



Original Article

Use of first aid kits on board a regional airline

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ABSTRACT

Objectives: In-flight medical events (IMEs), although relatively rare, they may be demanding. First aid on board is provided by cabin crew members or passengers who are healthcare professionals. Airline aircrafts are required by legislation to have medical kits on board, but the usefulness of the required medications is still under investigation. The objective of this study was to evaluate the use of medical kits on board a regional airline.

Material and Methods: We prospectively collected all IME reports from the biggest airline in Greece during a 5-year period (2014–2018) and investigated the use of medical kits on board.

Results: During the study period, 990 IMEs were recorded, corresponding to 16 IMEs for each million passengers or 1.8 IMEs for every 10,000 flights. The most frequent event was loss of consciousness (38.4%). The first aid kit was opened in 18% of IMEs but was used in 15%. Medications frequently used were burn hydrogel (in 4.7% of IMEs) and paracetamol (in 3.6% of IMEs). Only three passengers were treated with advanced medications (two with nitroglycerin and one with corticosteroid intramuscular injection).

Conclusion: Despite the availability of an advanced cardiac life support level, emergency medical kit on board, basic first aid, and over-the-counter medications were sufficient to successfully manage 98% of all IMEs in a regional airline. The required list of medications for onboard medical kits needs further study.

Keywords: First aid, Aviation, In-flight events, Passenger

INTRODUCTION

In-flight medical events (IMEs) have become more frequent following the increase in air traffic volume. Most of those events are minor, but some can still be challenging due to the limited medical resources on board and the time required to land for appropriate care.^[1-3] Passenger aircraft are required by legislation to carry a number of first aid kits (FAKs) according to the seats installed. European regulations^[4] require one FAK with a minimum list of medications and medical instruments per 100 passengers on board. The minimum list does not include a stethoscope, a manometer, or any other medical device and includes only six over-the-counter medications. An emergency medical kit (EMK) needs to be carried on board passenger aircraft when any point of the planned route is more than 60 min flying time at normal cruising speed from an aerodrome at which qualified medical assistance could be expected to be available. The minimum required list of EMK medical contents is sufficient to provide advanced cardiac life support (ACLS) level care as it includes IV lines, an intubation set, and emergency medications. EMK may also include a defibrillator based on operator risk assessment. Although the FAK may

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be installed in the cabin, the EMK, by regulation, should be kept in the flight crew compartment to prevent unauthorized access to it.^[4] Several medical^[5,6] and aviation organizations^[7] have proposed lists of contents for onboard EMKs. Although airlines comply with the legally required minimal list of medications, a high degree of variability exists in the contents of medical kits, with some airlines insufficiently equipped for critical medical situations.^[8]

Aegean Airlines is the flag carrier of Greece operating to several Greek, European, and Middle Eastern destinations. A member of Star Alliance, Aegean operates a fleet of over 50 Airbus aircraft (A319, A320, A321, and A321XLR) carrying over 14 million passengers each year. Aegean Cabin Crew Members (CCM) receive initial and recurrent first aid training according to European and International Resuscitation Guidelines^[9,10] and the European Commission Regulations.^[11] By company policy, all Aegean aircrafts are also equipped with an EMK in addition to the required FAKs, irrespective of the flight route planned. Up to 2020, there was no defibrillator on board. After each IME, the involved crew member or the volunteer health professional fills out an electronic form with passenger details, estimated diagnosis, first aid provided, and medications used. The form is dispatched to the airline flight operations. A copy of the event devoid of any passenger details is shared with the training department for feedback and data collection. This study aimed to examine the use of medications and medical instruments from FAK and EMK kits in Aegean Airlines to gather data on possible critical shortages in the official list.

MATERIAL AND METHODS

We collected anonymized reports on IMEs on Aegean Airlines flights that occurred from 2014 to 2018 and classified all IMEs in consensus based on symptomatology. Data collected included passenger gender and age, phase of flight, date, destination, flight time, any special needs or medical history, and the qualifications of the person that provided on-board assistance. Aegean Airlines CCM is required by company policy to document any medication removed from the FAK on the IME report, so we were able to track the exact use of medical supplies. The outcome of the IMEs was also recorded, including any diversion and requests for an ambulance on arrival. Data were analyzed using descriptive statistics, and nominal variables were tested for association using the Chi-squared test for independence with Yates Continuity Correction. $P < 0.05$ was used to indicate statistical significance. Statistical analysis was performed using the JASP 0.13.1 software. The study protocol was approved by the Research and Ethics Committee of the Hellenic Air Force Academy, and the publication of data was authorized by the management of the participating airline.

