Much travel occurs across large areas of water, either by ship (ferries, cruise ships, houseboats, water taxis) or plane. This requires precautions in the event of an emergency related to involuntary contact with water. In order to minimize possible casualties in the case of a ship disaster or a plane crash into water, vessels and aircraft are equipped with life jackets of various designs. Life jackets are “personal floating devices which are on board to help persons in water to keep their mouths and noses above the surface.”¹ At the start of most such trips, crew members demonstrate the location of these personal floating devices and their use so that passengers have the necessary information to act accordingly should the need arise.

Life jackets onboard ships or boats have attracted the attention of only a few researchers. For example, the behavior of different models on unconscious humans in heavy seas has been researched.² This research has been expanded by investigating the influence of clothing on the life jackets’ behavior.¹ In a high speed catamaran accident in 1995, it was found that two-thirds of passengers were unable to don their life jackets without assistance.³ The effect of educational efforts with varying outcomes has been observed⁴,⁵ and it was proposed that approximately 85% of boating-related fatal accidents between 1984 and 1991 could have been prevented had the victims been wearing life jackets.⁶ The search for literature on life jackets on airplanes was less successful.

Quite some time ago, a television news report caught this author’s attention, where, after a plane crash into water, several inflated life jackets could be observed floating among parts of the fuselage. Since life jackets are tightly folded, placed in packets, and stored under or between seats, it seemed unlikely that they freed themselves from their tight package, removed themselves from the pouch or compartment they were stored in, unfolded, found their way out of the wreckage, and inflated themselves thus being noticed on the water surface. This raised the question: Where were the people who had “activated” the life jackets and were supposed to be attached to these devices? One must assume that a passenger (or crew member) had attempted to don the jacket but was not able to do so.

There may be a number of reasons for this. Anyone who travels a lot by plane and watches the safety demonstrations in relation to the use of life jackets at

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the commencement of a flight, will notice several aspects which may undermine any efforts to provide maximum safety standards for passengers. First, the quality of the safety instructions varies considerably. Some are conducted with plenty of mirth, others in barely disguised boredom, even in complete silence and without announcement, as observed on a flight in January 2000, with only the passengers next to the demonstrating crew member noticing that “something was going on.” The individual video screens now installed in the backs of seats by some airlines may combat this problem, at least partially. Second, it seems that not all passengers actually observe the instructions or, if they do, pay insufficient attention. Frequent flyers may be particularly prone to directing their interest elsewhere since they have witnessed many instructions before. These two factors can lead to an extremely dangerous combination when a third factor comes into play, that is the quite considerable variety of models of life jackets which seem to be in use and, consequently, their donning procedure which depends on the individual design. This assumption was supported after collecting several safety instruction cards from various airlines depicting the model used.

Returning to the scenario of an emergency, it seems that inadequate familiarity with the life jacket provided on a flight in itself poses a safety risk that will be aggravated in an emergency situation through confusion, lack of space, limited time, smoke, darkness, unpredictable movements of the plane, and the general panic.

The purpose of this study was to conduct a baseline survey giving insight into the range and variety of life jackets provided onboard aircraft to date using as wide a range of commercial airlines as possible. The aims were (1) collect as many safety cards as possible from as many airlines as possible depicting the model used; (2) categorize the different models according to the design, thereby establishing common features as well as differences of each model; and (3) establish commonalities and differences in the procedure of donning the life jackets.

Methods

Data Collection

For this descriptive study, international and domestic airlines were contacted either through their Australian office or their headquarters overseas, and asked to provide a copy of the safety cards normally stored in the seat pockets in front of each passenger. After safety demonstrations onboard, crew members usually advise passengers to read the safety cards for more information. This implies that the drawing of a life jacket and the method of donning is part of the instruction, hence, the drawing is expected to be unambiguous. Based on this premise, it was decided that safety cards were the most practical way to meet the study purpose. Alternatively, a clean, high quality photocopy was accepted as well. Sometimes, an airline uses different models on different aircraft. Therefore, airlines were asked to provide a safety card per model. Also, cards collected directly from airline offices during travel and at holiday destinations were included.

