

## Cross-Sectional Survey of Physicians on Providing Volunteer Care for In-Flight Medical Events

Eric Chatfield; William F. Bond; Bradley McCay; Claude Thibeault; Paulo M. Alves; Marc Squillante; Joshua Timpe; Courtney J. Cook; Raymond E. Bertino

- BACKGROUND:** Airline carriers have equipment, procedures, and protocols in place to handle in-flight medical events (IFMEs). Community physicians may be asked for aid during IFMEs. *Cross-Sectional Survey of Physicians on Providing Volunteer Care for In-Flight Medical Events* surveyed self-assessed awareness and knowledge, perceived barriers, and suggestions for improving responses to IFMEs.
- METHODS:** We composed a survey regarding clinicians' self-assessed understanding of in-flight resources, procedures, flight environmental issues, and Good Samaritan protections. The survey was distributed primarily via electronic mail to medical staff list serves to a total of approximately 1300 physicians representing 2 health networks that serve urban, suburban, and rural areas in both inpatient and outpatient settings.
- RESULTS:** Total number of responses was 418. Physician response rate was 29.2% (379/1300). In 3% (39/1300), the responder either failed to indicate their background or was another type of health care professional (e.g., dentist, medical student, physician assistant). Of the physicians, 37.5% (142/379) were primary care and 42% (177/418) of responders reported at least one experience of being asked to volunteer. When asked how well they understand the protocols with which medical events are handled, 64% (262/412) responded "not at all" and 23% (94/412) reported "a little" knowledge. Only 56% (223/397) answered that 75% or more of U.S. flights have ground medical support available. There were 73% (298/411) who believed airlines were required to have medical supplies, but 54% (222/410) reported no knowledge of supplies available. A total of 69% (279/403) believed or were sure that the U.S. has a Good Samaritan law that applies to IFMEs.
- DISCUSSION:** Many physicians lack basic knowledge about IFMEs. Responders may assist more effectively if better informed about protocols and the availability of ground medical support. Education and timely information support are recommended.
- KEYWORDS:** aerospace medicine, aviation medicine, wilderness medicine.

Chatfield E, Bond WF, McCay B, Thibeault C, Alves PM, Squillante M, Timpe J, Cook CJ, Bertino RE. *Cross-sectional survey of physicians on providing volunteer care for in-flight medical events*. *Aerospace Med Hum Perform*. 2017; 88(9):876–879.

Limited literature exists regarding in-flight medical events (IFMEs).<sup>7,15</sup> Most articles are anecdotal, relaying individual physician experiences on flights and the problems they faced.<sup>9,17</sup> Data and records kept by airlines on IFMEs are closely held and are not readily available.<sup>3</sup> The best available epidemiological evidence comes from a study of ground medical control calls by Peterson et al.,<sup>16</sup> which reported an estimated 44,000 IFMEs occur worldwide each year. They found an incidence of IFMEs of 1 per 604 flights with the most common medical problems being syncope or presyncope, respiratory symptoms, and nausea or vomiting.<sup>16</sup> This incidence was similar to the 1 per 753 inbound flights found in an older survey by Cummins et al.<sup>4</sup>

Physicians flying as commercial passengers may find themselves called upon to assist in an IFME. Providing assistance to patients in this setting may be daunting due to several factors, including physician specialty and training. In addition to the usual diagnostic challenges and limited patient history, there

From the OSF Saint Francis Medical Center, Peoria, IL, and the University of Illinois College of Medicine at Peoria (UICOMP); Peoria, IL.

This manuscript was received for review in February 2017. It was accepted for publication in May 2017.

Address correspondence to: Raymond Bertino, 427 W. Crestwood Dr., Peoria, IL 61614; [rebertino@comcast.net](mailto:rebertino@comcast.net).

Reprint & Copyright © by the Aerospace Medical Association, Alexandria, VA.

