Pilot fatigue management

where to focus more

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PILOT FATIGUE MANAGEMENT: WHERE TO FOCUS MORE?

A CROSS REGIONAL ANALYSIS OF AVIATION SAFETY EVENTS

1. INTRODUCTION

Pilot fatigue remains a determinative factor in various safety events, leading to the introduction of Fatigue Risk Management regulations and operating standards worldwide.

In this study, event and pilot characteristics were recorded from safety investigation reports to identify associations with fatigue in cases where fatigue was stated as contributory or causal factor.

2. METHODS

The research sample consisted of 296 safety investigation reports, dated between 1990 and 2014, from five safety agencies (i.e. UK, USA, Canada, Netherlands and Australia). In total, 318 cases where subject to analysis in this study.

In the analysis of the reports, the following variables were recorded:

- Temporal factors
- Operational characteristics
- Event characteristics
- Aircraft characteristics
- Pilot characteristics

The variables were subject to frequency analyses and Chi-square / Fisher's Exact tests to identify potential associations with Fatigue. All statistical tests were performed with a significance level of 0.05.

3. RESULTS

Of the 318 cases, 28 (9%) claimed crew fatigue had an influence on the development and/or outcome of the event.

Literature confirmed	Literature not confirmed
Fatigue contributed more frequently to events that occurred during evening (i.e. 12.7%) and night operations (37.5%) in comparison with morning (i.e. 7.4%) and afternoon operations (i.e. 4.9%). *(ECA, 2012; Caldwell, 2005).*	No statistical differences were noted for pilot age. *(Gander & Signal, 2008; Wascher, E., & Getzmann, S., 2014)*
Safety events during take-off, climb, approach and landing phases were associated with fatigue (i.e. 16.0%) more frequently compared to en-route cruise (i.e 3.1%). *(ECA, 2012; Caldwell, 2005).*	No statistical differences were noted for the amount of rest or sleep period prior commencement of flight duties. *(Belenky et al., 2003)*
Occurrences with crews under longer duty times were associated with fatigue contribution to the event. *(Goode JH, 2003)*	No statistical differences were noted between incidents, serious incidents and accidents. *(Ministry of transport, 2017).*

Other associations: characteristics not examined in literature reviewed

- No significant changes over time in frequency of safety events where fatigue was a contributing or causal factor.
- Pilot or crew flight experience was not associated with occurrences attributed to fatigue amongst other factors.
- Fatigue was more frequently found as a factor in Control-Flight-Into-Terrain and Runway Excursion events.

No statistical differences were noted for:

- Aircraft type (i.e. jet, propeller, rotary)
- Aircraft age
- Operation types (i.e. Commercial Air Transport and other; passenger and non-passenger)

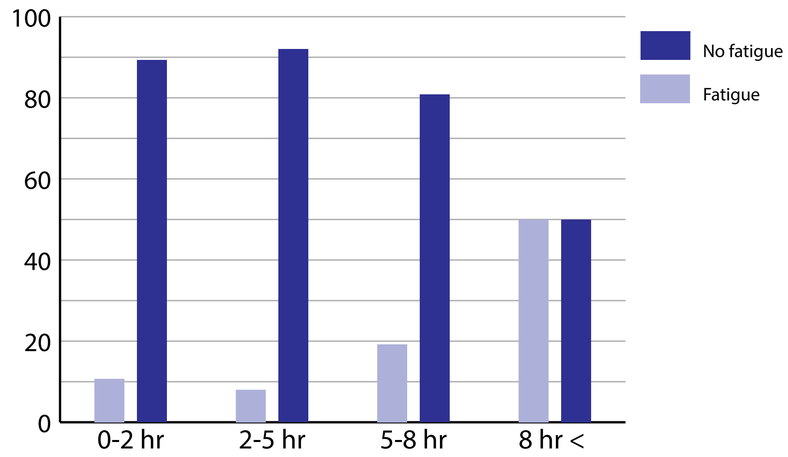

Figure 1: Distribution of fatigue as contributory factor with respect to flight duty times.

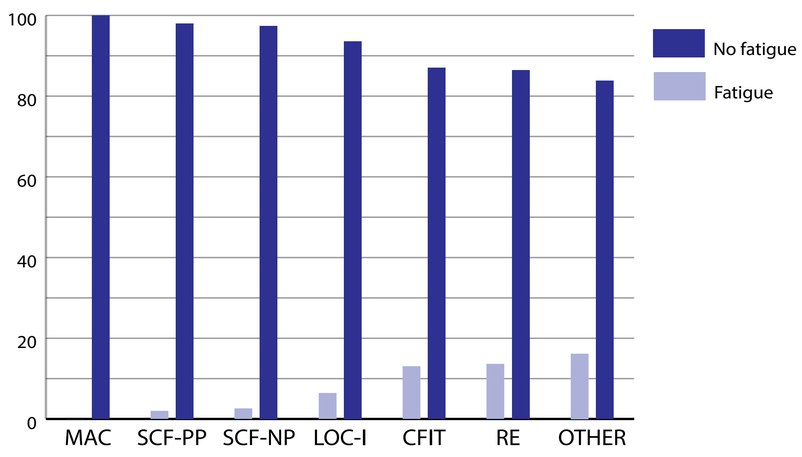

Figure 2: Distribution of fatigue as contributory factor in various event categories.
Note. CFIT (Controlled Flight into Terrain), LOC-I (Loss of Control - inflight), MAC (Mid-air Collision), RE (Runway Excursion), SCF-NP (System/component failure - Nonpowerplant), SCF-PP (System/component failure - Powerplant)

4. CONCLUSIONS

- Contribution of fatigue to safety occurrences has not significantly changed over time, despite continuous efforts to manage fatigue.
- Findings only partially confirm associations of fatigue with the operational, event, aircraft and flight crew characteristics included in this study.
- Fatigue has contributed to (serious) incidents and accidents with about the same frequency.
- Results suggest a consideration of quality of flight crew sleep/rest before reporting on duty.

FUTURE WORK:

- Further analysis to study cases from other regions and compare findings.
- Focus on quality of sleep and rest periods.

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