Analysis of Incident Reports

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Aerospace Human Factors Research
Introduction

- Aviation personnel are able to report safety-related issues to airlines or government entities such as the FAA, without penalty, through voluntary safety reporting systems.
  - Aviation Safety Reporting System is a national program that includes all aspects of aviation operations.
Purpose of Study

• Utilize existing safety reports to identify commonly cited safety issues and conditions associated with fatigue-related reports for flight attendants
Methods

• ASRS
  – On-line Database
    • Full-form Reports
    • Cabin Crew Personnel
    • January 1990 – December 2007
    • N = 2,628
  – Categories
    1) possible contributors to fatigue
      – Crew Coordination/ Communication, Crew Illness/Injury,
        Passenger Illness/Injury, Passenger Misconduct
    2) indicators of fatigue
      – Crew Rest Facility, Duty Time, Fatigue, Lack of Sleep/Rest,
        No/Missing Break/Meal, Scheduling
## Results - Overall

<table>
<thead>
<tr>
<th>Year</th>
<th>Reports Received</th>
<th>Full- form Reports</th>
<th>Full- form Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>50</td>
<td>59</td>
<td>118.0%</td>
</tr>
<tr>
<td>1998</td>
<td>622</td>
<td>387</td>
<td>62.2%</td>
</tr>
<tr>
<td>1999</td>
<td>737</td>
<td>551</td>
<td>74.8%</td>
</tr>
<tr>
<td>2000</td>
<td>896</td>
<td>440</td>
<td>49.1%</td>
</tr>
<tr>
<td>2001</td>
<td>754</td>
<td>267</td>
<td>35.4%</td>
</tr>
<tr>
<td>2002</td>
<td>505</td>
<td>244</td>
<td>48.3%</td>
</tr>
<tr>
<td>2003</td>
<td>437</td>
<td>245</td>
<td>56.0%</td>
</tr>
<tr>
<td>2004</td>
<td>489</td>
<td>139</td>
<td>28.4%</td>
</tr>
<tr>
<td>2005</td>
<td>585</td>
<td>68</td>
<td>11.6%</td>
</tr>
<tr>
<td>2006</td>
<td>1,093</td>
<td>115</td>
<td>10.5%</td>
</tr>
<tr>
<td>2007</td>
<td>1,035</td>
<td>62</td>
<td>5.9%</td>
</tr>
<tr>
<td>Total</td>
<td>7,203</td>
<td>2,628</td>
<td>36.1%</td>
</tr>
</tbody>
</table>
## Results - Cabin Crew Fatigue Reports

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage of full-form reports discussing fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>11.1%</td>
</tr>
<tr>
<td>1996</td>
<td>4.3%</td>
</tr>
<tr>
<td>1997</td>
<td>3.4%</td>
</tr>
<tr>
<td>1998</td>
<td>0.5%</td>
</tr>
<tr>
<td>1999</td>
<td>1.1%</td>
</tr>
<tr>
<td>2000</td>
<td>1.4%</td>
</tr>
<tr>
<td>2001</td>
<td>1.1%</td>
</tr>
<tr>
<td>2002</td>
<td>0.0%</td>
</tr>
<tr>
<td>2003</td>
<td>2.0%</td>
</tr>
<tr>
<td>2004</td>
<td>2.2%</td>
</tr>
<tr>
<td>2005</td>
<td>16.2%</td>
</tr>
<tr>
<td>2006</td>
<td>9.6%</td>
</tr>
<tr>
<td>2007</td>
<td>16.1%</td>
</tr>
</tbody>
</table>
Results - Cabin Crew Fatigue Reports

- Indicators of Fatigue

- Other
- Scheduling
- No/Missing Breaks/Meals
- Lack of Sleep/Rest
- Fatigue
- Duty Time
- Crew Rest Facilities

Percentage

Analysis of Incident Reports
October 27, 2010

Federal Aviation Administration
Results - Cabin Crew Fatigue Reports

- Time of Day

- 0001 to 0600: 17.1%
- 0601 to 1200: 29.3%
- 1201 to 1800: 22.0%
- 1801 to 2400: 31.7%
Results - Cabin Crew Fatigue Reports
- Passenger Misconduct

- Unauthorized Pax
- Smoking
- Pets
- Luggage/Bag Storage
- Electronic Devices
- Drug/Medicine
- Disruptive/Rude
- Bomb/Hijack Threat
- Alcohol

Percentage

0 10 20 30 40 50 60 70 80 90 100
Results - Cabin Crew Fatigue Reports

- Injuries and Illnesses

Percentage

Passenger Illness  50%
Passenger Injury  10%
Crew Illness/Injury  60%
Conclusions