DOI: <https://doi.org/10.3357/AMHP.4865.2017>

may be uncertainty about the equipment, the impact of the in-air environment on the medical problem, the role of the cabin and flight crews and medical ground support,<sup>15</sup> and concern over possible legal implications of their medical decisions.<sup>6,8</sup> Physicians may not be aware of factors that go into choosing to land in an emergency and that ground medical support exists for assistance in decision-making.<sup>15</sup>

A recent multicenter survey of fourth year medical students found that prospective medical school graduates have a lack of knowledge in the area of IFMEs and do not feel prepared to respond to IFMEs.<sup>11</sup> No study has documented the level of comfort or knowledge community physicians have about the supplies available in flight or the resources that have been put in place to assist response to the events. Our study sought an understanding of physicians' basic knowledge of IFMEs, their comfort level in responding, and suggestions on what might improve physician experiences in responding to IFMEs.

## METHODS

This study was a cross-sectional survey investigation of community physicians' self-assessed knowledge and comfort levels in concerning IFMEs. The study was granted exempt status by the local Institutional Review Board.

The survey was performed using a web-based survey tool (SurveyMonkey®, Palo Alto, CA). We distributed a link to the survey using medical staff electronic mail address lists from the three local hospitals and the area medical society. The survey was distributed electronically to a total of approximately 1300 physicians, which represents the combined active medical staff sizes of the three local hospitals within two health networks. One of the local hospitals is a tertiary care level 1 trauma center, one is a level 2 trauma center, and the third smaller hospital has no trauma designation. The represented health networks serve urban, suburban, and rural areas in central Illinois with both inpatient and outpatient practice settings represented. Paper copies of the survey also were available in the physician's lounge at the three hospitals. Responses on the paper surveys were manually entered into the web-based survey tool for ease of analysis. The survey was administered from February 3 to March 9, 2014. There were two electronic reminders via email. To increase response rate, a monetary incentive was donated to one of the local hospital foundations as directed by the choice of each survey respondent.

A survey of 20 questions (including demographics and qualitative questions) was developed through a consensus discussion of the investigators, who include emergency physicians, physicians with IFME content expertise, and an aerospace medicine consultant. Several nonparticipant physicians were asked to read over the survey to ensure the questions were clear. Respondents were informed that the questions beyond the demographics pertained only to commercial flights in the United States.

Questions focused on the availability of medications, equipment, ground support, issues surrounding medical liability, and airline protocols. The questions primarily asked respondents to

self-assess their knowledge, with four questions constituting a more direct quiz-like assessment of their understanding. Questions that assessed confidence in their response did so by using five responses, with a neutral middle response. For example, the question "Is there a 'Good Samaritan' rule or law that protects you if you volunteer for an in-flight medical event?" gave the anchors "I am sure there is not," "I believe there is not," "not sure," "I believe there is," and "I am sure there is." (Note: There is a U.S. Federal Good Samaritan law that was written to specifically cover in-flight emergencies.) Results are presented as simple frequencies and percentages. The final questions asked whether the respondent had ever assisted in an in-flight event and what things might make the respondent more comfortable in assisting in an event.

## RESULTS

Approximately 1300 medical staff members were surveyed via email and paper with 418 responses, for an approximate response rate of 32%. Of the surveys returned, 379/418 (90.7%) were received from respondents who self-identified as physicians, including 142/379 (37.5%) who self-identified as primary care along with 48/379 (12.7%) medical and pediatric subspecialties. There were seven self-identified nonphysician responders (1.7%), including a medical student, two nurse practitioners, a dentist, a perfusionist, and two podiatrists. There were 32 responders (7.7%) who did not answer the question concerning medical specialty and it is possible that some of these may have been nonphysicians. The demographics of the respondents are listed in **Table I**. Of the respondents, 186/414 (45%) rarely or infrequently practiced in a high acuity area and 177/418 (42%) reported at least one experience of being asked to volunteer.