Sampling

Only airlines whose routes travel over reasonably large areas of water and therefore, can be expected to carry life jackets were approached. Seat cushions or other floating devices were excluded from the survey. A random sample was impractical since an accurate sampling frame is not available. The airlines’ headquarter addresses from the latest *Travel Trade Yearbook* were used. Additionally, other airlines known to the researcher were invited to participate, as well as airlines whose contacts were provided by acquaintances residing in other parts of the world. Finally, airlines’ Web sites were searched for contact details. The dependence on the willingness of airlines to comply with the request resulted in a convenience sample. Overall, 76 airlines were contacted by regular mail, 36 (47%) of those responded to the request. The participation of a further 17 airlines was elicited by other means resulting in a sample of 98 cards from 53 airlines from five continents. Five (9.4%) of those airlines were solely domestic carriers in their respective countries.

Ethical Considerations

Since this research did not use human participants, no ethical clearance was necessary. The airlines’ participation was voluntary.

Analysis

The life jackets depicted on the cards were carefully observed, and categories meaningful to this study identified. The pictures of the life jackets were categorized according to the fastening mechanisms, presence or absence of a back flap, and the two major ways of donning (prefastened or not prefastened). The categorization process was repeated two more times by colleagues to ensure the reliability of the procedure. Only one card had to be reallocated.

Pilot Study

The first 10 cards collected were used to pilot categorizing, analysis, and the presentation of the findings. These cards are included in the overall results presented here.
Results

Ninety-eight cards contributed by 53 airlines entered the analysis. Although airlines had been asked to provide one safety card per model used (it was expected that some may use two, possibly three different designs), a number of companies participated with one card per aircraft type in their fleet. However, for the purpose of this study, only the number of different life jacket models per one airline was recorded regardless of how many aircraft this model was provided on.

Design of Life Jackets

Twelve separate categories had to be devised to accommodate clearly distinguishable depictions. The first main difference was between prefastened and not prefastened life jackets. Prefastened means that the straps securing the jacket to the passenger’s body are already fastened. This is important for the donning process since one must locate the loops through which the arms must be placed before the jacket can be adjusted, tightened, and therefore, secured. Eight (15%) airlines used this type of life jacket, one further airline provides the same system but the fixation mechanism is different.

The remaining jackets have to be fastened by the user. The main fixation devices are ribbons, and straps, the latter either with buckles or hooks. Eight (15%) airlines supply jackets with long ribbons originating at the front bottom of the jacket which have to be wrapped around the body and secured in a bow or knot. The life jacket of one other airline also has ribbons but originating from a back flap, and the ribbons need to be put through a ring in the front of the vest.

Eighteen (34%) airlines use life jackets that need no back flap and are secured in the front to the center strap by one buckle on the right hand side. A basically identical model but which is fastened with a buckle on the left hand side is supplied by four (7%) companies. One other airline’s model does show a back flap. One airline uses a similar model, however, the fixation strap in the front is not centered but placed more to the right of the vest.

Thirteen (25%) airlines use models with a back flap and two straps that need to be fastened to the front center by metal hooks, two (4%) use the same model but fastened by plastic buckles. Two airlines (4%) provide jackets to be fastened by a buckle, but without a center strap.

Finally, one airline chose a model with back flap and two straps to be fastened in the front center to a double swivel-snap (hooks are attached to the center strap rather than to the long side straps which only have nooses attached). One further airline’s model could not clearly be identified. It has a back flap, two straps to be attached to the front center with one buckle on the right hand side but the left strap seems prefastened at some stage.

Donning Procedure

There are two main ways of donning the life jackets used in this study. One is to enter the arms into prepared loops (this requires that the user can lay out the jacket to ensure the correct position of the loops), pulling down the back flap, locating the end of the straps, and tightening the jacket by pulling the straps. The second way is to put the jacket over the head, finding the strap(s), ensuring that they go around the body in the right way, fasten the buckles or the hooks to the front and pull the loose end of the straps to tighten the jacket.

Additional Observations

Of those already mentioned, two (4%) airlines have two different models on the same cards with an “OR” between the two versions (one combines 2 hooks/2 buckles, the other 2 hooks/1 buckle). Two airlines depict the donning process starting with one model and then, without explanation, continuing with a different model to complete the process.

Based on the information provided, eight (15%) companies use different life jacket models on different aircraft, therefore, the overall observation presented here results in more than 53 airline recordings.

Twenty-four (45%) airlines depicted the different use of adult-sized life jackets on children, seven (13%) airlines showed slightly different children-sized models, and six (11%) airlines have infant models with inflatable aprons. Some of those airlines offer a combination of the three options.

Discussion

This project has been conducted in an attempt to identify possible health and safety problems arising for the traveling public. During the process, it raised more questions and a number of further research areas were identified. The two main aspects discussed here will be the variety of life jacket designs, and the safety demonstrations/instructions concerning life jacket use.

