

Managing the ESCAPE

Consider an active passenger safety briefing, plain-language commands and keeping cabin crewmembers in sight to speed an evacuation.

BY WAYNE ROSENKRANS

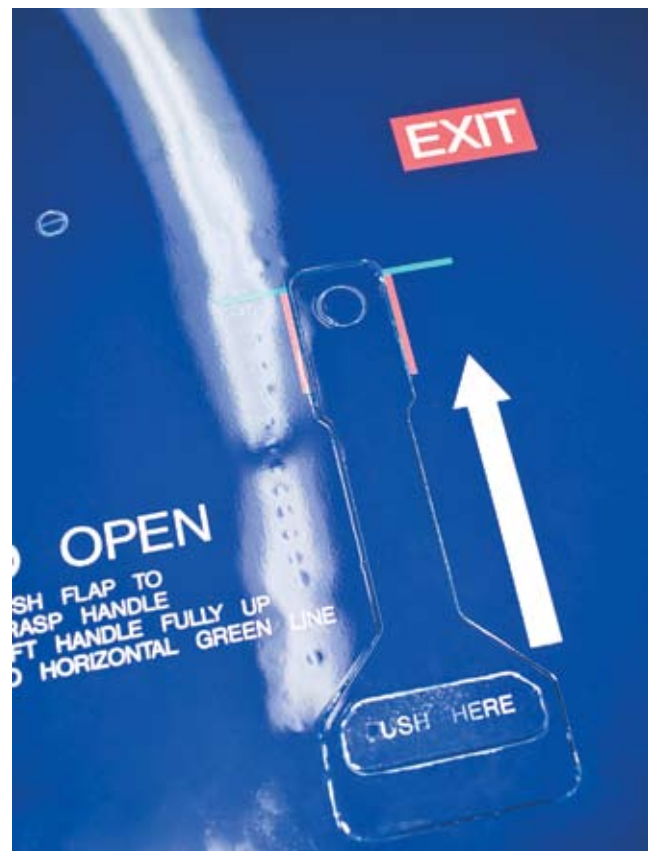
When 159 airline passengers volunteered for a series of evacuations from two cabin simulators, some recommended explicit survival-related phraseology with less concern about passenger comfort, said the report of a study funded by the Australian Transport Safety Bureau.¹

Three researchers from Cranfield University in the United Kingdom and Virgin Blue Airlines of Australia conducted 16 experimental evacuations (trials) in April 2005. Their objectives were influenced by a 2004 forum on best practices conducted through the Asia Pacific Cabin Safety Working Group of the Australian Society of Air Safety Investigators. Eight unnamed Australian and Asian airlines provided their passenger evacuation policies, commands, procedures and event history; cabin crew training manuals; and safety briefing cards for the Airbus A300, A320 and A340; Boeing 737, 747 and 777; BAE Systems BAe 146; de Havilland Dash 8; and McDonnell Douglas MD81/87/90.

The researchers took particular interest in variations among the airlines. For example, not all airlines required cabin crews to brief passengers on checking for fire or obstructions before opening overwing exits. Experiences of individual airlines — such as passengers inadvertently opening exits after a demonstration because of misunderstood instructions — were cited as reasons. Similarly, brace commands typically were part of planned-evacuation briefings, but only one airline's standard operating procedures required brace-position details to be provided during the preflight safety briefing.

“Standard procedures and cabin crew commands vary among operators, and there is no common set of commands and procedures that apply to passenger evacuations,” the report said. “Dual-lane flows significantly increase evacuation rates [according to other research], yet results from [the forum] showed that many [widebody aircraft] operators do not require their cabin crew to command passengers to move through exits two at a time.”

Minor variations were found among commands to board and descend slides, but the command currently favored by many cabin safety researchers — “Jump and slide” — was not in common use. Another example was crewmember instructions for life vests (life jackets). “One of the operators ... did not want cabin crew to get caught up in mandatory [life vest] procedures during an evacuation,” the report said. “This operator was involved in the conduct of research evacuation trials during which they found that not all passengers reacted to the set [memorized]



© 2006 JupiterImages

commands. In response to this, cabin crew then had to change the words slightly to make the passenger respond appropriately.”

To complement participant surveys and interviews, the researchers analyzed time-coded video recordings of the trials in the university’s Boeing 737 simulator and the upper deck of its Large Cabin Evacuation Simulator.² Four subgroups of participants completed four trials — two in each simulator type — under one of four scenarios.

The controlled conditions of the scenarios in the 737 simulator enabled comparison of an active safety briefing with a passive safety briefing; basic commands compared with basic commands supplemented by “tactile” commands, for example, telling passengers to use hands to feel their way to exits in a dark cabin; dual-lane-flow evacuation commands compared with absence of these commands in the widebody simulator; and the effectiveness of the cabin crew’s gestures, eye contact and other nonverbal communication when a half-height bulkhead or a full-height bulkhead blocked passengers’ views in the widebody simulator.

The passive method limited crewmembers to reading standard announcements after requesting passengers’ attention. The active method required crewmembers to physically and mentally involve passengers in the safety briefing by pointing out exit locations, counting rows in forward and aft directions to the nearest exits, and practicing the recommended brace position.

