FATIGUE RISK MANAGEMENT

WHERE ARE WE, AND WHERE ARE WE GOING?

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DISCLOSURES

• No conflicts to declare
• No off-label use
• Contracted to Virgin Australia, IATA
• All opinions are my own
“My mind clicks on and off... I try letting one eyelid close at a time... 

My eyes jump to the altimeter... I'm at 1600 feet.

The turn-indicator leans over the left - the airspeed drops - the ball rolls quickly...”

First non-stop transatlantic flight

May 1927  33.5 hours
Fatigue and safety

American MD-82  Little Rock
Epps Challenger  Birmingham
Corporate J-31  Kirksville
Med-Air Learjet 35  San Bernadino
Kalitta DC-8-61F  Guantanamo Bay
Colgan Air Q400  Buffalo
Air India Express 737  Mangalore
WHAT CAUSES FATIGUE?

1. Sleep-related factors (acute/chronic)
WHAT CAUSES FATIGUE?

2. Circadian factors
WHAT CAUSES FATIGUE?

3. Task-related factors: workload, environment
WHAT DOES FATIGUE DO TO PERFORMANCE?

- Less vigilant
- Variable with overall slower reactions
- Forgetfulness
- “Tunnel vision”
- Poor decision-making
- Apathy
- Mood changes
- Diminished communication
- ASLEEP
SAFETY EFFECTS IN OTHER SETTINGS

Residents on extended shifts (≥ 24 hours) vs. day shifts had more:

- significant medical errors, attention failures, and fatigue-related preventable adverse events resulting in fatality
- percutaneous injuries
- crashes, near misses, and falling asleep while driving

Sleep Loss Degrades Performance

Chronic, Partial Sleep Restriction Degrades Performance

Speed of Performance

Belenky et al, J. Sleep Res. 2003

Psychomotor Vigilance Task (PVT)
DRIVING SIMULATOR – LANE DEVIATION

Deviation of Lane Position

Day

Washington State University
PHASE 1 - STUDIES

Air New Zealand – subjective ratings and PVT

Easyjet – LOSA
PHASE 2 - ULR

Flight Safety Digest
AUGUST-SEPTEMBER 2005

Lessons From the Dawn of Ultra-long-range Flight
Phase 3: Other studies

Top of Descent Survey

Last descent of duty day

Self rated fatigue (SP, VAS)

Three months

>9000 responses

Three parts of operation
Top of descent survey results (Longhaul)
SAMN-PERELLI SCORES BY SECTOR

Short<Long  (p<0.001)
ACTIWATCH, SIM STUDIES
Phase 4: 2009 ICAO Task Force on FRMS

Over 40 participants – States, Operators, Scientists, Organisations

Produced ICAO Standard and Implementation Guide 2010
FRMS APPROACH – DATA-DRIVEN

Guía de Implementación OACI

1- FRMS – Política y documentación
2- Procesos de evaluación de riesgo en fatiga
   Identificar amenazas de fatiga
     - Reactivo, proactivo, predictivo
   Identificar riesgos de fatiga
   Intervenciones para controlar el riesgo de fatiga
3- FRMS – Procesos de garantía de seguridad
   Incluyendo medidas de efectividad
4- FRMS – procesos de promoción – entrenamiento, educación
5. FATIGUE MODELS

Based on combination of at least 2 processes - circadian and sleep components

Several available

- BAM
- CAS
- SAFE
- FAID
- SAFTE/FAST
CHALLENGES WITH MODELS

VALIDATION
STANDARDS

Over Reliance - EDUCATION
Accuracy – MORE DATA
IN-FLIGHT MEASURES VS MODEL PREDICTIONS

Powell DMC, Spencer MB, Petrie KJ
of a bio-mathematical fatigue model

Comparison of in-flight measures with predictions
Aviat Space Envir Med 2014 85:1177-84
no single measurement device was found to reliably indicate fatigue levels with enough granularity......

a learning model was constructed that was able to accurately categorize ...... data with a success rate greater than 95%.
PHASE 6 – REGULATION REVIEW

Regulations for FRMS – USA FRMP

Review of FTLs
  USA
  EU
  Australia
  Argentina
  etc etc
FATIGUE RISK MANAGEMENT

WHAT ARE PHASES 7 AND 8?
1. What about safety? How much fatigue = how much effect on safety?
FEW STUDIES TO DATE

• easyJet – LOSA
• Qantas – simulator study
• Thomas – LOSA compared to sleep 24h*
• French regional airlines – FOQA
• Other FOQA work
• MORE WORK NEEDED – FOQA, LOSA?

2. COCKPIT NAPPING

A 26-min nap improved subsequent physiological alertness and performance, especially during descent and landing.
• **Given the scientific evidence** that cockpit napping is safe and highly effective, as well as clear indications that the general public appreciates the value of cockpit napping, we take exception to the current prohibition on in-seat cockpit napping in civil aviation, and instead recommend that in-seat cockpit naps up to 45 min in duration be permitted in U.S. commercial flight operations.

GUÍA DE IMPLEMENTACIÓN OACI

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Questions?

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