Public health measures and oversight mechanisms in aviation – some concerns

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International standards
ICAO Annex 9. Facilitation

- **CHAPTER 6. INTERNATIONAL AIRPORTS — FACILITIES AND SERVICES FOR TRAFFIC**
  - **C. Facilities required for implementation of public health, emergency medical relief, and animal and plant quarantine measures**
    - 6.39 Each Contracting State shall ensure that handling and distribution procedures for consumable products (i.e. food, drink and water supplies) on board aircraft and at the airport are in compliance with the International Health Regulations (2005) and relevant guidelines of the World Health Organization (WHO) and Food and Agriculture Organization (FAO).
    - 6.40 Each Contracting State shall ensure that persons and entities involved in the handling and distribution of consumable products (i.e. food, drink and water supplies) on board aircraft and at the airport are appropriately trained to provide such services in compliance with the relevant guidelines of WHO and FAO. …..
      - Note.— Consultation with WHO on all measures concerning passenger health is advisable

International standards

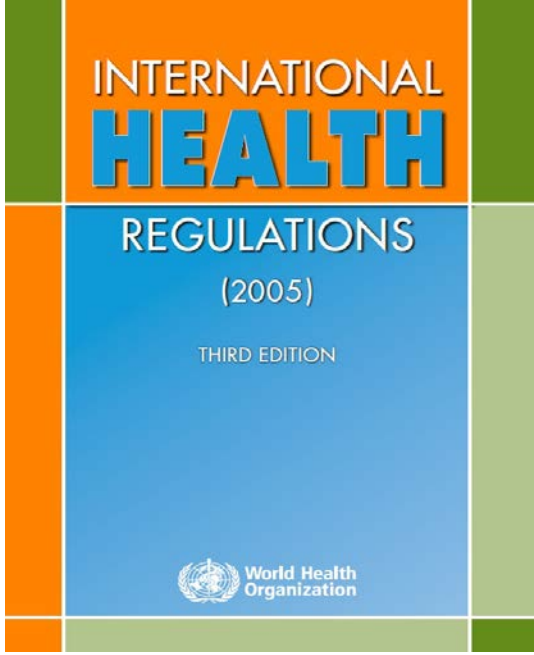
ICAO Annex 9. Facilitation

CHAPTER 8. FACILITATION PROVISIONS COVERING SPECIFIC SUBJECTS

E. Implementation of international health regulations and related provisions

- 8.14 Contracting States **shall comply** with the pertinent provisions of the *International Health Regulations* (2005) of the World Health Organization.

International standards
WHO IHR



Article 20 Airports and ports

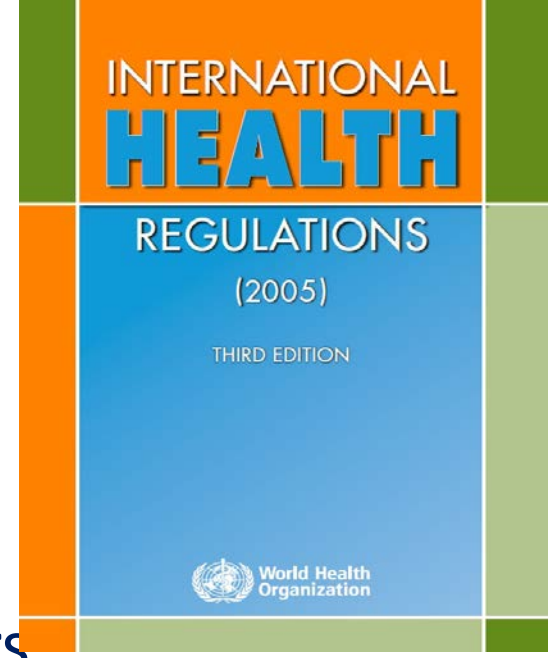
1. States Parties shall designate the airports and ports that shall develop the capacities provided in Annex 1

ANNEX 1

A. CORE CAPACITY REQUIREMENTS FOR SURVEILLANCE AND RESPONSE

B. CORE CAPACITY REQUIREMENTS FOR DESIGNATED AIRPORTS, PORTS AND GROUND CROSSINGS

International standards
WHO IHR (cont.)



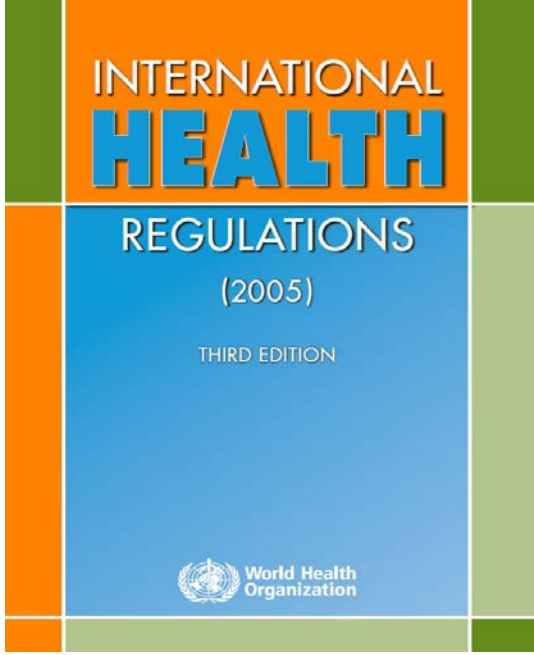
Article 22 Role of competent authorities

1. The competent authorities **shall**:

(a) be responsible for monitoring baggage, cargo, containers, conveyances, goods, postal parcels and human remains departing and arriving from affected areas, so that they are maintained in such a condition that they are free of sources of infection or contamination, including vectors and reservoirs;

(b) ensure, as far as practicable, **that facilities** used by travellers at points of entry **are maintained in a sanitary condition** and are kept free of sources of infection or contamination, including vectors and reservoirs;

International standards
WHO IHR (cont.)