When asked how well they understand the protocols with which medical events are handled, 262/412 (64%) respondents said they were "not at all" aware how they are handled and 94/412 (23%) stated they had "a little" knowledge about them. Only 223/397 (56%) answered that 75% or more of U.S. flights have ground medical support available and 158/400 (40%) believed it was "often" or "always" possible to have direct telephone contact with ground medical support. (Note: Ground support is nearly always available except during certain high-risk communications times such as takeoff and landing, with direct conversations dependent upon aircraft communications technology.<sup>7</sup>) There were 182/405 (45%) who believed affirmatively or were sure that flight attendants were trained to stay with the physician during the IFME. (Note: Flight attendants are trained to remain present for assistance when possible.<sup>10</sup>)

A total of 298/411 (73%) believed or were sure airlines were required to have medical supplies, but 222/410 (54%) responded "I do not know" what medical supplies were available. (Note: Aeromedical equipment is not standardized across all airlines, though guidelines and minimal requirements for U.S. flights exist.<sup>5,13</sup>) Only 233/412 (56%) believed or were sure that automated external defibrillators (AEDs) were required on all flights within the United States (note: defibrillators are required<sup>5</sup>) and

**Table I.** Demographics.

PARAMETERS	RESPONDENTS N (%)
Physician specialty	Physician respondents only (N = 379)
Primary Care	142 (37.5)
Family Medicine	44 (11.6)
Internal medicine	48 (12.7)
Pediatrics	33 (8.7)
Medicine/pediatrics	17 (4.5)
Other (Administration, Anesthesiology, Occupational Health, Pathology, Physical Medicine, Psychiatry, Radiology)	69 (18.2)
Emergency Medicine	54 (14.3)
Medical & Pediatric Subspecialties	48 (12.7)
Surgical Subspecialties	33 (8.7)
General Surgery	14 (3.7)
Obstetrics & Gynecology	10 (2.6)
Neurology	9 (2.4)
Years post graduate	All respondents (N = 418)
0–4	100 (24.0)
5–9	62 (14.9)
10–15	54 (12.9)
15–20	34 (8.2)
>20	167 (40.0)
Flights per year since graduation of medical school	
<1	32 (7.7)
1–2	136 (32.8)
3–5	163 (39.3)
6–10	52 (12.5)
>10	32 (7.7)
Number of instances on a flight when a request for medical volunteers was made	
0	241 (57.7)
1	88 (21.1)
2–3	65 (15.6)
4–5	15 (3.6)
>5	9 (2.2)
Frequency of medical practice involving high acuity care	
Rarely if ever	103 (24.9)
Infrequently	83 (20.0)
Regularly but not frequently	72 (17.4)
Frequently	60 (14.5)
Very frequently	96 (23.2)

The number of respondents is listed on the right side of the graph. For the first question, which regarded specialty, it pertained only to those self-identified as physicians. The remaining questions include physicians, nonphysicians, and those who did not identify themselves as any category.

182/396 reported they were either “not familiar” or “not entirely comfortable” with using an AED.

Of the respondents, 153/398 (38%) correctly answered that the cabin is pressurized to 6000 to 8000 ft and 135/397 (34%) correctly answered that syncope was the most common IFME. There were 279/403 (69%) who believed or were sure that the United States has a Good Samaritan law that applies to IFMEs. A total of 222/403 (55%) believed or were sure they would be asked to document what had happened in the IFME (such documentation is optional, but encouraged for those transferring to additional care).

One of the final questions asked respondents to share in an open-ended text box format what would make them more comfortable during an event. Of the respondents, 99/418 (24%) did not respond to the question and 319/418 (76%) responded

in some fashion, with 259/418 (62%) giving a comment that was interpretable or could possibly be classified into a theme. Common responses were then grouped into themes by consensus discussion of the authors, and the frequencies of the themes were tallied and are listed in **Table II**.

