

School of Brown University, Providence, Rhode Island; 3. Department of Epidemiology and Infection Control, Rhode Island Hospital, Providence, Rhode Island.

Address correspondence to Leonard A. Mermel, DO, ScM, Division of Infectious Diseases, Rhode Island Hospital, 593 Eddy Street, Providence, RI 02903 (lmermel@lifspan.org).

*Infect Control Hosp Epidemiol* 2013;34(6):653-655

© 2013 by The Society for Healthcare Epidemiology of America. All rights reserved. 0899-823X/2013/3406-0024\$15.00. DOI: 10.1086/670642

## REFERENCES

1. Lucado J, Gould C, Elixhauser A. *Clostridium difficile* infections (CDI) in hospital stays. Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality. Statistical brief 124. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb124.pdf>. Accessed January 31, 2013.
2. National and regional estimates on hospital use for all patients from the HCUP Nationwide Inpatient Sample (NIS). Agency for Healthcare Research and Quality website. <http://www.hcup-us.ahrq.gov/db/nation/nis/nissummstats.jsp>. Accessed January 31, 2013.

## Hospital Flood Preparedness and Flood-Related Psychological Consequences in 15 Provinces in Central Thailand after Implementation of a National Guideline

*To the Editor*—Severe flooding occurred in central Thailand during the period September–November 2011, which resulted in the closure of more than 30 regional hospitals.<sup>1</sup> A national guideline for hospital preparedness after flooding was made available in Thailand on May 14, 2012. From May 15, 2012, through June 30, 2012, there were several meetings to promote this national guideline for hospital flood preparedness. To evaluate hospital preparedness as well as to assess the psychological impact of floods among infection preventionists (IPs) in the initial 6-month interval after flooding, we conducted a survey designed by A.A. and T.K. This survey included questions about hospital personnel with infection control expertise, hospital characteristics, hospital preparedness plans developed to deal with the aftermath of flooding, administrative support, the institutional safety culture, and the psychological impact of the flood (eg, depression, depressive disorder, and insomnia) among IPs. All 104 secondary (100 or more beds) and tertiary care hospitals (250 or more beds) in 15 central Thailand provinces were invited to participate on the basis of a hospital list from the Ministry of Public Health. Between July 1, 2012, and October 31, 2012, we identified all hospitals that met the inclusion criteria in 15 provinces of central Thailand that were affected (but not necessarily closed) by extensive floods ( $n = 104$ ) for site visit interview. A 1-hour interview was conducted by research

nurses to the chief of IPs in each participating hospital. To minimize ascertainment and reporting bias, three 3-hour training sessions were conducted (by A.A.) to instruct the 5 research nurses on the survey tool and data collection processes. The survey instrument was pilot tested in 10 hospitals to ensure test validity. All 5 research nurses individually interviewed the same person at these 10 hospitals, and reliability checks were performed; 100% concordance in data capture was achieved.

Definitions of hospital characteristics were modeled from our previous report.<sup>2</sup> Institutional safety culture was measured by a 2-matrix safety score, calculated as the average of responses for agreement with 2 statements: “Leadership is driving us to be a safety-centered institution” and “I would feel safe being treated here as a patient.”<sup>3,4</sup> Administration support was categorically ranked as poor, fair, good, very good, and excellent. Definitions of depression and post traumatic stress disorder (PTSD) were previously described.<sup>5,6</sup> Descriptive characteristics were used to describe the hospital preparedness plan developed to deal with the aftermath of flooding. This study was approved by the institutional review board of the Faculty of Medicine, Thammasat University, Pathumthani, Thailand.

A total of 101 (97.1%) of 104 eligible hospitals responded to the survey (69 [69%] were not flooded, and 32 [31%] were damaged by the flood). Among the responding hospitals, 55 (55%) had 1 or more infectious diseases specialist, 46 (46%) had 1 or more hospital epidemiologist, 65 (65%) reported good to excellent support of the infection control programs from hospital administration, and 40 (40%) were affiliated with a medical school. The median amount of time that the respondents had been in their current position was 9 years (range, 3–30 years), and the median institutional safety score was 7 (range, 2–10). Overall, the major gaps in flood preparedness plan during floods were (1) lack of an environmental cleaning and fungal decontamination protocol (26 [81%] of 32), (2) lack of surge capacity plans for patients and family (21 [66%] of 32), and (3) lack of exercise drill of flood protocol (16 [50%] of 32). Obstacles related to hospital flood preparedness and improvement after flooding among 32 hospitals that were affected by major flooding are shown in Table 1. Overall, at the initial 6-month interval, 20 (63%) of 32 lead IPs in the flood-affected hospitals complained of having some psychological consequence related to the floods (eg, PTSD, depression, inability to concentrate, insomnia, and having difficulties with family relationships). Notably, 5 (20%) of the 20 lead IPs met the definition of PTSD, and 3 (15%) met the definition of depression, whereas 12 (60%) of the lead IPs complained of having some psychological consequences related to floods (difficulties with family relationship [ $n = 6$ ], insomnia [ $n = 3$ ], and inability to concentrate [ $n = 3$ ]).

