Understanding the IMSAFE Checklist and the Dirty Dozen List - Awareness is Critical

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On 1st June 2009. Marc Dubois, the captain of Air France Flight 447 was recorded on the Cockpit Voice Recorder (CVR) as saying "I didn't sleep enough last night. One hour. It's not enough right now".

AF Flight 447 was a scheduled international passenger flight from Rio de Janeiro, Brazil, to Paris, France. The Airbus A330 serving the flight stalled and couldn't be recovered by pilots, eventually crashing into the Atlantic Ocean at 02:14 UTC. In total, 228 people (216 passengers and 12 crew onboard) lost their lives in the AF Flight 447 accident. Devastatingly, there were no survivors.

In accordance with the crash investigation report; the aircraft crashed after temporary inconsistencies between the airspeed measurements, -likely because of the aircraft's pitot tubes being obstructed by ice crystals - caused the autopilot to disconnect, after which the crew reacted incorrectly and ultimately caused the aircraft to enter an aerodynamic stall, from which it did not recover. Now it is known that the AF Flight 447 could have been recovered from human factor discipline.

An aircraft accident is almost always the result of a chain of events rather than a single event. For minimizing the accident/incident probability, it is possible to declare that aviation is an industry of checklists. It is possible to find a checklist for almost every single system on an airplane especially for flight operations and maintenance activities. The checklists are periodically reviewed and changed as necessary. For flight operations, there are checklists such as the walk-around checklist, the engine start-up checklist, the before take-off and after take-off checklist, and many more. The checklist for emergency procedures is generally carried on the knee-boards and/or easy-reachable areas. Other than machines and components there are checklists for humans also. These checklists are regulated for cockpit and cabin crew, for maintenance experts, for dispatchers fitness, and readiness for aerial activities. In an "acrostic" way, the checklist for human resources in the aviation industry is called I'M SAFE. It was initially released by the FAA and rapidly adopted by airliners.

IMSAFE stands for:

Illness: *The current or recent illnesses that could affect flight.*

Medication: *Any medications are taken that could impair the pilot's ability to fly.*

Stress: *Unusual psychological pressure and/or anxiety.*

Alcohol: *Any alcohol in the last eight hours.*

Fatigue: *Being tired and/or not adequately rested.*

Emotion: *Being emotionally upset about anything.*

Illness

Pilots should have a valid medical certificate for piloting operations. Besides, FAR 61.53 indicates that "If a pilot has or develops a known medical condition that would prevent him from obtaining a medical certificate, he is prohibited from flying as a required crewmember". There is another regulation item in FAR, it is FAR 91.3 which also underlines the illness issues stating that "The pilot in command is directly responsible for the operation of the flight. The pilot alone is responsible for ensuring his own health is up to par before taking the controls".

Conclusionally a pilot in a situation represented in Figure 1 should take his own responsibility for informing the airliner company and seek a doctor consultancy as soon as possible.

Medication

It is known that almost every medication has some side effects. In this manner, many prescriptions can be dangerous for a pilot in terms of adverse effects for flying. An Aviation Medical Examiner (AME) is an expert who can advise on pilots on physical and psychological effects. In the FAA's safety briefing brochure named "Flight After Use of Medications with Sedating Effects," it is clearly defined that pilots should wait until at least five dosage periods have passed. In other words, if the prescription says to take medication every 4 to 6 hours, pilots should wait until at least 30 hours (5 X 6 Hours) after the last dose before piloting the aircraft (FAA, 2013) As is shown in Figure 2, a pilot should declare themselves "unable to work" if she/he feels any adverse effects of medication.