RESULTS

A total of 990 IMEs were recorded at a rate of 16 IMEs for each million passengers or 1.8 IMEs for every 10,000 flights (61,283,428 passengers carried on 541,032 flights). The average scheduled flight time (takeoff to landing) of the involved routes was 2.4 hours. The majority of the events involved adults with a mean age of 41 years (91.4%). The most frequent IMEs were loss of consciousness (38.4%), followed by gastrointestinal problems (8.3%), injuries (8.0%), respiratory symptoms (7.3%), cardiac events (7%), burns (5.9%), and anxiety disorders (5.7%) [Table 1]. The majority of passengers denied any history (60.5%). Although only 23 (2%) of all IMEs involved wheelchair passengers, these were three times more likely to have worse outcomes ($P = 0.003$). Diversion was decided in 3.2% of the cases, mainly for IMEs involving wheelchair passengers ($P = 0.016$). Most events were treated by volunteering passengers who were healthcare professionals (63% physicians). Cabin crew used FAK more frequently compared to healthcare professionals ($P < 0.001$). EMK use (1% of IMEs) is by regulation authorized only to healthcare professionals. For a large number of IMEs (30.8%), simple comfort actions such as offering water or juice, opening overhead vents, and reclining the seat were adequate to relieve symptoms. Simple first aid, such as putting the passenger in the recovery position (20%), providing oxygen (7.5%), or administering sugar sublingually (6.5%), was also adequate to address the IME. When healthcare professionals responded (23%), they tended to administer oxygen more frequently (38%) than cabin crews ($P < 0.001$). FAK was opened in 18% of the IMEs but was used in 15% of the cases. Kits were opened mainly during the cruise phase of the flight (82%). The most frequent medications were a burn hydrogel (in

Table 1: Aegean airlines in flight events 2014-2018.

Diagnostic group	Outcome		
	Improved	Worse	Total
Loss of consciousness	355	28	381
Respiratory/Difficulty breathing	65	8	73
Cardiac symptoms/Chest pain	38	4	42
Gastrointestinal symptoms	78	5	83
Pain	50	3	53
Allergic reaction	28	0	28
Infectious disease/Fever	34	4	38
Injury	80	6	86
Burn	57	2	59
Behavior	119	5	124
Bleeding no injury	13	3	16
Obstetrical symptoms/Delivery	3	1	4
Other	3	0	3
Total In-Flight events	925	65	990

Table 2: Medication used and first aid provider

First aid provider	Medications used	Frequency	Percent
Cabin crew (Only FAK)	No medication	221	68,634
	Burn Hydrogel	35	10,870
	Paracetamol tabs	20	6,211
	Povidone oint	11	3,416
	Own medication	8	2,484
	Dimetindene oint	5	1,553
	Cétrimide oint	5	1,553
	Antacid tabs	4	1,242
	Paracetamol syr	3	0,932
	Xylometazoline spray	3	0,932
	Antihistaminic tabs	2	0,621
	Aerolin Inh	1	0,311
	Corticosteroid eye drops	1	0,311
	Fusidic acid oint	1	0,311
	Loperamide tabs	1	0,311
	Acetylsalicylic acid tabs	1	0,311
	Total	322	100,00
Health professional (FAK and EMK)	No medication	549	82,186
	Paracetamol tabs	16	2,395
	Own medication	13	2,146
	Burn Hydrogel	12	1,796
	Antacid tabs	11	1,647
	Povidone oint	11	2,997
	Acetylsalicylic acid tabs	7	1,048
	Loratadine	5	0,749
	pseudoephedrine tb		
	Dimetindene oint	5	0,749
	Alprazolam tabs	3	0,449
	Metoclopramide tabs	3	0,449
	Bromazepam tabs	3	0,449
	Etilefrine drops	3	0,449
	Corticosteroid inj	3	0,449
	Xylometazoline spray	3	0,449
	Butylbromide tabs	2	0,299
	Aerolin Inh	2	0,299
	Benzodiazepine tabl	2	0,299
	Nitroglycerin patch	2	0,299
	Cétrimide oint	2	0,299
	Adrenaline inj	1	0,150
	Antihistaminic oint	1	0,150
	Doliprane tabs	1	0,150
	Glucose tabs	1	0,150
	IV infusion	1	0,150
	Ibuprofen tabs	1	0,150
Natural tears coll	1	0,150	
Nimesulid tabs	1	0,150	
Paracetamol syr	1	0,150	
Pensordil tabs	1	0,150	
Propranolol tabs	1	0,150	
Total	668	100,00	

