Recommendations for Updates to Emergency Medical Kits for Commercial Aviation

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INTRODUCTION: Emergency medical kits (EMK) are provided to clinicians who volunteer on commercial aircraft during a medical emergency. The contents of the EMKs are mandated by the Federal Aviation Administration in the United States and, internationally, by the International Civil Aviation Organization and the country of airline origin. The mandatory contents of the kits have not been updated by the Federal Aviation Administration since 2006, and the EMKs continue to lack key equipment such as automated blood pressure cuffs, glucometers, pulse oximeters, and epinephrine autoinjectors. Of further concern is a lack of standardized and centralized reporting for in-flight medical events that, if it existed, could better inform the contents of the kits. This commentary is intended to advocate for an update to the EMKs in the United States given the authors' experiences with in-flight medical events.

KEYWORDS: medical kits, commercial aviation, in-flight emergencies.

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After a substantial slowdown in air traffic due to the COVID-19 pandemic, the number of scheduled flights has increased markedly, with now more than 4.5 billion passengers flown on scheduled flights each year.[1] It is difficult to determine the exact number of in-flight medical emergencies (IME), given there is no central data repository for these events.[2,3] This is further confounded as not all IMEs may be recorded, especially if no ground consultation is required. Based on available data, about 1 in every 604 flights has an IME that requires a ground consultation, meaning that the total number of IMEs is likely much higher.[4] The lack of reliable data makes it difficult for stakeholders to maintain public safety onboard aircraft, and it also prevents providers from being properly prepared to handle such emergencies.

The emergency medical kits (EMK) available on domestic aircraft in the United States are mandated by the Federal Aviation Administration (FAA) to contain medications and medical supplies (**Table I**).[5,6] The composition of the kits has not been updated since 2006,[6] though the Aerospace Medical Association did provide updated guidance in 2019;[7] the EMKs continue to lack the equipment necessary to respond to IMEs effectively. Updates to the EMK are an ongoing source of concern among legislators[8,9] and medical professionals[4,10] alike. Shortages of EMK contents have been used to justify the exclusion of some components, and these shortages have persisted, extending exemptions for airline carriers on four (epinephrine, dextrose, lidocaine, and atropine) critical medicines contained in the EMK.[11] Given shortages and rare use of some of these medications, it seems reasonable that certain medications, like atropine and lidocaine, could be removed to accommodate for more valuable additions, as outlined below.

We posit that the following items are much needed updates to enable clinicians to provide higher quality care:

1. Automated blood pressure cuff: Vital sign assessment is difficult in flight given the vehicle and passenger noise in

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Table I. Contents of Current Mandatory Emergency Medical Kit.[5,6]

CONTENTS	QUANTITY
Sphygmomanometer	1
Stethoscope	1
Airways, oropharyngeal	1 pediatric, 1 small adult, 1 large adult
Self-inflating manual resuscitation device	3 masks (pediatric, small adult, large adult)
CPR mask	3 masks (pediatric, small adult, large adult)
IV Admin Set (tubing with 2 Y connectors)	1
Alcohol sponges	2
Adhesive tape (1 in standard roll)	1
Tape scissors	1
Tourniquet	1
Saline solution (500 cc)	1
Protective gloves	1
Needles (sizes necessary to administer meds)	6
Syringes (sizes necessary to administer meds)	4
Analgesic (acetaminophen, 325 mg)	4
Antihistamine tablet (25 mg)	4
Antihistamine injectable, (50 mg, single dose ampule)	2
Atropine (0.5 mg, 5 cc)	2
Aspirin (325 mg)	4
Bronchodilator (MDI)	1
Dextrose (50%, 50 cc)	1
Epinephrine (1:1000, 1 cc)	2
Epinephrine (1:10,000, 2 cc)	2
Lidocaine (5 cc, 20 mg · ml^{-1})	2
Nitroglycerine tablets (0.4 mg)	10
Instructions for use of drugs in the kit	1

combination with space constraints. This makes auscultating blood pressure via stethoscope quite difficult, particularly given the low quality of the disposable stethoscopes that are typically on board. When auscultating blood pressure, the clinician cannot continue to ask further questions as they must listen for gain/loss of Korotkov sounds. An automatic, oscillometric blood pressure cuff would permit the clinician to obtain blood pressure while simultaneously continuing to assess the patient. This is particularly important given approximately 35% of in-flight emergencies are attributed to syncope or near syncope.[2,4]