Stress

For most of us, stress is a regular part of our daily life. It is claimed by some experts that a little stress might be beneficial for keeping us on our toes. But if it is higher than the average line, then it could adversely affect job performance, especially commercial airliner pilots. Stress is cumulative and it could be either acute (Short-Term) or chronic (Long-Term) like human fatigue (Göker, 2018)

Alcohol

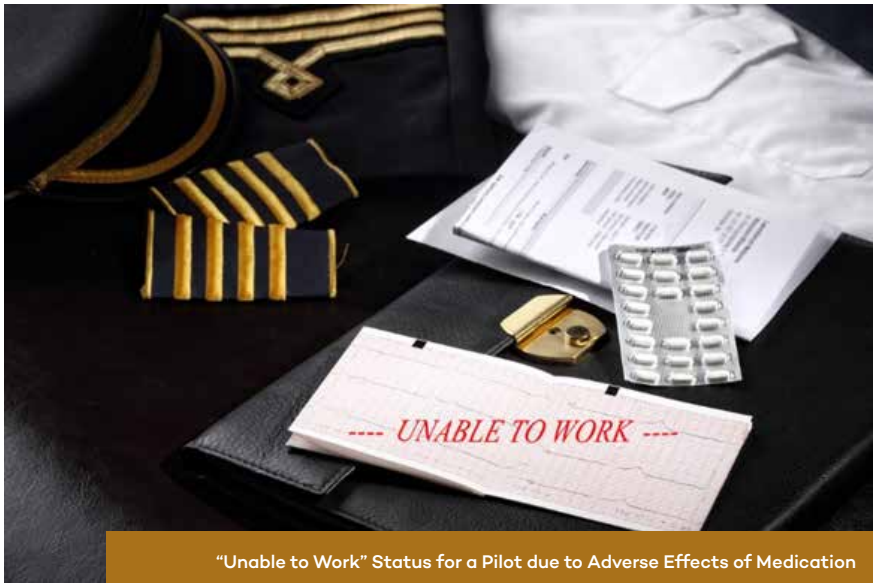
Alcohol dulls the senses. At high altitudes, it is more effective than at sea level. Another adverse impact of alcohol is dehydrating the body, as concluded in a study regarding "alcohol and altitude relation" conducted by American psychologist R. A. McFarland in the 1930s. This study and many more investigations underline that alcohol does have a more powerful effect on the body at higher elevations. These studies concluded that 2 or 3 drinks taken at a high altitude are equivalent to 4 or 5 drinks taken at sea level. There's a positive correlation between alcohol and altitude.

FAR 91.17 clearly forbids consuming alcohol. It states that; "No person may act or attempt to act as a crewmember of a civil aircraft;