Article 22 Role of competent authorities

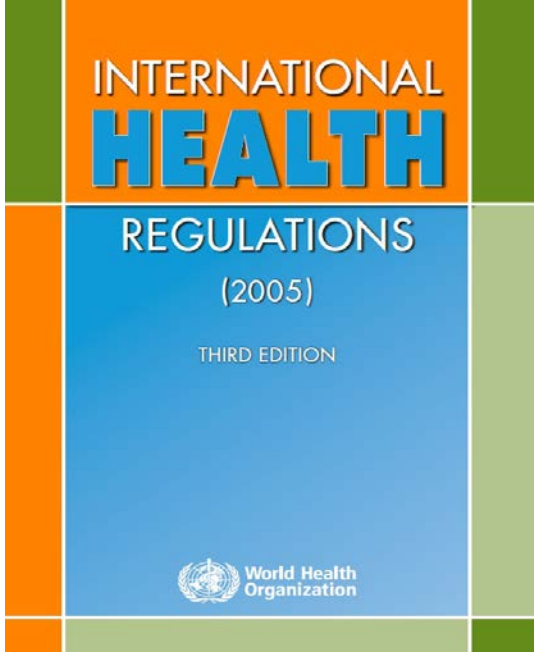
1. The competent authorities **shall**:

(c) **be responsible for the supervision** of any deratting, disinfection, disinsection or decontamination of baggage, cargo, containers, **conveyances,** goods, postal parcels and human remains or **sanitary measures for persons, as appropriate under these Regulations**;

(d) **advise conveyance operators, as far in advance as possible, of their intent to apply control measures to a conveyance**, and shall provide, where available, written information concerning the methods to be employed;

(e) be responsible for the **supervision of the removal and safe disposal of any contaminated water or food**, human or animal dejecta, wastewater and any other contaminated matter from a conveyance;

International standards
WHO IHR (cont.)



B. CORE CAPACITY REQUIREMENTS FOR DESIGNATED AIRPORTS, PORTS AND GROUND CROSSINGS

1. At all times

- The capacities:

  (c) to provide **trained personnel for the inspection of conveyances**;

  (d) to ensure **a safe environment for travellers** using point of entry facilities, including portable water supplies, eating establishments, flight catering facilities, public washrooms, appropriate solid and liquid waste disposal services and other potential risk areas, by conducting **inspection programmes**, as appropriate; and

  (e) to provide as far as practicable a programme and trained personnel for the control of vectors and reservoirs in and near points of entry.

Public health matter of air passenger's health

What is most common disease, affecting air passengers?

Traveler's diarrhea !!!

Inspection of safe environment eating establishments, flight catering facilities

Traveler’s diarrhea

- Travellers' diarrhea is the most common illness that affects travellers. It is easily spread from person to person or by eating food or drinking water contaminated with feces (2022).
  - https://travel.gc.ca/travelling/health-safety/diseases

- The most common causes of medical events on board are gastrointestinal diseases or troubles (25%) (2016)
  - https://www.amjmed.com/article/S0002-9343(16)30546-0/pdf

Catering on board is not necessarily the only cause of the foodborne traveler’s diarrhea, but there is no control or investigation procedures of the cases of air passengers affected

Public health matter of flight safety concern

Meals for flight and cabin crew members

What is the most common cause of flight crew incapacitation in flight?

Gastroenteritis!

Inspection of safe environment eating establishments, flight catering facilities

Causes of pilots' incapacitation

ICAO Doc 8984 – Manual of Civil Aviation Medicine

Table I-3-1. Causes of incapacitation in airline pilots, in order of frequency.

(Adapted from Buley, 1969; Green and James, 1991)

1.	Uncontrollable bowel action (21%) and "other" gastrointestinal symptoms (54%)	75%
2.	Earache/blocked ear	8%
3.	Faintness/general weakness	7%
4.	Headache, including migraine	6%
5.	Vertigo/disorientation	4%

