

Evaluation of an Online Educational Intervention to Increase Knowledge and Self-efficacy in Disaster Responders and Critical Care Transporters Caring for Individuals with Developmental Disabilities

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ABSTRACT

Objective: Disability-related education is essential for disaster responders and critical care transporters to ensure positive patient outcomes. This pilot study evaluated the effect of an online educational intervention on disaster responders and critical care transporters' knowledge of and feelings of self-efficacy about caring for individuals with developmental disabilities.

Methods: A 1-group, pretest-posttest, quasi-experimental design was used. A convenience sample of 33 disaster responders and critical care transporters participated.

Results: Of the 33 participants, only 24% had received prior education on this topic, and 88% stated that such education would be beneficial to their care of patients. Nineteen participants completed both the pretest and posttest, and overall performance on knowledge items improved from 66% correct to 81% correct. Self-efficacy for caring for developmentally disabled individuals improved, with all 10 items showing a statistically significant improvement.

Conclusion: Online education is recommended to improve the knowledge and self-efficacy of disaster responders and critical care transporters who care for this vulnerable population after disasters and emergencies. (*Disaster Med Public Health Preparedness*. 2019;13:677–681)

Key Words: disaster medicine, disaster planning, emergency preparedness, emergency responders, vulnerable populations

As the past several decades of research have demonstrated, disasters particularly affect the poorest and most marginalized people, while at the same time exacerbating vulnerabilities and social inequalities and harming economic growth.¹ The prevalence of developmental disabilities appears to be increasing. For example, over 12 years, the frequency of developmental disabilities among children has increased from 12.84% to 15.04% of the US population. In 2008, 1 in 6 children in the United States was reported to have a developmental disability.² This increase in frequency among children will lead to a corresponding increase among adults. In 2010, 1.2 million adults (0.5%) had an intellectual disability and 944 000 (0.4%) adults had other developmental disabilities such as cerebral palsy or autism.³ Those with physical disabilities can be at risk during an evacuation if assistance is not available.

PURPOSE OF THE PILOT STUDY

An estimated 200 000 people with disabilities were evacuated from New Orleans after Hurricane Katrina

in 2005. Of these, 13 000 were reported to have developmental disabilities.⁴ Just like evacuees without disabilities, disabled evacuees were moved throughout the country and were left without their medications, equipment, medical records, and other needed supplies. More recently, research on this topic has begun to emerge. The online program Rescue-D, which uses scenarios and simulations, can be an effective means of making disability-related training available to a wide variety of emergency responders across geographically disparate areas.⁵ The pilot study presented here adds to the literature regarding what type of education is useful and how to deliver it to responders in the most acceptable way.

METHODS

Online Educational Intervention

The state of New Jersey mandates that all emergency responders complete an online training program titled DO NO HARM—Developmental Disabilities Awareness Training for NJ First Responders.⁶ This course was developed by the Rutgers University Office of

Continuing Professional Education. Using photos and video clips of realistic scenarios, the course introduces first responders to the challenges of interacting with someone with developmental disabilities and recommends approaches for a successful encounter. It explains, for example, that a person with a developmental disability may respond to questions and instructions without understanding them and may take everything said literally. First responders are encouraged to use simple, direct language and avoid jargon and expressions that can have more than one meaning.

The DO NO HARM program has 3 sections designed around the following objectives: (1) understanding basic information about people with developmental disabilities and their potential difficulties with communication, learning, comprehending, and responding; (2) quickly identifying individuals who may have developmental disabilities in order to take appropriate actions to protect the individual and care providers; and (3) learning strategies to interact appropriately and safely with people with developmental disabilities in various emergency situations. This program was adopted by the University of Colorado, with removal of state-specific information, and instituted as training for the state's emergency medical technicians and first responders.⁷ With permission from Rutgers and the University of Colorado, the DO NO HARM course was the online intervention used for this pilot study.

Participants

Convenience sampling was used to obtain disaster responders who were employed with Carolinas MED-1,⁸ a mobile emergency department designed to provide comprehensive patient care at the site of a disaster or other mass casualty incident, and critical care transporters who were employed with MedCenter Air,⁹ a critical care transport team that operates a fleet of fixed wing, rotary wing, and ambulance transport modes to offer rapid patient transport and support for emergency medical services responders throughout a regional area. Inclusion criteria comprised the ability to read and understand English, over 18 years of age, employment with Carolinas MED-1 or MedCenter Air, and work as a disaster responder or critical care transporter.