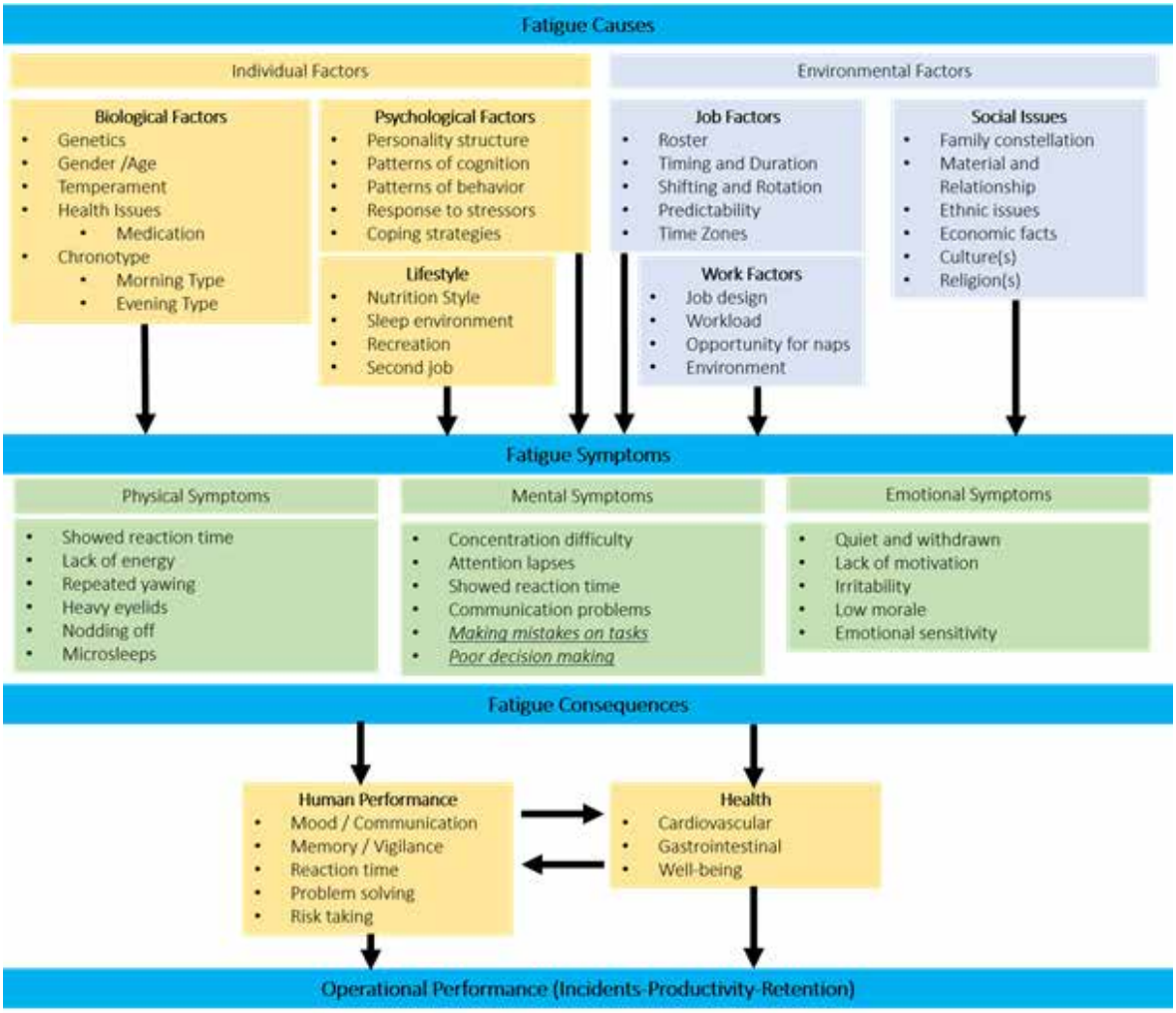
A Pilot in Need of Medical Assistance

- *Within 8 hours after the consumption of any alcoholic beverage,*
- *While under the influence of alcohol,*
- *While using any drug that affects the person's faculties in any way contrary to safety."*

The FAA also recommends 24 hours of pause after consuming alcohol and before sitting behind the yoke/stick. Alcohol avoidance is as critical as developing a flight plan, a good preflight inspection, obeying ATC procedures, and avoiding severe weather. Ideally, total avoidance of alcohol should be a key element observed by every pilot in planning or accomplishing a flight. Although there's a rule called "8 hours from bottle to throttle" many airlines have a more stringent 12 hour time limit.



"Unable to Work" Status for a Pilot due to Adverse Effects of Medication



Fatigue

Undoubtedly piloting tasks require higher-order intellectual processing and further-focusing abilities. On the other hand, fatigue is a crucial and cumulative factor for aviation safety causing human errors via a decrease in the abilities to conduct these tasks.

Factors that cause human fatigue can be provided as follow;

- *Sleep deprivation,*
- *Circadian rhythm abnormalities,*
- *Health-related tiredness,*
- *Task-induced influences*

These adverse effects may include significant degradation in;

- *Decision-making skills,*
- *Memory sharpness,*
- *Judgment proficiency,*
- *Reaction time*
- *Situational awareness in aerial operations.*

Literally, the factors provided above could lead to accidents. (Bendac etc, 2020)

The chronic form of fatigue is more insidious and subjective. Factors causing fatigue are lack of sleep, crew scheduling, a long duty period, Jet or shift lag, high workload, and lacking physical or mental fitness. There are subjective and objective measurements to estimate fatigue levels. Figure 3 shows the causes, symptoms, and consequences of fatigue.