In this follow-up survey, several gaps identified during the flooding (eg, surge capacity plans for patients and staff, plan

TABLE 1. Reported Obstacles Related to Hospital Flood Preparedness (HFP) Plan and HFP Improvement after Flooding among Infection Preventionists at 32 Flooded Hospitals

Hospital flood preparedness plan	No. (%) of hospitals	
	Lack of adequate plans during flood (n = 32)	Plan improved 6 months after flood (n = 8)
Flood protocol	8 (25)	8/8 (100)
Exercise or drill of flood protocol	16 (50)	16/16 (100)
Protocol to help hospital personnel and families during and after flood	15 (47)	6/15 (40)
Stockpile of PPE for use	6 (19)	5/6 (83)
Protocol for appropriate PPE use	5 (16)	3/5 (60)
Surge capacity plans	21 (66)	11/21 (52)
Plans for opening flood-unaaffected units for use	3 (9)	2/3 (67)
Environmental cleaning and fungal decontamination protocols	26 (81)	17/26 (65)
Plans for operating isolation units	10 (31)	5/10 (50)
Plans for operating clinical laboratories	3 (9)	2/3 (67)
Protocol for equipment disinfection and sterilization	8 (25)	7/8 (88)
Protocol to mitigate odor	18 (56)	7/18 (39)
Protocol for waste management	5 (16)	4/5 (80)
Administration support	3 (9)	2/3 (67)

NOTE. PPE, personal protection equipment.

for environmental cleaning, and fungal decontamination protocols) were significantly improved by 50%–100% after implementation of the national guideline for hospital flood preparedness. We also identified that this major flood had significant psychological consequences for lead IPs. Additional studies to rigorously evaluate the magnitude of these consequences after major flooding would bolster efforts to improve hospital flood preparedness in developing countries and elsewhere.

#### ACKNOWLEDGMENTS

**Financial support.** This study was supported by the National Research University Project of the Thailand Office of Higher Education Commission (to A.A. and T.K.).

**Potential conflicts of interest.** All authors report no conflicts of interest relevant to this article. All authors submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and the conflicts that the editors consider relevant to this article are disclosed here.

**Anucha Apisarntharak, MD;<sup>1</sup>**  
**Thana Khawcharoenporn, MD, MSc;<sup>1</sup>**  
**Keith F. Woeltje, MD, PhD;<sup>2</sup>**  
**David K. Warren, MD, MPH<sup>2</sup>**

Affiliations: 1. Division of Infectious Diseases, Faculty of Medicine, Tham-

masat University, Pathumthani, Thailand; 2. Division of Infectious Diseases Washington University School of Medicine, St. Louis, Missouri.

Address correspondence to Anucha Apisarntharak, MD, Division of Infectious Diseases, Faculty of Medicine, Thammasat University, Pathumthani, Thailand 12120 (anapisarn@yahoo.com).

*Infect Control Hosp Epidemiol* 2013;34(6):655–656

© 2013 by The Society for Healthcare Epidemiology of America. All rights reserved. 0899-823X/2013/3406-0025\$15.00. DOI: 10.1086/670643

#### REFERENCES

- 2011 Thailand floods. [http://en.wikipedia.org/wiki/2011\\_Thailand\\_floods](http://en.wikipedia.org/wiki/2011_Thailand_floods). Accessed April 20, 2012.
- Apisarntharak A, Khawcharoenporn T, Woeltje K, Warren DK. Hospital flood preparedness: a survey of 15 provinces in central Thailand. *Infect Control Hosp Epidemiol* 2012;33:953–954.
- Krein SL, Kowalski CP, Damschroder L, Forman J, Kaufman SR, Saint S. Preventing ventilator-associated pneumonia in the United States: a multicenter mixed-methods study. *Infect Control Hosp Epidemiol* 2008;29:933–940.
- Saint S, Kowalski CP, Kaufman SR, et al. Preventing hospital-acquired urinary tract infection in the United States: a national study. *Clin Infect Dis* 2008;46:243–250.
- Westen D, Malone JC, DeFife JA. An empirically derived approach to the classification and diagnosis of mood disorders. *World Psychiatry* 2012;11:172–180.
- Carlier IV, Lamberts RD, Van Uchelen AJ, Gersons BP. Clinical utility of a brief diagnostic test for post traumatic stress disorder. *Psychosom Med* 1998;60:42–47.