The initial recruitment email was sent to 194 eligible individuals and included a link to the online study site in Qualtrics.¹⁰ The email also informed potential participants that the study would collect demographic data and pretest and posttest results and would include an online educational intervention. Potential participants were notified that the Qualtrics website would be open for participation and data collection for 4 weeks. To help recruit adequate sample, nursing and emergency medical services continuing education hours (1.0 hours) were awarded and participants were able to enter to win one of five \$50 gift cards after all elements of the study were completed.

Of the eligible individuals that were contacted, 33 provided consent to participate (17% response rate) and completed the demographic questionnaire and pretest. Nineteen individuals, referred to as *completers*, completed the posttest and wrap-up survey. Demographic data on all 33 consenting participants were analyzed. The impetus for this study stemmed from a lack of literature on how many disaster responders and critical care transporters receive education on caring for developmentally disabled individuals or desire to receive this education. These data are important because they could provide evidence of the need to offer education on this topic in the future. However, to evaluate for statistically significant changes in knowledge and self-efficacy, only the 19 completers were included in analysis as data from both the pretest and the posttest were needed to detect changes. The pretest and posttest surveys were administered immediately before and after the online educational intervention.

Data Collection and Measurement

Statistical Package for the Social Sciences Software (SPSS)¹¹ was used for all quantitative data analyses. Participants who provided informed consent were asked to complete 4 components in the online Qualtrics study site:

1. *Pretest*. The pretest obtained general demographic information (12 items) and measured baseline knowledge (14 items) and self-efficacy (10 items). Estimated time = 15 minutes.
2. *Online educational intervention*. The participant accessed the online educational intervention via the Qualtrics website or through a provided hyperlink. Estimated time = 45 to 60 minutes, depending on the extent of online interactivity by the participant.
3. *Posttest*. The posttest contained identical knowledge and self-efficacy items as the pretest. Estimated time = 15 minutes.
4. *Wrap-up (satisfaction) survey*. This survey addressed the participants' satisfaction and feedback regarding the process of the project (6 quantitative items and 3 qualitative items). Estimated time = 10 minutes.

RESULTS

On the demographic survey, 73% of participants reported that they have cared for more than 16 individuals with developmental disabilities in their health care career, while only 24% had received education in their academic program on the subject of caring for individuals with developmental disabilities in emergency or disaster situations. A total of 76% of participants reported that they either did not receive or do not recall receiving education in their academic programs on this subject. In addition, 88% of participants indicated that they believe that education regarding caring for individuals with disabilities after a disaster would be of benefit to them while only 12% said they do not want the education or are undecided.

TABLE 1

Knowledge Items Pretest and Posttest Results with Paired *t* Tests

		Paired Differences							
		Mean	Std Dev	Std Error Mean	95% Confidence Interval of the Difference		<i>t</i>	<i>df</i>	Sig. 2-Tailed
					Lower	Upper			
Item 1	pretest1–posttest1	–0.105	0.315	0.072	–0.257	0.047	–1.455	18	0.163
Item 2	pretest2–posttest2	–0.105	0.737	0.169	–0.461	0.250	–0.622	18	0.542
Item 3	pretest3–posttest3	–0.158	0.958	0.220	–0.620	0.304	–0.718	18	0.482
Item 4	pretest4–posttest4	–0.368	0.597	0.137	–0.656	–0.081	–2.689	18	0.015*
Item 5	pretest5–posttest5	0.053	0.705	0.162	–0.287	0.392	0.325	18	0.749
Item 6	pretest6–posttest6	–0.105	0.315	0.072	–0.257	0.047	–1.455	18	0.163
Item 7	pretest7–posttest7	–0.842	1.119	0.257	–1.381	–0.303	–3.281	18	0.004*
Item 8	pretest8–posttest8	–0.684	0.946	0.217	–1.140	–0.228	–3.153	18	0.006*
Item 9	pretest9–posttest9	0.316	0.749	0.172	–0.045	0.677	1.837	18	0.083
Item 10	pretest10–posttest10	–0.474	0.841	0.193	–0.879	–0.068	–2.455	18	0.025*
Item 11	pretest11–posttest11	–0.053	0.229	0.053	–0.163	0.058	–1.000	18	0.331
Item 12	pretest12–posttest12	0.105	0.315	0.072	–0.047	0.257	1.455	18	0.163
Item 13	pretest13–posttest13	–0.211	0.631	0.145	–0.514	0.093	–1.455	18	0.163
Item 14	pretest14–posttest14	0.211	0.918	0.211	–0.232	0.653	1.000	18	0.331

*Statistically significant change ($P < .05$).