Subjective techniques are based on self-report of sleep and tiredness whereas objective interventions are built on the basis of the physiological features of the subject (Brain waves, Eye gaze, Facial feature recognition) or their physical manifestations (Muscle tone, Wrist inactivity, Head orientation). Fatigue measurements aim to support and maintain alertness and performance during a long or uneventful duty period. Fatigue countermeasures are mainly based on self-reported data and there is a need for a "safety" factor for self-reports (Göker, 2018)

Emotion

Unlike commercial drivers, who can pull over at a rest stop if they feel uncomfortable and fatigue is setting in, commercial pilots cannot pull over at a convenient rest stop such as on the nearest cloud.

Albeit pilots are generally known as calm, stoic, and patient but they are also human and are affected by environmental and social conditions. It should always be kept in mind that emotions stay deep and surface under stress or pressure. In some safety research, it is stated that "pupil-based parameters are sensitive to emotion, and pupil changes are associated with motivation, distress, and drowsiness". It is noteworthy to say that there is a correlation between physiological features and emotional appearances.

Conclusion

The ICAO and IATA Fatigue Risk Management Technical Group have been studying Extending Flight and Duty Limits for COVID-19.

It is visible that during Covid days many jobs have been negatively affected by working conditions. In that manner, the ICAO has warned pilots in terms of the elements of the Dirty Dozen. The ICAO warnings about COVID-19 risks in terms of the Dirty Dozen are briefly summarized below:

• Lack of Communication

Inadequate/ ineffective communication of new rules, SOPs from regulator or airline management or the operators

Habit interference - interferes with actions taken, ie automatically shaking hands, touching controls, etc.

• Complacency

Lockdown has changed the way we live, for weeks to months at a time.

Time management and priorities have shifted and a refocus could take time.

Overconfidence and under confidence both need to be avoided.

• Lack of Knowledge

A lot has changed with COVID-19 still around. Airport procedures, passenger screening, first aid and CPR guidelines, cockpit disinfection, checklists, management of passenger illness on board, international rules, etc. – it's a lot of unlearning and new learning. It takes a while for the new information and procedures to become a habit. While fear is not required, awareness and alertness is a must.

• Distractions

Changes in living patterns in recent weeks, a sick or unattended family member, increased procedures, new protocols, and return to flying after a gap are all distractors. Since new systems take time to be seamlessly established; and the dynamics of the problems may call for further changes, one needs to be mindful, agile, and focused.

• Lack of Teamwork

The dynamics of the situation are such that everyone is still learning and coping.

• Fatigue

Readjusting to time zones and flying schedules after such a significant break could be difficult initially. Obesity, lack of exercise, alcohol, and relearning of tasks can also lead to easy physical and mental fatigue.

• Lack of Resources

Financial trouble may leave companies with fewer people to do more work. Social distancing may allow for less personal interactions. Constant screening, protection, and disinfection measures may burden existing resources thus leading to some gaps in the system.

• Pressure

Relief flights, flying only specific routes, fear of contracting the virus, restricted movements during layovers, reduced number of crew, CRM, having a potential carrier or COVID-19 patient on-board are all additional pressures while flying.

• Lack of Assertiveness

Everyone is dealing with a new physical and mental situation. Some procedures are longer, some digital, and some with more restrictions. It may take time to familiarize and adapt.

• Stress

Financial losses, the anxiety of going back to the family after a flight, anger, lack of control, frustration, resentment, lack of confidence, the uncertainty of the future and return to 'normalcy', illness or death of a loved one, a child who has yet to resume schooling or exams, the need to earn, living your passion of flying during such trying times and safety of self and others – all add to the stress.

New ways of living at home, at work, and in society.

Wearing PPE suits while flying, required COVID-19 tests, hotel stays pre- and post-flights and layover, restricted activities during hotel stay including food.

Social distancing is the new norm and has caused a distance between us and impacts our happiness.

• Lack of Awareness

Guidelines are changing often, employers may have to change protocols as per national and international requirements and lessons learned after resuming operations. It is imperative for everyone to be aware of the risks and to know what is expected of them.

• Norms

In the COVID-19 era, safety has an enhanced definition. The goal is Flight safety while maintaining personal safety (ICAO, 2020).