This study does not pretend to have captured every possible design of life jackets onboard airplanes. One limitation of this study is that it had to be based on the assumption that the depicted model actually corresponds with the one provided onboard a specific aircraft. The findings nevertheless suggest that there is indeed a wide range of possible designs in use. The extent of this variation may come as a surprise to some. It is also unclear why some airlines use different models in their fleet. The rationale could not be ascer-
tained in follow-up phone calls. Not only were different models used on different aircraft (and depicted on separate cards) but two versions could also be found pictured on the same card. This is somewhat like “you’ll see which one when you need it.” Taking this to a level of more concern, on one of the flights of a company participating in this study in the year 2000, this author found two cards in the seat pocket, each picturing a different model. Because this was a small plane and no flight attendant onboard, it was never clarified which model was carried onboard. On one flight it was even observed that the model used for the safety demonstration and the model depicted on the safety card were different. Considering the observed lack of attention paid to safety demonstrations and instructions, it may be possible that a number of passengers miss the differences between the designs. This, however, could be crucial in the event of an emergency.

With all this variety, the crucial role of the safety demonstrations and the importance of their high standard in the method of delivery and content become clear. One could make a point and argue that these instructions qualify as health education/advice and also, because they concern travelers, come under the umbrella of travel health. Therefore, they must meet educational standards and have to be tested to ensure that these expectations are met. This also includes the quality of depictions on safety cards. In this study, they ranged from good quality photographs, to the representation of computer-generated features, to poorly executed drawings with some too unclear to be certain about their design. There may also be a way of creating a better “learning environment” for passengers onboard aircraft. No research into this area could be identified so far.

Other important questions are, first, what percentage of passengers do pay attention to instructions and, second, how much of the information given is actually retained by passengers. The first question will, however, become increasingly difficult to monitor with an increasing number of airlines providing personal screens above the tray tables. Furthermore, knowledge of the theoretical content of an instruction does not automatically translate into the mastery of its application in practice. This also needs to be tested, although not in mid-air, but in simulations capturing a real-life environment rather than controlled laboratory settings.

There is no doubt that life jackets have undergone rigorous testing during and after the manufacturing process. The technical capabilities of the different models were not part of this study. However, maybe there is too much reliance on the technical performance of particular models, and more emphasis should be placed on their employment in real-life situations. What we do not know at this stage is how the average load of passengers on any of the many thousand commercial airplanes in the air at any given moment, will be able to deal with those life jackets in an acute, probably life-threatening situation.

The ideal situation seems to be to have one standard life jacket model for all airlines, chosen as the best of all currently manufactured. This way, hearing the same instructions on every flight and seeing the same model used in demonstrations will reinforce the message even in passengers who only sporadically pay attention. Also, this could lead to a different approach of preparing people for the use of this device in that drills could be carried out in various places, such as schools, since the same jacket is used everywhere.

Following from this discussion it becomes clear that there are further personal floating devices available, provided to hundreds of thousands of travelers and warranting further research. There are still a number of airlines using the passenger seats as a floating device should an emergency arise. This requires the passengers to remove the part of the seat they were sitting on and use strap handles underneath this part to hold on to. Once in the water one is required to lie on top of this device, which clearly requires the person to be conscious. One such seat was removed once by this researcher out of curiosity only to find that the handles to which one is supposed to cling were missing! No literature could be found on the usefulness of this safety measure.

Another area to study in relation to travelers’ health are the life jackets used on ships, ferries, and boats. Often they consist of two to three packs of Styrofoam sewed into a canvas vest. It is difficult to comprehend this apparent difference of design to life jackets on aircraft considering that in both cases they cater to people who come in involuntary contact with water.

Conclusion

Travel health is not only concerned with pre- and post-travel care related to illnesses but also encompasses travelers’ safety and issues which might compromise it. The findings of this study hopefully raise the awareness that there may be room for improvement when it comes to increasing the safety of passengers in the rare event of an emergency. Also, a range of further research has been recommended. Although the manufacture of the best life jacket in terms of efficiency and the donning procedure must be left to the technical experts, there are areas where a closer cooperation between health, and particularly health education professionals, and safety experts in the tourism and transportation industry is recommended for the benefit of the traveling public.
References


Kaola bear at Featherdale Park near Sydney, Australia. Submitted by Danielle Gyurech, MD, and Julian Schilling, MD.