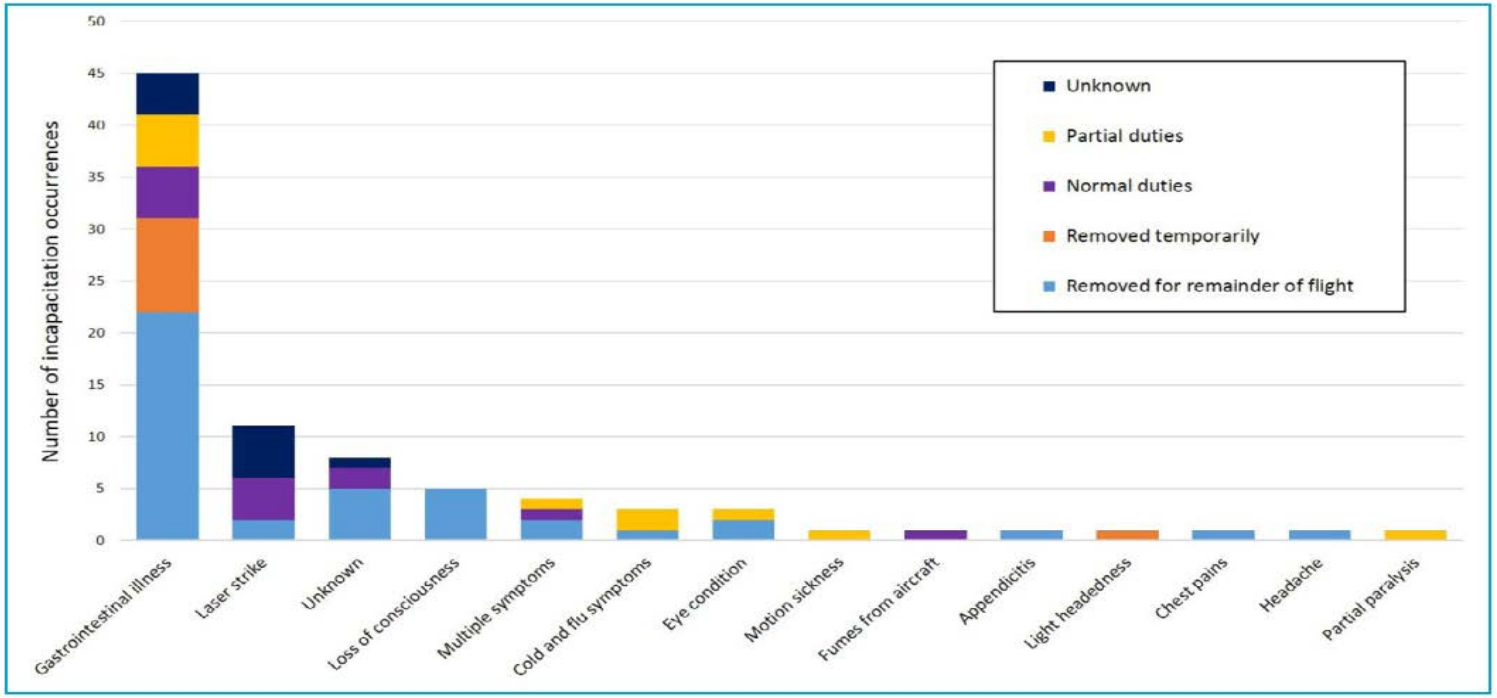
Causes of pilots' incapacitation

Australian Transport Safety Bureau - Pilot incapacitation occurrences 2010–2014

1.	Gastrointestinal illness	75%
2.	Laser strike	11%
3.	Unknown	8%
4.	Loss of conscience	5%
5.	Multiple symptoms	4%

In the majority of the occurrences reported, the incapacitation was severe enough for the pilot to be removed from duty for the remainder of the flight

Figure 1: Causes of pilot incapacitation and resultant duty restrictions in high capacity transport operations, 2010 to 2014



