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Current and future considerations in Aviation Medical Certification

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Presentation Overview

01 Risk Assessment

02 Technical updates

03 The role of new technology

04 Upper age limit

05 Single pilot, extended minimum crew and remote pilot operations

06 Non-AME examinations

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Risk Assessment

Aviation Medicine in a changing environment

Individual	Medical	Aviation
Psychological/ mental	Scientific developments	Operational variability
Lifestyle diseases	Role of telemedicine	Human in the system
Fitness to fly	Certification challenges	Role of automation
Use of technology in a responsible and appropriate way		
Review risk assessment and risk mitigation processes and tools		
Review selection, training, assessment and certification procedures and tools		
Consider role of competency based performance assessments		
Consider monitoring and oversight outcomes		

Risk Assessment in a changing environment

- Multiple types of operations
- Multiple stakeholders
- Existing risk in the system
- Additional risk introduced into the system
- Multiple risk assessment models
- Appropriate application of the 1% rule
- Use of risk matrices, qualitative and quantitative tools

Risk Mitigation in a changing environment

- Assess potential risk mitigation measures
- Independent evidence-informed approach
- Risk mitigation model e.g. Swiss Cheese model
- Balance the risks and the benefits
- Acceptable level of risk (risk threshold)
- User acceptance and compliance
- Scheduled regular review

Technical updates

Colour vision

Country	Testing methods
1	AOC/HRR/Dvorine/Ishihara (up to 8 errors allowed), Farnsworth Lantern , Optec 9000, Richmond HRR, OCVT (Operational colour vision test)
2	Ishihara, Holmes Wright Lantern, Farnsworth Lantern, CAD, OCVA (operational colour vision assessment)
3	Ishihara, Holmes Wright Lantern, Farnsworth Lantern, D15, CAD, OCVA (operational colour vision assessment)
4	AOC/HRR, Farnsworth D15
5	Ishihara, CAD/PMFT (Practical Medical Flight Test) Video linked
6	Ishihara, Martin Lantern test
7	Ishihara, CAD
8	Ishihara, CAD

Diabetes

IDDM considerations

- Allowed: UK, Austria, USA Ireland, Canada, South Africa, Australia and Israel
- New insulin analogues
- Insulin delivery systems
- New monitoring systems: Continuous Glucose Monitoring (CGM) devices

Other updates

Priority areas

- Mental Health – post Covid, EASA study
- Telemedicine – post COVID developments
- Science and technology – CVS, vision, neurological
- Radiation – Occupational and passenger

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The role of technology

Telemedicine

Considerations for integration of telemedicine in various areas of Aviation Medicine and CAPSCA

- Non aviation regulation implications
- Feasibility and utility
- Infrastructural requirements
- Cost implications

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Technology and Artificial Intelligence

- Use of Chat GPT
- Virtual consultation
- Virtual examination
- Virtual training
- Virtual support
- Digital records and certificates
- Electronic medical certificates
- AI analysis – compliance with protocols
- Bio-monitoring of pilots
- Remote diagnosis & assistance
- Commercial space medicine

Integration in Aviation Medicine

- Accommodate the global rapidly advancing technology into increasingly complex aviation operations
- Balance acceptable level of risk with benefits of evolving technologies, considering societal acceptance
- Collaborate with all stakeholders for the highest level of harmonization

Upper Age Limit

Risk Assessment Upper Age Limit

- Sudden incapacity
  - Research available e.g. EASA study
  - Incident and accident data
- Subtle incapacity
  - Aviation medical reports
  - Peer reports
  - Performance data
- Cognitive decline
  - Cognitive testing
  - Peer reports
  - Performance data

Other Considerations Upper Age Limit

- Need representative data (pilots age 65 and older)
- National sovereignty (risk threshold)
- Bilateral or multilateral agreements
- Future developments
  - Single pilot
  - Extended multi-crew operations
  - Ultra long haul operations
  - Automation

Considerations when assessing risk in older pilots

Physical	Cognitive	Occupational
• **Sudden** • Cardiovascular • Central Nervous System • Gastro-intestinal • Renal • **Subtle** • Malignancy • Senses	• Judgement • Decision-making • Reaction time	• Circadian rhythm • Night work • Fatigue • Type of operation • Organizational factors

Potential risk mitigation measures

Medical

- Health promotion emphasis
- Increased frequency at higher age
- Additional tests (CVS, CNS, cognitive, sensory)
- Combined with operational and assessment