• From 1990 to 2007, number of fatigue-related full-form reports per year averaged 2.4

• Between 2004 and 2007, the number of reports averaged 10.5

• Approximately 50% of the fatigue-related narratives involved concerns associated with scheduling and/or duty time issues – a finding that is largely consistent with the survey finding

• Voluntary safety reports can identify issues and problems of which the airline, industry, and government would otherwise be unaware
Conclusions

• ASRS data are not completely representative of the issues that are faced by the flight attendant population

• Data analyzed, echo issues raised in the survey and provide support for recommending science-based scheduling and countermeasures training

• The review and analyses indicated that flight attendants report fatigue and other potentially contributing factors “somewhat” frequently
Questions?

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International Flight Attendant Fatigue Regulations and Collective Bargaining Agreements

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Civil Aerospace Medical Institute
Aerospace Human Factors Research Division
Title 14 Code of Federal Regulations

- Sections 121.467 and 135.273 (Flight Attendant Fatigue)

<table>
<thead>
<tr>
<th>Scheduled Duty Period (Hours)</th>
<th>Normal Minimum Rest Period (Hours)</th>
<th>Reduced Rest Period (Hours)</th>
<th>Subsequent Rest Period (Hours)</th>
<th>Number of Flight Attendants Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 or less</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>Min</td>
</tr>
<tr>
<td>14-16</td>
<td>12</td>
<td>10</td>
<td>14</td>
<td>Min + 1</td>
</tr>
<tr>
<td>16-18</td>
<td>12</td>
<td>10</td>
<td>14</td>
<td>Min + 2</td>
</tr>
<tr>
<td>*18-20</td>
<td>12</td>
<td>10</td>
<td>14</td>
<td>Min + 3</td>
</tr>
</tbody>
</table>

*Applies only to duty periods with 1 or more flights that land or take off outside the 48 contiguous states and the District of Columbia

Note: Generally, off-duty time begins no less than 15 minutes after the aircraft pulls into the gate and continues until 1 hr prior to a flight attendant’s next departure.

Table summarized according to Title 14 CFR
Prescriptive Rules Advantages

• Easy to apply
• Work well for daytime operations
• Establishes a benchmark for economic competition between carriers
Prescriptive Rules Disadvantages

- Night operations
- Circadian rhythms
- Time zones
- Layovers
- Human factors
METHOD

• Procured 38 Regulations & 13 Collective Bargaining Agreements (CBA)

1. 117 International Civil Aviation Organization (ICAO) members websites
2. FAA International Field Offices
3. International Cabin Safety Symposium
4. ICAO Flight Safety Exchange Information
5. FAA Cabin Safety Aviation Safety Inspectors
Countries Represented

Figure 1. The 41 ICAO member states represented in the study.
METHOD

• Inclusion Criteria
  Regulations or CBAs with duty time and rest rules applicable to cabin crewmembers and/or all crewmembers

• Content Analysis (n=35)
  1. Working hour limits
  2. Sleep and rest requirements
  3. Circadian rhythms
  4. Other
# RESULTS - Rule Types

<table>
<thead>
<tr>
<th>Rules (n=35)</th>
<th>%</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Hour Limits</td>
<td>49</td>
<td>17</td>
</tr>
<tr>
<td>Sleep and Rest Requirements</td>
<td>37</td>
<td>13</td>
</tr>
<tr>
<td>Circadian Rhythm</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>35</td>
</tr>
</tbody>
</table>
RESULTS - U.S. Comparison

U.S. Flight attendants work longer with shorter rest periods

[Bar chart showing comparison of working hours and rest periods for U.S. and Others]
DISCUSSION

• Common Practices
  – Majority use prescriptive rules
  – Carriers may be scheduling flight attendants to the limit
  – Prescriptive rules have limitations

• Best Practices
  – Data driven
  – Adaptive
  – Incorporate science-based fatigue knowledge
  – Recognize fatigue risks
RECOMMENDATIONS

• Establish flight attendant fatigue workgroup
  – Subject matter experts
  – Aviation stakeholders
  – Medical and research scientists
  – Aviation Safety Management Systems experts

• Re-evaluate Title 14 CFR Sections 121.467 and 135.273

• Develop adaptive fatigue mitigation safety system combining scientific principles and knowledge with operational support
Limitations

• Regulations specifically addressing flight attendants duty and rest periods are minimal

• Information reported is time sensitive – rules change

• Possible misinterpretation of regulation/CBA due to legalese
Questions?

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