https://www.atsb.gov.au/sites/default/files/media/5768970/ar-2015-096-final.pdf

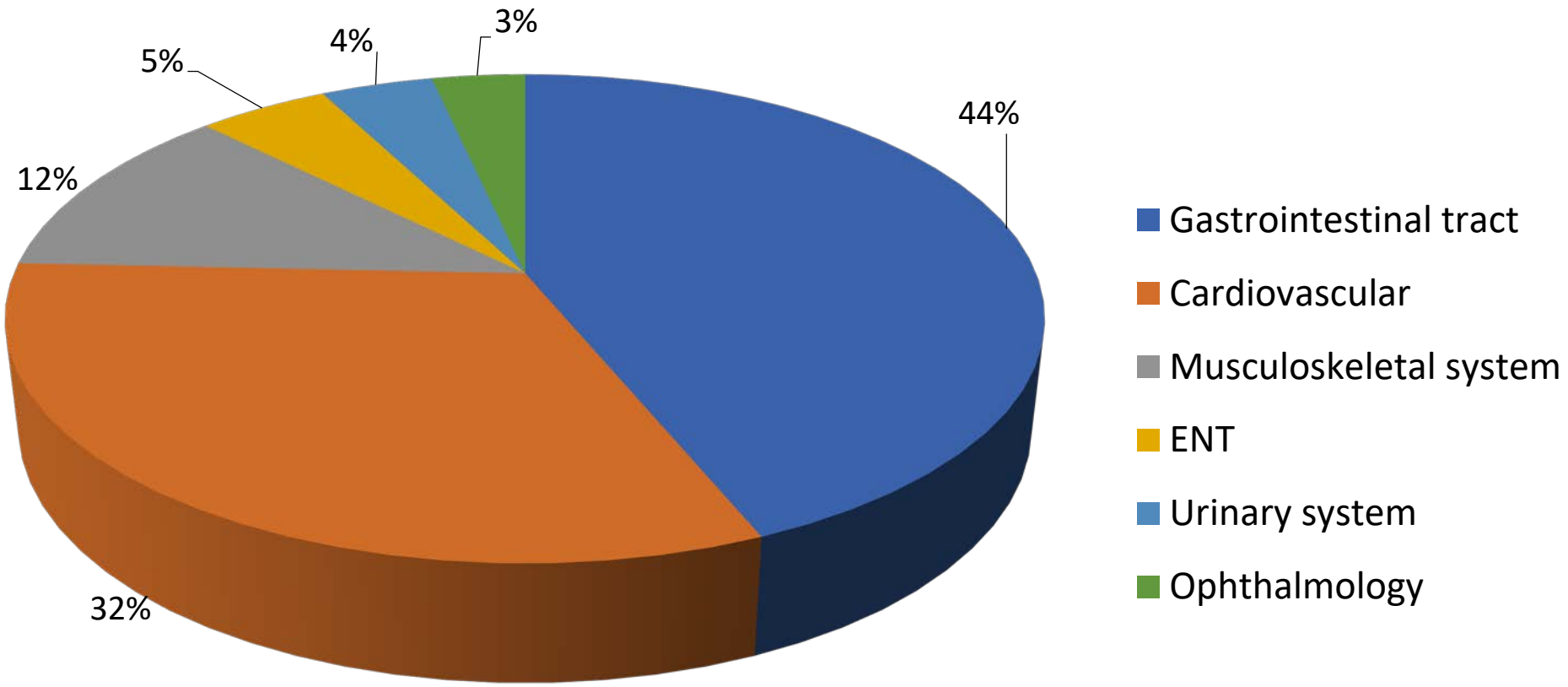
Causes of pilots' incapacitation

Transport CANADA - Pilot incapacitation

- The most common causes of sudden incapacitation are gastrointestinal (stomach and bowel) problems, such as stomach cramps, nausea, vomiting or diarrhea.
- Pilots must be careful of the food and drink they consume, particularly in remote areas or where there are poor facilities. Two pilots flying together should never eat the same food, and preferably should not eat at the same time.

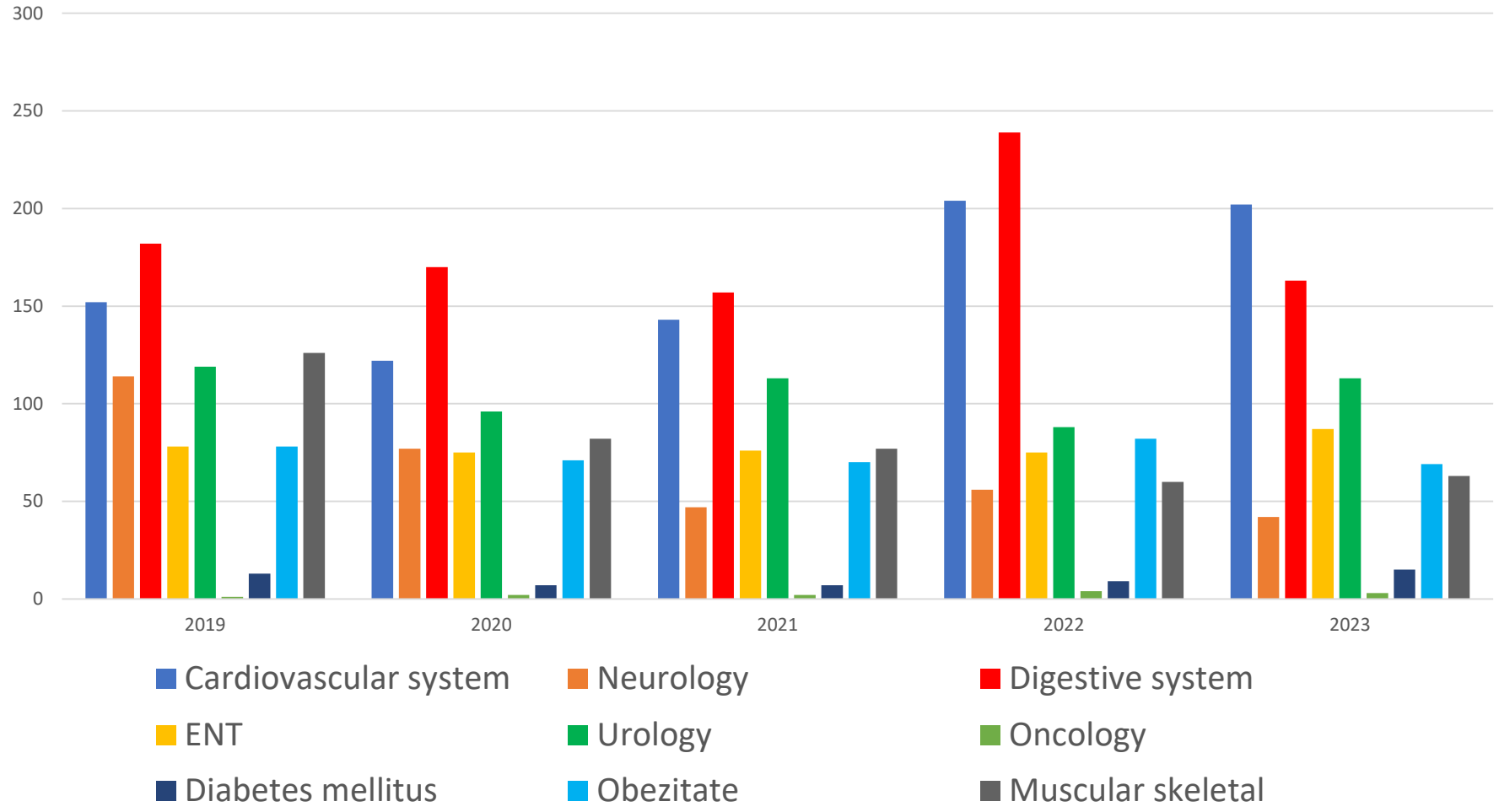
https://tc.canada.ca/en/aviation/publications/pilot-incapacitation-tp-11629