Operational

- Employer support
- Human factors/ CRM/ peer support/ FRMS
- Adjusted training practices
- Incapacity support and recovery training
- Crew pairing - old and experienced pilot with younger less experienced

Assessment

- Simulator checks and line checks
- Increased frequency
- Added parameters
- Combined with medical and operational mitigation measures

ANW Conclusions

a) The importance of a risk-based approach was emphasized and needs to be supported by scientific evidence and relevant data focused on commercial pilots operating over the age of 65 to address and measure real risks.

b) Age could be used as a predictor for risk management, but competency and performance assessments could be helpful in addressing individual risk assessment in addition to medical assessment.

c) Type of operations in terms of number of pilots and category of aircraft should be considered.

d) The panel was of the opinion that age limitations is an aviation system-wide safety concern and should not be used to solve other non-safety industry problems.

Single pilot, minimum crew and remote pilot operations

SiPO and eMCO Operations

European Union

Assess the issues and the feasibility of the implementation of **Extended Minimum Crew Operations (eMCO)** and **Single Pilot Operations (SiPO)** in the EU regulatory framework

United States

Conduct a review of FAA research and development activities in support of **single-piloted cargo aircraft** assisted with remote piloting and computer piloting

ICAO Assembly

Working paper from ICAO States submitted to the 41st Assembly

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Standards: Annex 6

- **Requirements for pilots**
  - Training, flight experience, certification, medical fitness to fly
  - No specific requirement to have more than one pilot on board

- **Aircraft design**
  - Flights operated in accordance with aircraft design specifications
  - Airworthiness approval

Standards: Annex 6

Flight operations

- Flights operated in accordance with approved flight operations and limitations
- Specific requirements e.g. night flight operations, HEMS

General assumptions

2 pilots on aircraft

Both physically and cognitively present

Both well rested

Systems & procedures in case of medical incapacity or a flight emergency

Aviation safety

- Achieved through **redundancy**
- Redundant **sub-systems** on aircraft and the ground
- **2-pilot** crew is part of the redundancy
- Current **safety record** and safety culture is based upon two properly rested, fully qualified and well-trained pilots

The pilot in the system

Sensory importance

- Sight (in and out of cockpit)
- Smell (smoke, fumes, electrical problem)
- Taste
- Touch (vibrations, stick shaker, control pressures)
- Auditory (alerts, engine noise, unusual sounds)

Example: British Airways Flight 009, 1982
Volcanic ash cloud

The pilot in the system

Human factors and performance

- Incapacitation (physical or mental)
- Need to leave cockpit (physiology)
- Social interaction and mental well-being (psychology)
- Situational awareness (Cognitive)
    - Time to assess situation
    - Reaction time
    - Distraction
    - Workload
    - Fatigue

Example: JetBlue Flight 191, 2012
Pilot mental breakdown

The pilot in the system

System safety procedures and technology

- Division of responsibilities between crew
  - Checklists
  - Pilot flying and pilot monitoring
  - Evacuation duties

- Accident prevention
  - Investigations e.g. ice on wings, engine malfunctions
  - Solve problems in unexpected situations

The pilot in the system

Remote oversight

- Lack of sensory cues
- Situational awareness and reaction time
- Communication link – delays, loss of link
- Cybersecurity

The pilot in the system

Recovery from incapacity

- **Early recognition**
  - Routine monitoring, especially during critical phases of flight
  - Pilot actions

- **Cabin crew assistance**
  - Immediate medical assistance
  - Inform ATC and other ground support sections
  - Locked cockpit door

- **Remote operator**
  - Provide ground support
  - Take-over of control in emergencies

Considerations for SiPO and eMCO Operations

- Operations would require:
  - Aircraft design
  - New procedures
  - New levels of automation
  - Remote pilot on ground to support the single pilot and able to take over when needed
- Balance the risks and the benefits

Possible single pilot certifications options

- Certified for single pilot operations
- Single pilot operations with qualified crew member on board
- Single pilot operation with non-qualified crew member on board
- Single pilot operations with remote pilot oversight