Knowledge Items

Knowledge data were collected from identical items administered in the pretest and posttest, and only the results of the 19 completer participants were included in the analysis. Each individual knowledge item was assessed for mean scores (percent correct) and statistically significant changes. The results of the pretest and posttest showed that overall knowledge improved from 66% correct to 81% correct, which indicates an increase in overall knowledge. Table 1 shows the paired *t* test results for each knowledge item. Results showed that while 12 of the 14 knowledge questions showed an increase in percentage correct from the pretest to the posttest, there were statistically significant changes ($P < .05$) for 4 of these items.

Self-efficacy Items

The participants were administered 10 items that used 5-point Likert scale ranging from 1, strongly agree, to 5, strongly disagree, that measured their self-reported confidence level for caring for individuals with developmental disabilities. These items were identical on the pretest and posttest to measure significant changes, and data from the 19 completer participants were used in the analysis. Results revealed an increase in overall percentage of agree and strongly agree on all 10 items, from 53% on the pretest to 92% on the posttest, indicating an increase of 39% in responses showing agreement with self-efficacy. Paired *t* tests were used to determine if these changes were statistically significant. Table 2 shows that the changes were statistically significant ($P < .05$) for all 10 items.

Wrap-up Survey—Participant Satisfaction

After completing the posttest, participants completed the wrap-up survey to evaluate their satisfaction with the course. This

survey consisted of 6 Likert-scale and 3 open-ended items. Most participants (94.73%) agreed or strongly agreed that the videos used in the online educational intervention were helpful and effective. All (100%) reported that the online educational intervention provided them with a variety of learning activities to promote their learning on how to care for individuals with developmental disabilities, and all reported that the materials presented in the online educational intervention were motivating and helped them to learn. All (100%) of the participants reported that the online educational intervention increased their ability to identify individuals with developmental disabilities and 94.74% felt more prepared to appropriately care for an individual with developmental disability during a disaster response or critical care transport situation after completing the online educational intervention. The majority (94.74%) indicated that, given the opportunity to complete a course like this again on another educational topic, they would.

DISCUSSION

The pilot study has demonstrated that (1) education is lacking and needed for caring for the developmentally disabled community after a disaster, (2) disaster responders and critical care transporters who participated in this pilot study were receptive to online education, (3) online education can improve the knowledge and self-efficacy levels of disaster responders and critical care transporters related to caring for individuals with developmental disabilities, and (4) this method of education has the potential to educate larger numbers of individuals in this population.

Limitations

Limitations of this pilot study were lack of a prior power analysis and the small sample size. Efforts were made to recruit participants and 33 enrolled in the pilot study; however, only

TABLE 2

Self-efficacy Items Pretest and Posttest Results with Paired *t* Tests

		Paired Differences					<i>t</i>	<i>df</i>	Sig. 2-Tailed
		Mean	Std. Dev	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Item 1	pretest1 – posttest1	0.263	0.452	0.104	0.045	0.481	2.535	18	0.021*
Item 2	pretest2 – posttest2	0.316	0.582	0.134	0.035	0.596	2.364	18	0.030*
Item 3	pretest3 – posttest3	0.789	0.918	0.211	0.347	1.232	3.750	18	0.001*
Item 4	pretest4 – posttest4	1.105	1.049	0.241	0.600	1.611	4.595	18	0.000*
Item 5	pretest5 – posttest5	0.684	0.820	0.188	0.289	1.079	3.637	18	0.002*
Item 6	pretest6 – posttest6	0.579	0.838	0.192	0.175	0.983	3.012	18	0.007*
Item 7	pretest7 – posttest7	0.316	0.478	0.110	0.086	0.546	2.882	18	0.010*
Item 8	pretest8 – posttest8	0.684	0.749	0.172	0.323	1.045	3.980	18	0.001*
Item 9	pretest9 – posttest9	1.000	1.106	0.254	0.467	1.533	3.943	18	0.001*
Item 10	pretest10 – posttest10	1.105	0.875	0.201	0.683	1.527	5.504	18	0.000*

*Statistically significant change (*P* < .05).