Medical cause for short term unfitness –2-6 mon.
(holders of Class 1 medical certificate, 2014-2023, Moldova)



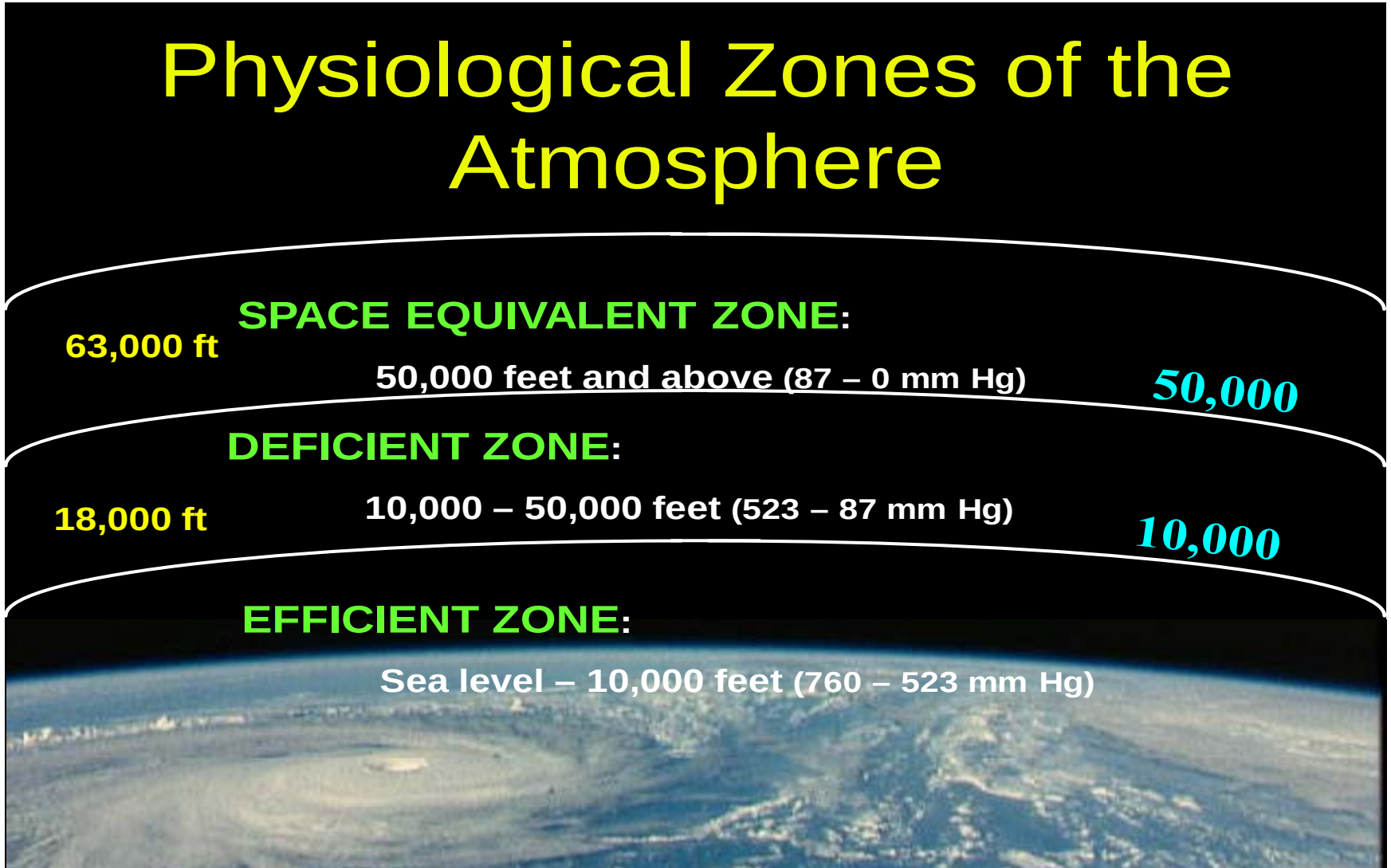
Morbidity

holders of Class 1 medical certificate, 2019-2023, Moldova



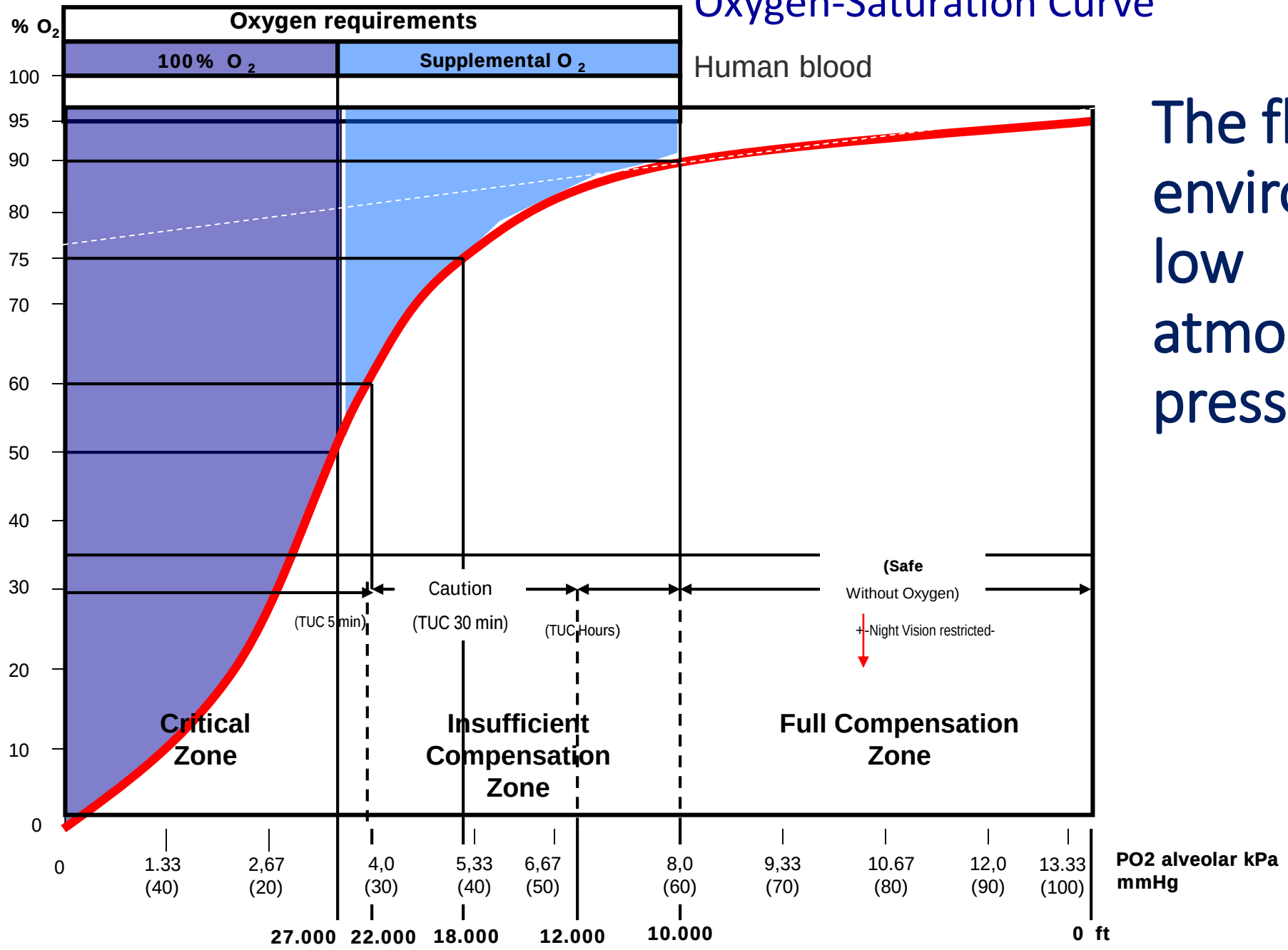
Aviation Physiology