4.7% of IMEs), paracetamol (in 3.6% of IMEs), and an antihistaminic (1%). Only three passengers were treated

with advanced medications (two with nitroglycerin and one with corticosteroid IM Intramuscular injection), but none of these events was life-critical [Table 2]. Medical instruments (usually the manometer) were used in only 1% of the IMEs. Healthcare professionals requested more frequently an ambulance on arrival (43%) compared to cabin crew (29%) ($P < 0.001$), but the ambulance was finally used in 69% of requests. No critical shortages of medications or medical instruments were recorded by the attending healthcare professionals. IMEs involving special needs passengers had no difference in FAK use compared to other passengers ($P = 0.135$). There were only three deaths on board during the study period (one death on board per 20.5 million passengers or 180,000 flights). The involved passengers were either very elderly (over 90 years) or with known severe pre existing diseases (recent cancer surgery), and they were immediately declared dead by a passenger physician. No resuscitation attempts were initiated, and no FAK was opened.

DISCUSSION

In this study, IMEs were rare as we have recorded 16 IMEs per million passengers or 1.8 events/10 thousand flights probably related to the regional flight character of Aegean Airlines (average scheduled flight time of routes was 2.4 hours). The specific medical conditions of the IMEs recorded in this study are in accordance with the literature^[1-3] with loss of consciousness (38.4%) the most frequent recorded problem and the main cause for diversion.

We have found that CCMs were three times more likely to use an FAK compared to healthcare professionals ($P < 0.001$), a trend possibly related to the familiarity of CCMs with the contents of the FAK and their training. We have also noticed some differences in the use of medications between cabin crews and healthcare providers. Cabin crew used a medical kit in 32% of the IMEs, while healthcare providers used it in 12% of cases ($P < 0.001$). The medications most frequently used by CCM were paracetamol (6%) and burn hydrogel (10%). Healthcare professionals administered the same medications but in much lower frequencies (3% and 2%, respectively, $P < 0.001$). In the opinion of the authors, this finding reflects the confidence of Aegean CCM in treating simple pain syndromes and minor burns and their familiarity with FAK contents. Oxygen was more frequently administered by healthcare professionals ($P < 0.001$), most probably as a result of clinical experience and event severity. Healthcare professionals also provided a diversity of advanced medicines to the affected passengers [Table 2]. IMEs involving passengers with special needs (wheelchairs and unaccompanied minors) were related to more frequent use of the kits (9%). Although an EMK exists on board all Aegean flights, this was used only in 1% of cases. This may

be related to the rarity of serious IMEs in regional flights and the clinical skills of healthcare professionals. However, it may also reflect the hesitation to use medications and devices that they are not familiar with. This is further complicated by the diversity of FAK contents among regional airlines. In one recent study of European Airlines, the kit contents were found to vary considerably even among different aircraft of the same airline.^[8] Several physicians in our study reported the stethoscopes to be of limited value due to background noise and found more useful the pulse oximeter and the glucose meter. In a study of German airlines only 68.5% of the participating physicians have found the onboard medical equipment to be sufficient for in-flight events.^[12]

Standardization of passenger aircraft FAKs based on data from this and other studies^[8,12,13] will help healthcare professionals to be confident with the use on board. When one considers the logistics of replenishing the kits after use and the need for frequent inspections of expiring dates, as well as the bureaucracy involved, standardization is urgently needed. Medical kit contents should be clearly listed on multilingual forms outside the box as this may help avoid unnecessary opening of the FAK. The FAK and emergency medical kit (EMK) compartments should also be standardized according to symptomatology, as this has been shown to be the way first aid is provided on board, a cramped and noisy aircraft. Although an automatic external defibrillator (AED) was found present only in 26% of German airlines,^[8] we feel that the EMK should be standardized according to ACLS protocols and include an AED.