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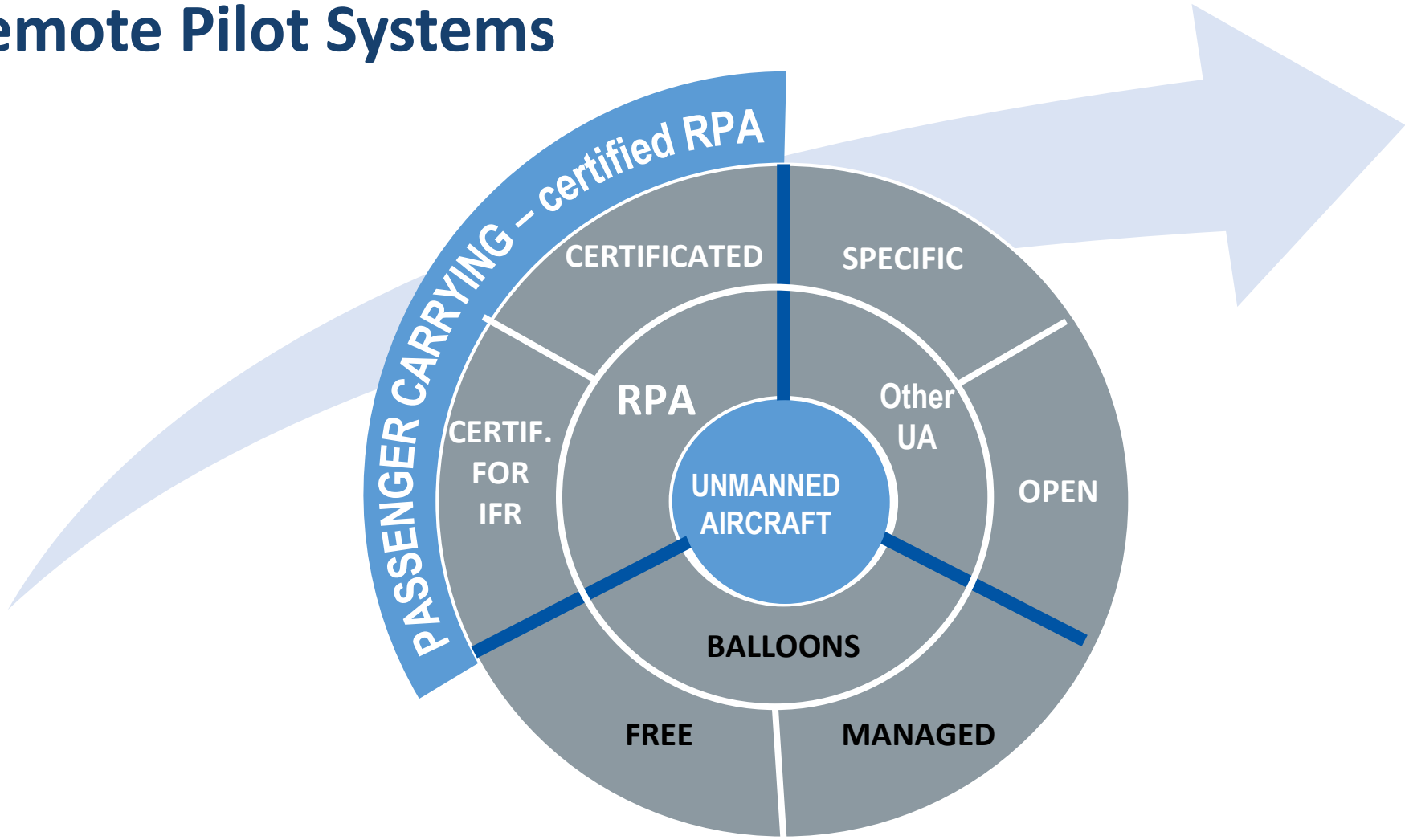
Remote Pilot Systems



Remote pilot operations based on risk

Certified category
(High Risk)

- Beyond Visual Line of Sight
- Operations in controlled airspace
- International IFR flights
- Air Taxi

Medical certificate

- Current Class 3
- Might need to be amended

Remote pilot operations based on risk

Open category

(Low risk)

Visual Line of sight (VLOS)

Height/ weight restrictions

Specified distance from people, buildings, airports

Day time flights only

Clear weather conditions

Specific category

(Medium risk)

Operations in very low airspace

Flying near or over people

Flying near airports/ heliports

Transport of goods

Inspections

Aerial work

Medical applications

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Non-AME examinations

National non-AME practices

Physician assistant

Drivers license

Self declaration

IAOPA proposal for international acceptance

- Examination by non-AME

- Restricted Class 2
  - Maximum take-off weight: 3000 kg
  - Maximum air speed: 250 kts
  - Maximum altitude of 25,000
  - Maximum 5 people on board