The flight environment – low atmospheric pressure



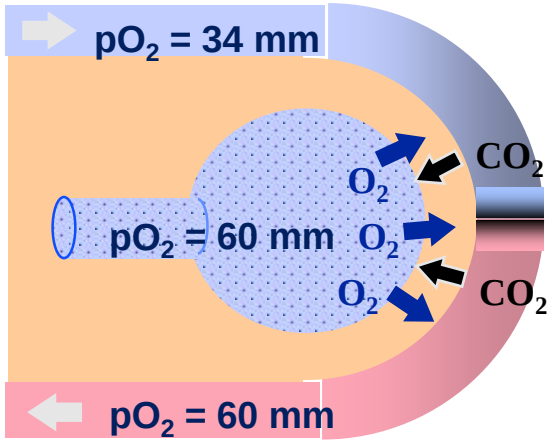
Oxygen-Saturation Curve

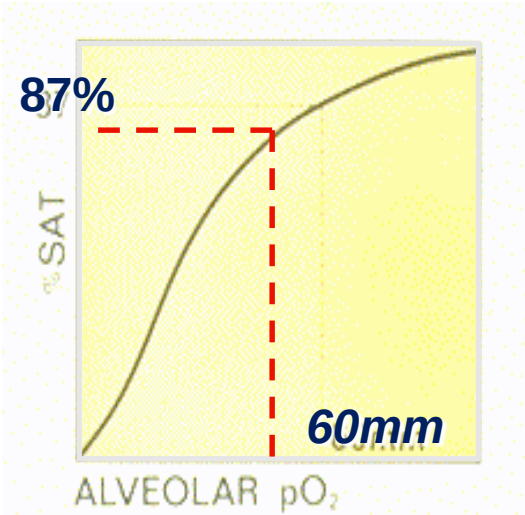
Human blood



The flight environment – low atmospheric pressure

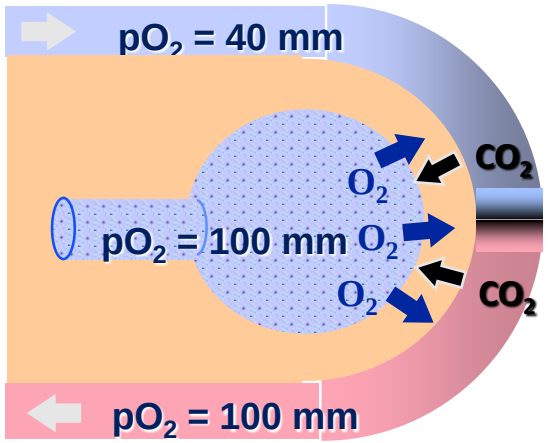
Effect of Pressure on Blood O_2 Saturation ($SatO_2$)