19 completed the posttest, possibly because of the length of time required for the online educational intervention. Another limitation was the use of measurement surveys that had not been previously tested. Although the items were reviewed by individuals with content expertise, it is recommended that future research on the development of valid tools related to this topic be conducted. The posttest was administered immediately after the online educational intervention in an effort to prevent participation attrition. Long-term changes in knowledge and self-efficacy were not evaluated, which is also a limitation of this pilot study. The 1-group design and absence of a control group was an additional study limitation and it is possible that posttest responses were influenced by exposure to the same items on the pretest.

Future Research

While the pilot study indicated a variety of educational backgrounds (from high school diploma to doctorate), the data were not analyzed to determine if responses varied according to different educational backgrounds. Future studies may attempt to specify educational backgrounds and survey the learners' educational needs prior to implementation and study. It is recommended that future research related to online education on this topic include a larger participant pool. Redesign of the online educational intervention should be considered due to participants' feedback regarding the length of program, with shorter educational offerings recommended.

An additional future research recommendation includes the need to study the long-term changes in knowledge and self-efficacy gained from this intervention. This could be accomplished by administering additional posttests at varying times. It is also recommended to study patient outcomes to determine if individuals with developmental disability receive different and/or improved care as a result of the education. Results demonstrate that online education has the potential to improve knowledge on this topic.

CONCLUSION

As the developmentally disabled population increases, the need for education on caring for this population also increases. Online educational interventions focused on disaster responders and critical care transporters that use photos and video clips of realistic scenarios can increase the knowledge and confidence levels of these health care professionals in a nonthreatening environment that can provide feedback and repetition for a successful outcome prior to exposure to real world situations. The disaster responders and critical care transporters are then able to respond to this vulnerable population and care for them appropriately by not treating them as a different population but as part of the larger community with unique needs.

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REFERENCES

- Mitchell T, Guha-Sapir D, Hall J, et al. Setting, measuring and monitoring targets for reducing disaster risk: recommendations for post-2015 international policy frameworks. Overseas Development Institute. <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9215.pdf>. Published October 2014. Accessed May 8, 2017.

2. Boyle C, Boulet S, Schieve L, et al. Trends in the prevalence of developmental disability in US children, 1997-2008. *Pediatrics*. 2011;127(6):1034-1042.
3. US Bureau of the Census. <http://www.census.gov/content/dam/Census/library/publications/2012/demo/p70-131.pdf>. Published 2010. Accessed May 8, 2017.
4. National Council on Disability. Quarterly Meeting: People with Disabilities and Emergency Management; January 2008; Washington, DC. https://nacd.gov/system/files_force/Documents/Quarterly%20Meeting-%20People%20with%20Disabilites%20and%20Emergency%20Mgmt%202008.pdf?download=1. Published January 29, 2008. Accessed May 8, 2017.
5. Wolf-Fordham SB, Twyman JS, Hamad CD. Educating first responders to provide emergency services to individuals with disabilities. *Disast Med Public Health Prep*. 2014;8(6):533-540.
6. The State of New Jersey Department of Health and Senior Services. DO NO HARM—Developmental Disabilities Awareness Training for NJ First Responders. <https://njlmn.njlincs.net/cdr/DD/course/player.html>. Published 2008. Accessed May 8, 2017.
7. The University of Colorado—JFK Partners. Developmental Training for First Responders. <http://www.ucdenver.edu/academics/colleges/medical-school/programs/JFKPartners/educationtraining/onlinecourses/Documents/Developmental%20Disabilities%20for%20First%20Responders/player.html>. Published 2017. Accessed May 9, 2017.
8. Carolinas MED-1. Carolinas HealthCare System Mobile Medicine. www.carolinasmed-1.org. Published 2016. Accessed May 9, 2017.
9. MedCenter Air. Carolinas HealthCare System Mobile Medicine. www.medcenterair.com. Published 2016. Accessed May 9, 2017.
10. Qualtrics [computer program]. Version Jan 2018. Provo, UT: Qualtrics; 2018.
11. *Statistical Package for the Social Sciences* [computer program]. Version 23 for MacOS. Chicago, IL: SPSS Inc; 2015.