## DISCUSSION

Our surveyed providers were uncertain regarding the procedures and protocols in place on commercial airliners to handle IFMEs. Lack of knowledge undoubtedly exacerbates that angst, or may be a source of it. There has been no prior attempt in the general physician population to objectively define where awareness and knowledge may be lacking. Improvement in physician knowledge about IFMEs and support protocols may increase physician comfort in responding to events, improve patient care and improve decision making regarding continuation or diversion of the flight, though that decision ultimately rests with the pilot.<sup>7,10</sup> Our survey helps define a baseline of current physician knowledge and may be helpful in determining what types of information and educational efforts may be valuable to the flying physician public.

Physicians should gain comfort in knowing there are a number of standard protocols in effect to make events run more smoothly. Certain medical equipment and medications, though not standardized, are available on U.S. commercial flights where a flight attendant is required, which can help stabilize a patient until the next course of action can be decided, including AEDs, oxygen, and epinephrine.<sup>14</sup> Cabin crews also undergo training to recognize events and provide basic assistance.<sup>10</sup> Over the last 10 years, all the major carriers in the United States have had access to ground support consisting of physicians and nurses with training in aviation medicine and experience in emergency medicine.<sup>15</sup> Ground support can then provide medical advice for the physician and help create plans for further care (most often relayed through the flight deck), including possible flight diversion and ambulance waiting at the airport for immediate transportation to appropriate facilities. In the United States, federal law via the 1998 Aviation Medical Assistance Act (which includes a Good Samaritan provision) provides protection against liability in the event of volunteer care

**Table II.** Common Responses\* for Improving Physician Comfort with Responding to In-Flight Medical Emergencies (IFMEs).

WHAT WOULD MAKE RESPONDENT MORE COMFORTABLE	NO. OF COMMENTS
Training	38
Other medical personnel on flight	20
Equipment/medications available	109
Knowledge regarding liability	53
Protocols/procedures for in-flight medical events	44
Knowledgeable cabin crew	25
General knowledge about in-flight medical events	38
Contact with ground support	27
Standardized equipment	4

\* Some respondents gave multiple answers across different categories.

during an emergency, except in cases of gross negligence or willful misconduct.<sup>2</sup>

A relatively simple change for this specific environment is promoting physician education. Airlines have already implemented many protocols and procedures, often under advisement from medical bodies that are familiar with the unique environment of air travel.<sup>12</sup> Familiarity with these protocols and procedures may help the traveling physician when events are encountered. In addition, real time information support through portable apps<sup>1</sup> and telemedicine, may also improve the handling of medical events.

There are limitations to our study. The first is a limited response rate, which may in turn limit the ability to generalize our findings. However, this represents a reasonable sample of physicians from a medium sized city and its surrounding area. A second concern is whether our physician cohort accurately represents the population of flying physicians in general. Emergency medicine physicians were somewhat over-represented in our survey population, making up 14% of the physician responders; this, however, would likely bias the results in favor of awareness and preparedness. With regard to flying frequency, the estimates seem to fit expected norms of travel several times a year for vacation and conferences. Identifiers within our population were also limited to length of practice since medical school graduation, frequency of flying, and medical specialty. Other factors such as age or region of training were not surveyed, which may influence general knowledge of in-flight events.

In conclusion, our study demonstrated uncertainty among a cohort of providers regarding the procedures and protocols IFMEs. Lack of knowledge likely results in discomfort when asked to assist in these events and may lead to poorer patient care. Our survey also offers a means to measure improvement in the knowledge of future healthcare professionals.

## ACKNOWLEDGMENTS

Technical Assistance: Elizabeth Holzwarth, Educational Program Assistant, Jump Trading Simulation, and Daniel Hammerton, Research assistant, Jump Trading Simulation.

Some of the authors were the creators of airRx, an IFME assistance app for medical providers. None are receiving any financial compensation from this app and the app is nonprofit.

This work was presented at the International Congress of Aviation and Space Medicine (ICASM), Mexico City, Mexico (2014), and the Annual Scientific Meeting of the Aerospace Medical Association (AsMA), Lake Buena Vista, FL (2015).

