not important, 5 = extremely important).

likely to discipline their residents than were participants from the West. TABLE 4 shows responses regarding disciplinary action overall as well as separately for faculty and residents.

Discussion

This study is the first, to our knowledge, to examine potential differences in EM physician response by resident physicians versus faculty physicians, by sex, and by region, and to explore physicians' perspective about whether resident physicians who fail to report for duty during a mass casualty event should be disciplined. We surveyed EM faculty and residents because they are the front line for such events. Although it would be speculative to apply our data to residents in other specialties, our findings may give program directors and institutional officials impetus to more formally assess their mass casualty capabilities.

The scenario that achieved the lowest response rate was the natural disaster, with about half of the respondents willing to report for duty. This is contrary to the available data, which show that only nuclear or biologic disasters typically yield that low of a response rate.^{2,5,14} Although questions were worded to assess willingness, some of the participants may have factored in ability when answering the survey. In 2005, Qureshi et al⁴ investigated the difference between willingness and ability, finding that respondents were more willing to work during a natural disaster than they were during a nuclear disaster but were less able to do so.

Based on our results, we identify 3 important points regarding health care emergency management.

First, there is the persistent gap in disaster training. Although overall training has increased during the past 15 years^{7,8} and has even been incorporated into the Model of the Clinical Practice of Emergency Medicine,¹⁵ more than 40% of participants (231 of 488; 47.3%) indicated they have not had formal disaster training. This gap also may reflect a lack of recall of effective disaster training because current methods have not proven to be beneficial.¹⁶ We would expect that to be true not only in emergency medicine but also in other specialties.

Second, we suggest there would be benefit in focusing components of formal disaster training on factors that have been shown to affect response. Similar to other studies,^{2,4,5,17–22} we found themes motivating response rates, including concern for family, personal safety, availability of protective equipment, and sense of duty. Providing training on how to address and mitigate the obstacles involving family concerns and personal safety might be as useful as training on incident command structures and triage.

Third, we identify an apparent deficit in institutional preparation that relates to the provision for, and protection of, health care professionals' families. There is a paucity of training for hospital leadership on how to create safe and effective environments of care that facilitate provider response before a disaster strikes.^{5,17,23} Although several studies reveal a recurring pattern of obstacles across many types of providers, few hospitals have incorporated those recommendations into their policies and disaster-mitigation planning.^{2,17,24–26}

We were somewhat surprised by the responses suggesting little or no ramifications for residents who fail to report to duty during a disaster. An individual's unwillingness to work places an added burden on colleagues who do respond. Anecdotally, few residency programs have clearly defined the expectations for physician learners and faculty, although curricula have expanded in the past several years.^{6,23,25} Obviously, without such expectations as a starting point, disciplinary action against residents would not be appropriate.

Our study has several limitations. First, we used hypothetical scenarios, and our responses may not reflect physicians' actions when faced with real situations. Second, our convenience sampling of residencies attempted to incorporate a wide geographic mixture but may not truly have reflected potential regional differences. Three participating sites had response rates below the targeted 70%, yet only 1 of those sites had a response rate below 50% (29.1% for residents and 46.7% for faculty). Because of the anonymous nature of the survey, we were unable to further characterize features of nonresponders. It is possible that a self-selection bias may have been present, with participants who responded being more likely to respond in a real disaster.

TABLE 4 ATTITUDES REGARDING DISCIPLINARY ACTION: ALL REGIONS AND PARTICIPANTS^a

Disciplinary Action Type	Conventional Explosion, %	Natural Disaster, %	Nuclear Disaster, %	Novel Flu Outbreak, %
All participants				
None	17.8	23.6	32.2	14.8
Informal PD meeting	34.8	38.3	30.5	33
PD meeting with paper trail	24.2	17	16.6	23.8
Formal letter	4.3	2.7	2	7
Restriction of moonlighting	3.3	1.4	0.6	1.4
Probation	2.9	2.3	1.6	4.1
Termination	0.4	0	0	0.8
Other	6.4	9.0	7.6	6.8
No answer	5.9	5.7	8.8	8.4
Residents (all regions)				
None	19.3	23.6	38.2	17.4
Informal PD meeting	44	46.7	34.4	41.7
PD meeting with paper trail	18.1	10.8	9.7	16.2
Formal letter	3.5	1.9	1.5	6.9
Restriction of moonlighting	3.9	0.8	0.4	1.2
Probation	3.5	2.3	1.5	3.5
Termination	0.4	0	0	0.4
Other	0	7.7	5.4	4.6
No answer	7.3	6.2	8.9	8.1
Faculty (all regions)				
None	16.2	23.6	25.3	11.8
Informal PD meeting	24.5	28.8	26.2	23.1
PD meeting with paper trail	31	24	24.5	32.3
Formal letter	5.2	3.5	2.6	7
Restriction of moonlighting	2.6	2.2	0.9	1.7
Probation	2.2	2.2	1.7	4.8
Termination	0.4	0	0	1.3
Other	13.5	10.5	10	9.2
No answer	4.4	5.2	8.7	8.7

Abbreviation: PD, program director.

^aResults are percentages of answers favoring that particular disciplinary action, with bolded numbers being the most commonly chosen action for each type of disaster.

Conclusion

Our findings showed that one-half of responding EM physicians had formal disaster training. The EM residents and faculty's willingness to respond to 4 hypothetical disaster scenarios ranged from 54.1% to 94.2%. Across all locations,

sex, and faculty/resident levels, concern for family members' welfare was the most important factor affecting response rates. New training curricula should address how to mitigate challenges surrounding dependent care, how to provide safe environments of care, and physicians' professional obligations.

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