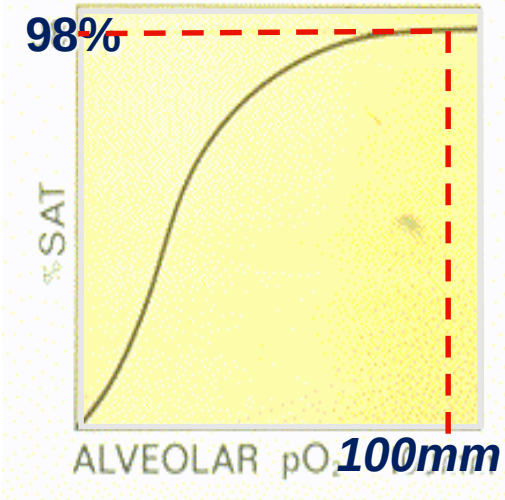




10,000 feet

Alveolar pO_2	=	60mm
Arterial pO_2	=	34mm
Press. Grad.	=	26mm
Arterial Sat.	=	87%

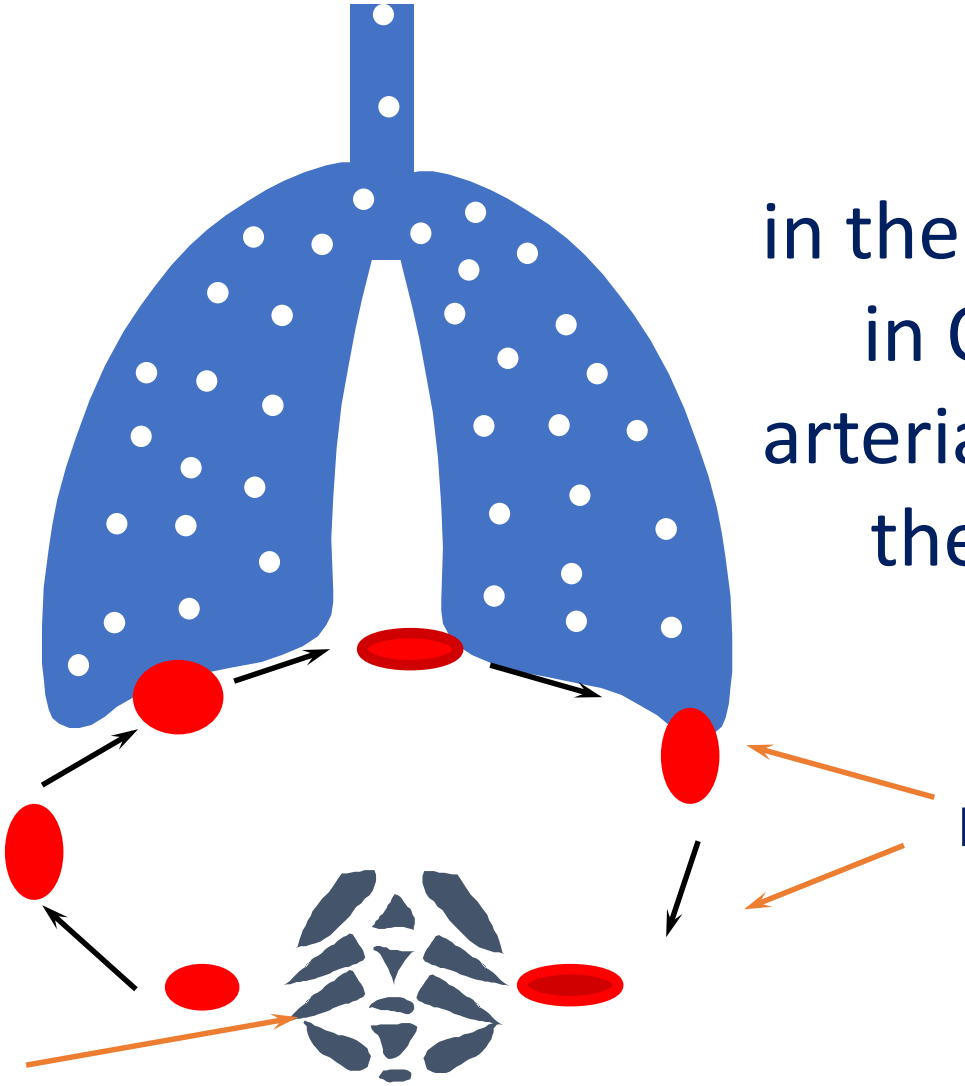




Sea level

Alveolar pO_2	=	100mm
Arterial pO_2	=	40mm
Press. Grad.	=	60mm
Arterial Sat.	=	98%