*Authors and affiliations:* Eric Chatfield, D.O., Asante Three Rivers Medical Center, Grants Pass, OR; William F. Bond, M.D., M.S., Department of Emergency Medicine and Jump Trading Simulation; OSF St. Francis Medical

Center, and University of Illinois College of Medicine at Peoria, Peoria, IL; Bradley McCay, M.D., Marc Squillante, D.O., and Joshua Timpe, M.D., Department of Emergency Medicine, and Courtney J. Cook, M.D., and Raymond E. Bertino, M.D., Department of Radiology, OSF St. Francis Medical Center, Peoria, IL; Claude Thibeault, M.D., Consultants Aeromed Inc., Bros-sard, Quebec, Canada; and Paulo M. Alves, M.D., MedAire/International SOS, Phoenix, AZ.

## REFERENCES

1. airRx App. Jump Trading Simulation and Education Center; 2016; Version 1.2.1 [Mobile application software]. Available from: <https://itunes.apple.com/us/app/airrx/id1031955544?mt=8>. <https://play.google.com/store/apps/details?id=org.osfhealthcare.airrx&hl=en>.
2. Aviation Medical Assistance Act of 1998. Pub. L. No. 105-170, 49th U.S. Congress, 44701: April 24, 1998. Federal Register: April 12, 2001 (Vol. 66, No. 71).
3. Chandra A, Conry S. In-flight medical emergencies. *West J Emerg Med*. 2013; 14(5):499–504.
4. Cummins RO, Schubach JA. Frequency and types of medical emergencies among commercial air travelers. *JAMA*. 1989; 261(9):1295–1299.
5. Federal Aviation Administration. Emergency medical equipment. Final rule. *Fed Regist*. 2001; 66(71):19028–19046.
6. Garneau WM, Harris DM, Viera AJ. Cross-sectional survey of Good Samaritan behaviour by physicians in North Carolina. *BMJ Open*. 2016; 6(3):e010720.
7. Gendreau MA, DeJohn C. Responding to medical events during commercial airline flights. *N Engl J Med*. 2002; 346(14):1067–1073.
8. Gross CP, Reisman AB, Schwartz MD. The physician as ambivalent Samaritan. *J Gen Intern Med*. 1998; 13(7):491–494.
9. Horton JC. In-flight emergency. *Ann Emerg Med*. 2015; 65(3):345.
10. International Air Transport Association. Medical Manual, 8th ed., revision 1. Montreal (Canada): International Air Transport Assoc.; 2016.
11. Katzer RJ, Duong D, Weber M, Memmer A, Buchanan I. Management of in-flight medical emergencies: are senior medical students prepared to respond to this community need? *West J Emerg Med*. 2014; 15(7):925–929.
12. Lyznicki JM, Williams MS, Deitchman SD, Howe JP 3rd. Council of Scientific Affairs, American Medical Assoc. Inflight medical emergencies. *Aviat Space Environ Med*. 2000; 71(8):832–838.
13. Medical Considerations for Airline Travel [Internet]. Alexandria (VA): Aerospace Medical Assoc.; 2014. [Accessed November 8, 2016]. Available from: <https://www.asma.org/publications/medical-publications-for-airline-travel/medical-considerations-for-airline-travel>.
14. Medical Emergencies. Managing in-flight medical events (guidance material for health professionals). Alexandria (VA): Aerospace Medical Assoc.; 2016:1–12.
15. Nable JV, Tupe CL, Gehle BD, Brady WJ. In-flight medical emergencies during commercial travel. *N Engl J Med*. 2015; 373(10):939–945.
16. Peterson DC, Martin-Gill C, Guyette FX, Tobias AZ, McCarthy CE, et al. Outcomes of medical emergencies on commercial airline flights. *N Engl J Med*. 2013; 368(22):2075–2083.
17. Stone MD, Lubarsky DA, Agarwal GC. Lessons learned during an in-flight medical emergency: case report and discussion. *J Travel Med*. 2014; 21(2):130–132.