Limitations

Limitations of the study include the relatively small number of events. Our data are also only relevant to short and medium range flights.

CONCLUSION

This study contributes data on the use of FAKs on board regional airlines. Medical events on board Aegean Airlines flights occur with the same frequency reported in the literature. The vast majority of these events recover before landing with simple care measures. FAKs, although necessary and required by regulation, are seldom used and, in most of these cases, only to provide simple over the counter medications.

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Ethical approval

Approval for the study was provided by the Hellenic Air Force Center for Aviation Medicine Research Board (No 7/2019).

Declaration of patient consent

Patient's consent was not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. DeJohn CA, Wolbrink AM, Véronneau SJ, Larcher JG, Smith DW, Garrett JS. An evaluation of in-flight medical care in the U.S. *Aviat Space Environ Med* 2002;73:580-6.
2. Nable JV, Tupe CL, Gehle BD, Brady WJ. In-flight medical emergencies during commercial travel. *N Engl J Med* 2015;373:939-45.
3. Martin-Gill C, Doyle TJ, Yealy DM. In-flight medical emergencies: A review. *JAMA* 2018;320:2580-90.
4. Annex to ED Decision 2012/018/R acceptable means of compliance (AMC) and guidance material (GM) to part-CAT. Germany: European Union Aviation Safety Agency; 2012. Available from: <https://www.easa.europa.eu/en/document-library/acceptable-means-of-compliance-and-guidance-materials/amc-gm-part-cat> [Last accessed on 2023 Dec 25].
5. Aerospace Medical Association (AsMA) Medical Guidelines Task Force. Medical guidelines for airline travel. In: *Aviation Space and Environmental Medicine*. 2nd ed., vol. 74. 2003. p. A1-9. Available from: <https://www.asma.org/asma/media/asma/travel-publications/medguid.pdf> [Last assessed on 2023 Dec 25].
6. Aerospace Medical Association (AsMA). *Managing in-Flight Medical Events*; 2018. Available from: <https://www.asma.org/asma/media/asma/travel-publications/medical%20guidelines/in-flight-medical-events-guidance-document-revised-July-2016.pdf> [Last assessed on 2023 Dec 25].
7. IATA Medical Manual. AsMA guidance document, medical

- emergencies. Managing in-flight medical events. 2016th ed. Canada: IATA; 2017.
8. Sand M, Gambichler T, Sand D, Thrandorf C, Altmeyer P, Bechara FG. Emergency medical kits on board commercial aircraft: A comparative study. *Travel Med Infect Dis* 2010;8:388-94.
 9. Zideman DA, De Buck ED, Singletary EM, Cassan P, Chalkias AF, Evans TR, *et al.* European resuscitation council guidelines for resuscitation 2015 section 9. First aid. *Resuscitation* 2015;95:278-87.
 10. Singletary EM, Zideman DA, De Buck ED, Chang WT, Jensen JL, Swain JM, *et al.* International consensus on first aid science with treatment recommendations. *Circulation* 2015;132:S269-311.
 11. European Commission. Aero-medical aspects and first-aid Initial training course and examination. Annex V. Appendix 1 to Part-CC. Commission Regulation (EU) No 290/2012. Belgium: European Commission. Available from: <https://eur-lex.europa.eu/LexUriServ> [Last assessed on 2024 Jan 25].
 12. Hinkelbein J, Neuhaus C, Wetsch WA, Spelten O, Picker S, Böttiger BW, *et al.* Emergency medical equipment on board German airliners. *J Travel Med* 2014;21:318-23.
 13. Ruskin KJ. In-flight medical emergencies: Time for a registry? *Crit Care* 2009;13:121.

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