Hypoxic Hypoxia



Reduced pO_2 in the lungs => reduction in O_2 tension in the arterial blood & hence in the capillary blood

Aviation Physiology

Aircraft cabin environment

- Cabin pressurization systems ensure that the effective altitude to which the occupants are actually exposed is much lower than of the one aircraft is flown. It ensures the effective pressure for the normal human's vital activity
- Standard of ICAO - the 'cabin altitude' in commercial aircraft should not exceed 8000 feet in normal operations with the pressure – 565 mmHg
- P_AO_2 is approximately 75mm Hg. However, due to the shape of the oxy-haemoglobin dissociation curve, this only results in a fall of arterial oxygen saturation to around 90% and is well tolerated in healthy travellers.

Self imposed stress that increase hypoxia

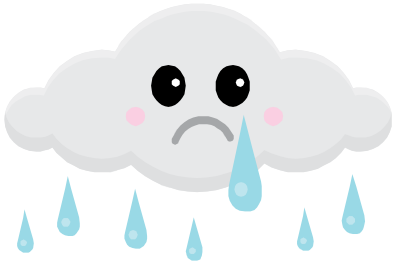
- Drugs
- Exhaustion
- Alcohol
- Tobacco
- Hypoglycemia

  DEATH

Meals for crew members

- Flight and cabin crew members have considerable occupational pressures, such as shift work, sedentary work, stress, fatigue and environmental altitude physiological conditions. A balanced diet plays a key role in overcoming these challenges as it supplies adequate nutrients required for their safety performance
- The qualitative and quantitative characteristics of the food are important to be met for the appropriate diet of crew members.
- Some low-cost operators provide very limited amount and variety of food for crew members' meals, motivating and accepting pilots to take food from home
- No harmonised approach in controlling how catering for crew members is organised and safety of their meals is ensured

Aviation Physiology
The flight environment: Low humidity



- Humans are sensitive to humid air because the human body uses evaporative cooling as the primary mechanism to regulate temperature.
- Comfortable humidities for humans depend on the temperature, between 40 % and 60 %.
- At an altitude of 30,000 ft, the outside air temperature is in the region of – 40^{o}C and is extremely dry, typically containing about 0.15 g/kg of moisture. For pressurised aircraft flying at these levels, the conditioned air entering the cabin has a relative humidity of <1%.
- Exhaled moisture from passengers and crew, together with moisture from galleys and toilets, increases the humidity but the average levels usually remain in the region of 6 to 10% which is below the 20% normally accepted as comfort level. Levels on the flight deck can be as low as 3%.

Aviation Physiology
The flight environment: Low humidity

- Low humidity can cause mild subjective symptoms, such as dryness of the eyes and mucous membranes – tissue lining nasal passages to dry, crack and become more susceptible to penetration of some viruses, may also cause eye irritation.

- Sufficient Drinking Recommended for Crew Members to Avoid Dehydration

- Water consumption on board the aircraft is a physiological need. Air passengers during flights of many European Air Operators (low-cost mostly) should buy water

Aviation Physiology
The flight environment: Low humidity

- **Ryanair –** No free food or drink onboard, not even a free bottle of water. Buy on board only.
- **EasyJet –** No free food or drink onboard “although crew will provide tap water if requested,” the airline says. More options on the buy-on-board menu.
- **Wizz Air –** No free food or water. Buy on board only.
- **Aer Lingus -** No free food or water. Buy on board only.
- **Iberia –** For flights under four and a half hours, passengers have to buy snacks and drinks on board.
- **Vueling –** No free water or snacks. Buy on board only.
- **Norwegian –** All food and drink needs to be purchased on board. For flights over two hours and 15 minutes, hot meals can also be pre-ordered for a fee.
- **TAP –** Food and drink can only be bought on board.

The flight environment: clean cabin for passengers and crew members

IHR of WHO:

At all times

- The capacities:

  (c) to provide **trained personnel for the inspection of conveyances**;

  (d) to ensure **a safe environment for travelers…**

Cleaning of aircraft after each flight is not ensured by many low-cost operators in Europe and globally. Cabin crew members are requested to clean the cabin between flights. Proper cleaning by handling staff is only done at the end of the day

Public Health matters in aviation - challenges

- Public health services play an important, to say better – the leading role in organizing measures at the airport to prevent the impact of non compliance with hygiene and sanitary standards before any public health event takes place and also play a coordinating role between all stakeholders at the airport in preparedness and response to the public health event.
- However, the harmonization in implementation of the international regulation of hygiene and sanitation in aviation is limited (Non compliance with **binding standards** of WHO IHR (2005) on points of entries including the designated airports)
- There is a need of presence and work of the public health authority at the airport for the entire period of the airport's operation and that should be accomplished at each international airport not only at the designated ones.
- No requirements on hygiene and sanitation control for all international airports, airlines

Public Health matters in aviation - challenges

- More details on public health matters in aviation might need to be better regulated by ICAO Annexes to ensure safety related public health aspects at all times and for better preparedness for managing aviation in any threats to public health

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