



MINI-REVIEW

Pilot training: What can surgeons learn from it?



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Training;
Patient safety;
Performance
evaluation

ABBREVIATIONS

FAA, USA Federal
Aviation Authority;
EASA, European
Aviation Safety
Agency

Abstract Objective: To provide healthcare professionals with an insight into training in aviation and its possible transfer into surgery.

Methods: From research online and into company archives, relevant publications and information were identified.

Results: Current airline pilot training consists of two categories, basic training and type-rating. Training methods comprise classroom instruction, computer-based training and practical training, in either the aircraft or a flight-training device, which ranges from a fixed-base flight-training device to a full flight simulator. Pilot training not only includes technical and procedural instruction, but also training in non-technical skills like crisis management, decision-making, leadership and communication. Training syllabuses, training devices and instructors are internationally standardized and these standards are legally binding. Re-qualification and recurrent training are mandatory at all stages of a pilot's and instructor's career.

Conclusion: Surgeons and pilots have much in common, i.e., they work in a 'real-time' three-dimensional environment under high physiological and psychological stress, operating expensive equipment, and the ultimate cost for error is measured in human lives. However, their training differs considerably. Transferring these well-tried aviation methods into healthcare will make surgical training more efficient, more effective and ultimately safer.

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Introduction

Aviation has advanced enormously in making flying a routine and safe experience for its passengers. In the beginning each pilot learned from his or her peers and knowledge was handed down from master to student. During the pioneering stages every flight brought new insights. Setbacks were a daily experience and often

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pilots paid the ultimate price for failure, i.e., death. Naturally there was a strong urge to help fellow pilots to survive in a harsh and unforgiving environment. The best practices found their way into manuals, and standard operating procedures were made mandatory. For example, current aircraft manufacturers issue an operating manual for each type of aircraft they sell and that has to be approved by the country's aviation authority, e.g., The Federal Aviation Authority (FAA) for the USA, and European Aviation Safety Agency (EASA) for the European Union.

Safety is the ultimate goal in aviation (as well in healthcare, as stated in the Hippocratic Oath 'primum nil nocere'). The aviation community is very determined to convert lessons learned from incidents and accidents into better procedures and practices. For every rule in the pilot's handbook there is someone who has paid for it with their life. Therefore best practices and results from accident investigations are formulated into standard operating procedures that are legally binding for the entire industry.

At present the training and qualification of an airline pilot consists of two elements. First, there is general training as an airline pilot (transport pilot licence) and second the training for the specific aircraft he or she is going to fly (the so-called type-rating). The first part takes ≈ 2 years of training at an average cost of €100,000. The second part lasts 6–8 weeks with an average cost of €30,000–40,000. Basically *ab initio* training for a new airline pilot takes ≈ 3 years and costs €150,000–200,000.

What is taught?

'Ignoranti quem portum petat – nullus suus ventus est.' (Seneca, 4 BCE); if you do not know which port you are heading for – no winds will be in your favour. A univer-

sal pilot's licence requires a uniform syllabus. If the kind of proficiency is not defined, or which kind of behaviour should be achieved, it will not be possible to compare the qualifications and training measures that lead to them. International regulatory bodies like the EASA and the FAA have issued detailed syllabuses that are mandatory for each training organization [1]. To a limited extent this has also been achieved in healthcare [2], but it seems that internationally binding standards are not yet in view. The reasons for that are multifaceted, e.g., the vast amount of medical knowledge and the speed of its progress. Nevertheless, it is a barrier to comparing the efficiency of training methods and results.

During the last 30 years Crew Resource Management (the way aviation professionals deal with each other and handle the challenges they face together with their team) became increasingly important in aviation. Consequently the contents of pilot training and rating had to be amended. Currently it is generally agreed that a good pilot shows proficiency not only in technical skills and procedures but also in interpersonal skills, also known as non-technical skills [3].

How are pilots trained in aviation?

As mentioned above, pilot training consists of Basic Training to obtain the pilot's licence, and specific training, like the Type-Rating Course, to qualify flying on a certain model of aircraft. These are summarised under the terms 'initial' and 'conversion' training. The training is accompanied by life-time recurrent training. Each quality airline provides its pilots with regular simulator events to train for particular emergency scenarios. This training is termed 'line-oriented flight training'. During these sessions a pre-selected emergency scenario is handled by the crew in real time. The flight is videotaped for the subsequent debriefing, where the crew

Table 1 Elements of interpersonal skills [4].

Categories	Elements	Example behaviours
Cooperation	Team building and maintenance Considering others Supporting others Conflict solving	Establishes an atmosphere for open communication and participation Takes condition of other crew members into account Helps other crew members in a demanding situation Concentrates on what is right rather than who is right
Leadership and managerial skills	Use of authority and assertiveness Maintaining standards Planning and co-ordinating Workload management	Takes initiative to ensure involvement and task completion Intervenes if task completion deviates from standards Clearly states intentions and goals Allocates enough time to complete tasks
Situation awareness	System awareness Environmental awareness Anticipation	Monitors and reports changes in system states Collects information about the environment Identifies possible/future problems
Decision making	Problem definition/diagnosis Option generation Risk assessment/option choice Outcome review	Reviews causal factors with other crew members States alternative courses of action Asks other crew member for options Considers and shares risks of alternative courses of action Checks outcome against plan

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