2. Pulse oximeter: The altitude of the cabin is generally pressurized as low as 2440 m (8005 ft), which is well above sea-level. The increased elevation can more easily provoke hypobaric and hypoxia-related medical conditions. Due to the sedentary nature of flying, passengers may also be predisposed to conditions of hypercoagulopathy, such as pulmonary embolism. This makes the inclusion of a pulse oximeter an important piece of equipment that airlines often crowdsource from other passengers.
3. Glucometer: Hypoglycemia is a condition which can present with a variety of symptoms, from lightheadedness to nausea to stroke-like symptoms. Given the wide variety of presenting symptoms, and because there is no glucometer mandated in the EMK, it is likely that hypoglycemia is underdiagnosed and misdiagnosed in flights. If identified early, it is easily treated in order to avoid more dramatic decisions, such as emergency landing. Dextrose, the treatment for hypoglycemia, is mandatory in EMKs. Though the overall use of dextrose in flight is thought to be low (0.4%),[11] this could be related to misdiagnosis. If it is mandatory to carry the treatment (dextrose), the equipment to diagnose it (glucometers) would be meaningful.
4. Epipen Autoinjectors: Allergies, including peanut allergies, have been on the rise for the past several decades, making the presence of life-saving epinephrine on planes even more crucial.[12] EMKs are required to have epinephrine, but it is typically distributed in glass vials where the correct dose and type (1:1000 vs. 1:10,000) must be drawn up by a qualified practitioner. Because clinicians responding to in-flight medical emergencies are generally volunteers and may not be from specialties that frequently respond to critical medical emergencies, it is possible that the epinephrine ampules present in EMKs could be dosed incorrectly. Even providers who regularly respond to critical emergencies may not be accustomed to drawing up medications and could make mistakes. Therefore, in settings where trained personnel are not as familiar with epinephrine ampules and drawing up medications, epinephrine autoinjectors would be highly beneficial for in-flight anaphylactic events.[7] Additionally, glass ampules must be opened carefully to avoid self-injury and an autoinjector entirely removes this risk. We also recommend pediatric dosing for autoinjectors since the pediatric population is one in which dosing errors are more likely.[7] This mandate, while potentially increasing costs to airlines, would ultimately improve patient safety and outcomes by reducing time to treatment, medication dosing errors, and avoidance of self-injury. The U.S. Congress has passed the FAA Reauthorization Act of 2024, which specifies that flight EMKs must have appropriate medications and equipment that can practically be administered to address anaphylaxis. We believe an epinephrine auto-injector remains the most practical option for in-flight anaphylaxis treatment.
5. Standardized and centralized reporting of in-flight medical events: A central repository of data is needed in order to better characterize the type and severity of medical emergencies. If these data existed in a centralized location, the composition of medical kits could be adequately determined based on incidence of various medical conditions and procedures. Additionally, documentation of the hospital care, final diagnosis, and outcomes of patients treated in flight, rather than symptoms alone, would allow higher fidelity classification of pathologies, as well as facilitate research and protocols to safeguard future passengers.[10]

The authors recognize that these recommendations may represent an increased cost to airlines and a cost/benefit analysis is important for any commercial entity.[3] However, these changes are likely to provide enhanced medical care for patients in the commercial aeromedical environment. With the correct equipment, up-to-date medications, and appropriate access to medical kits, we hope that patients can be better cared for in a time of isolation and immense need. We believe

these modifications will empower volunteer clinicians with the best tools possible when facing a challenging situation with limited resources and support.

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