“The results [of the study] showed that an active safety briefing had statistically significant³ advantages over a passive safety briefing ... that the visibility of the cabin crew influenced passenger perceptions of evacuation effectiveness [and] that participants

generally had a low understanding of why they might be required to take certain actions in emergency situations,” the report said. “This suggested that it is important that operators take passenger expectations and comprehension into account when devising evacuation commands. ... Indeed, the commands provided by crew and the safety knowledge of passengers may be particularly critical in those evacuations where conditions are difficult — such as in low visibility, where the aircraft has landed at an unusual angle, or in the presence of smoke.”

In the 737 simulator trials, researchers looked for any benefit from the cabin crew providing additional instructions on how to evacuate in darkness. “[In these trials,] the crewmember at the front of the cabin called ‘Move to the rear of the cabin,’ ‘Use your hands’ [and] ‘Feel your way’ to establish a flow to the exit.”

Researchers using the Large Cabin Evacuation Simulator focused on any benefit from the cabin crew using dual-lane flow instructions. “In order to provide a further test of the efficacy of the commands, an exit redirection took place, in which participants [without prior knowledge of the exit(s) available] were instructed to move from the upper right forward exit to the upper left forward exit after approximately 10 seconds,” the report said.

Surveys of participants before the trials revealed various misconceptions about safety issues, despite the participants’ prior exposure to safety briefings. For example, some said that they did not understand what the command “Brace, brace, brace” means, the report said. They would prefer an explanation during the preflight safety briefing or to hear crewmembers repeat a simpler command such as “Heads down, stay down” or “Heads down, feet back.”

Others had not comprehended instructions about oxygen masks. “It was ... evident from the responses that some people had not grasped the fact that if people did not act quickly, they would lose consciousness,” the report said. “It was also evident that most people would assist family, friends and traveling companions first, and that they did not always appreciate that they had to put their own mask on first in order to be able to do so.”

Participants’ suggestions for clear communication included the following:

- “Listen to this briefing. It could save your life.”
- “[Cabin crews briefing passengers about oxygen masks] never mention unconsciousness, they must do that. As it is usually done, it sounds a bit selfish — you first.”
- “Brace. Emergency landing position.”
- “Leave everything.”

The report said that analysis of mean evacuation times found the following results:

- “There was no significant effect on evacuation times of the use of tactile commands ... [or] the type of briefing. ... Participants who received the active briefing rated it as significantly more helpful [and associated with a higher level of confidence] in the evacuation than the passive briefing ... [and] rated finding [an open] door [and using the evacuation slide] as significantly easier than participants in the passive briefing ... moving through the exit itself was rated as



significantly more difficult by participants in the passive [briefing].”

- “Participants evacuating without dual-lane flow commands were significantly quicker than participants evacuating with dual-lane flow commands. ... The cabin crew did not instruct passengers to come forward and queue along the wider cross aisle, and hence there was little scope [space in main aisles] for passengers to comply with the commands [and] it was possible for passengers to mass through the exits in a disorganized fashion when they were not in dual-lane flows — this would not have been possible had slides been used.”
- “Participants evacuating in high-visibility conditions (with half-height bulkheads) were not significantly faster than participants evacuating with low visibility (full-height bulkheads). ... The half-height bulkheads meant that cabin crew could actually be seen by passengers, who rated the crew’s nonverbal communication as significantly more useful in the high-visibility evacuations.”

Improvising evacuation commands works in some circumstances, but in others “overtraining” cabin crewmembers — i.e., ensuring recall of infrequently used commands through

practice — is more appropriate. Cabin safety research so far does not tell airlines whether one phrase is superior to another, but current findings should be considered in developing and refining emergency procedures. ●

FSF editorial note: This article, except where noted, is based on the Australian Transport Safety Bureau report *Evacuation Commands for Optimal Passenger Management* by Lauren J. Thomas and Antoinette Caird-Daley of the Human Factors Group, School of Engineering, Cranfield University; and Sophie O’Ferrall of Virgin Blue Airlines. The 85-page report, published in April 2006, contains tables, figures, appendixes, photographs and illustrations. The report is available at <www.atsb.gov.au>.

Notes

1. Participants comprised 84 men and 75 women aged 20–50 (with a mean age of 30.9 years), who were normally fit and healthy, and had various levels of experience as airline passengers.
2. Cranfield University’s Boeing 737 cabin simulator is a single-aisle facility, containing 10 rows of seats, a fully functional Type III exit, two Type I exits, a service door and an evacuation slide on one of the rear Type I exits. The university’s Large Cabin Evacuation Simulator is a twin-aisle, double-deck modular cabin configurable similarly to an Airbus A340 (or other aircraft); for the study, it was equipped with an evacuation platform outside the upper left forward Type A door instead of a slide.
3. The report said, “In this [study] context, statistical significance means that the probability that the observed differences are due to the experimental effects is over 95 percent.”

Participants evacuate from Cranfield University’s Large Cabin Evacuation Simulator in a scenario with dual-lane flow commands and half-height bulkheads.