Risk assessment Considerations

- Training, understanding and experience of the aviation environment
- Decision-making and support for decision making in complex cases
- Keeping updated with new developments and technology
- Record keeping and reporting
- Data for health promotion and medical protocols
- Supervision and oversight – auditing practices
- Licensing and legal implications
- International standardization

ANW Conclusions

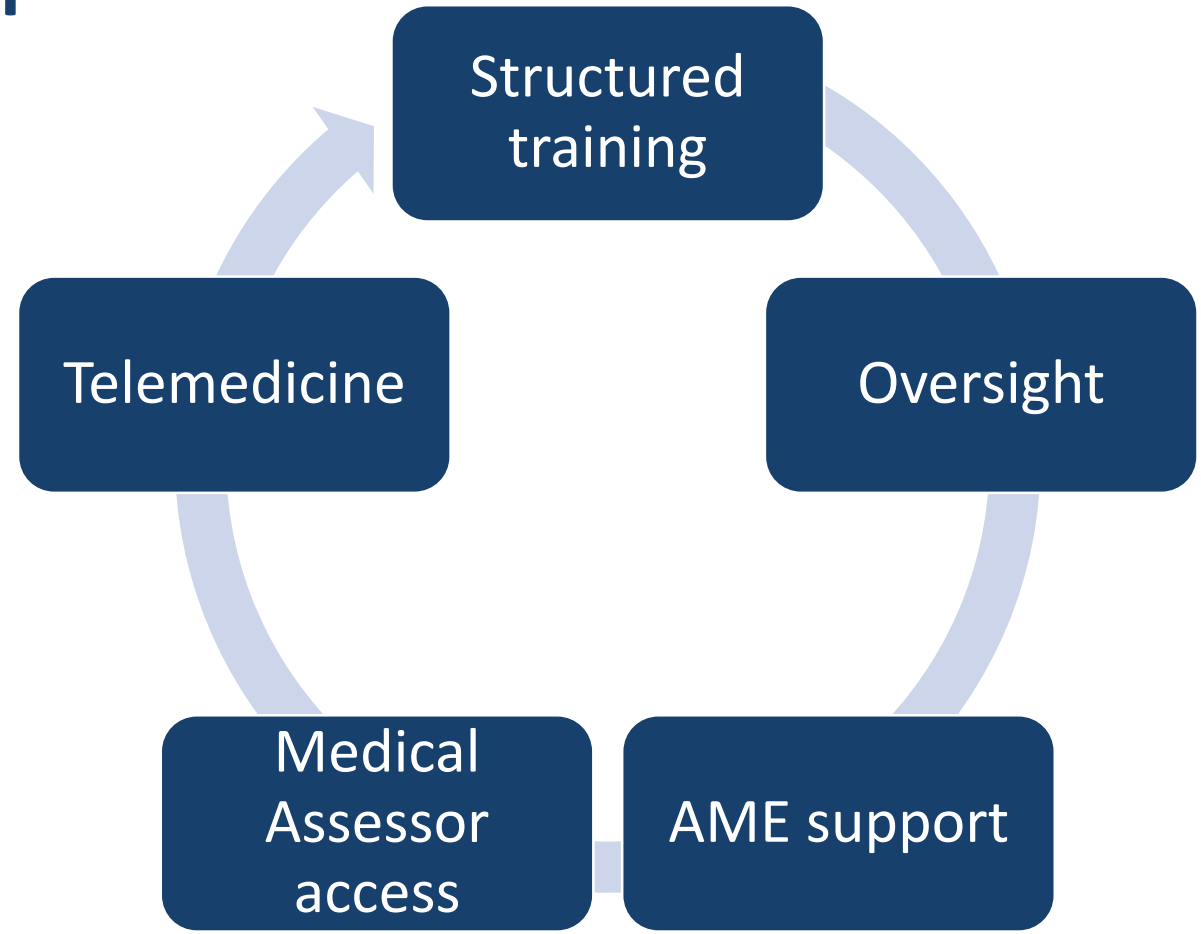
a) A proposed amendment to allow non-AME medical practitioners to issue aviation medical certificates for private pilots operating aeroplanes with certain restrictions was discussed.

b) Concerns were raised on the understanding and experience of such practitioners in the field of aviation medicine, training requirements and oversight mechanisms.

c) Current state experiences and challenges regarding global harmonization of standards was discussed.

d) Acceptance and mutual recognition of national medical certificates is considered to be a step forward.

Potential mitigation



Thank You!

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