Evaluating the Sleeper-Berth Provision

A Preliminary Investigation into Usage Characteristics and Safety-Critical Event Involvement

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Advancing Transportation Through Innovation
Outline

• Background

• Description of the data set

• Address the following three research questions:
  1) What driver characteristics are associated with increased SBP use?
  2) What work characteristics are associated with increased SBP use?
  3) What is the relationship between SBP use and safety-critical event occurrence?
Hours-of-Service and Shift Restart Methods

• Hours-of-Service (HOS) regulations set guidelines for commercial motor vehicle driver’s maximum daily drive time, workday hours, and work week hours

• HOS includes required rest periods to take to start a new shift

• These rest periods include:
  • “10+ hours”
  • “34+ hours”
  • Sleeper-berth provision (SBP)
Hours-of-Service and Shift Restart Methods

• Sleeper-berth provision (SBP)
  • Drivers must spend at least 8 (but less than 10) consecutive hours in the sleeper berth
    • Rest period does not count as part of the 14 hour work window for driving
  • Driver must take a second rest period of at least 2 (but less than 10) consecutive hours, which can be spend in sleeper berth, off duty, or a combination of the two
    • Rest period does count as part of the 14 hour work window for driving
• After completing second rest period, your available hours are calculated at the time you completed the first required rest period
# Sleeper Berth Provision

<table>
<thead>
<tr>
<th>Task</th>
<th>Task Duration</th>
<th>14-Hour Window Time Remaining After Task</th>
<th>11-Hour Driving Time Remaining After Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>On duty (not driving)</td>
<td>2 h</td>
<td>14 – 2 = 12 h</td>
<td>11 – 0 = 11 h</td>
</tr>
<tr>
<td>Driving</td>
<td>5 h</td>
<td>12 – 5 = 7 h</td>
<td>11 – 5 = 6 h</td>
</tr>
<tr>
<td>Sleeper berth</td>
<td>8 h</td>
<td>7 h</td>
<td>6 h</td>
</tr>
<tr>
<td>Driving</td>
<td>6 h</td>
<td>7 – 6 = 1 h</td>
<td>6 – 6 = 0 h</td>
</tr>
<tr>
<td>Off duty break</td>
<td>2 h</td>
<td>14 – 6 – 2 = 6 h</td>
<td>11 – 6 = 5 h</td>
</tr>
</tbody>
</table>
Methods: The Data Set

- Driving video data and activity register data collected in the Naturalistic Truck Driving Study (Blanco et al.)
Methods: Hybrid Data Set

• The video data and speed information used to verify/update the time of driving marked in the activity register.

• Baselines and SCEs, by definition, must occur during driving, so activity registers were adjusted to reflect that a baseline or SCE occurred only during driving and not during other activities.
  • Blanco et al. (2011) adjusted the driving periods in the activity register to ensure all SCEs occurred during marked driving periods.
  • The current study followed the same process for the previously selected baselines.

• Hybrid data set then used to identify shift-restart breaks.
Results - Research Question 1

Proportion of Shifts Preceded by SBP Break vs. CMV Driving Experience (years)

Driver Data
## Results - Research Question 2

<table>
<thead>
<tr>
<th>Shift-Restart Method</th>
<th>N</th>
<th>Average Drive Hours Preceding the Break</th>
<th>Average Work Hours Preceding the Break</th>
</tr>
</thead>
<tbody>
<tr>
<td>10+ hour</td>
<td>1,227</td>
<td>7.57</td>
<td>10.84</td>
</tr>
<tr>
<td>34+ hour</td>
<td>253</td>
<td>7.56</td>
<td>10.98</td>
</tr>
<tr>
<td>SBP</td>
<td>183</td>
<td>8.11</td>
<td>12.05</td>
</tr>
</tbody>
</table>
Results - Research Question 3

<table>
<thead>
<tr>
<th>Shift-Restart Method</th>
<th>SCE Count</th>
<th>SCE Percentage of Events</th>
<th>Baseline Count</th>
<th>Baseline Percentage of Events</th>
<th>Total Event Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>10+ hour</td>
<td>1,599</td>
<td>36%</td>
<td>2,831</td>
<td>64%</td>
<td>4,430</td>
</tr>
<tr>
<td>34+ hour</td>
<td>280</td>
<td>36%</td>
<td>504</td>
<td>64%</td>
<td>784</td>
</tr>
<tr>
<td>SBP</td>
<td>222</td>
<td>29%</td>
<td>538</td>
<td>71%</td>
<td>760</td>
</tr>
</tbody>
</table>
Results - Research Question 3

• The relationship between SCE rate and shift-restart method was tested two ways

• Mixed-effect negative binomial model results:
  • No significant difference found in the SCE rates in shifts following a SBP break and the SCE rates in shifts following 10+ hour or 34+ hour restart breaks ($t = -0.63, p = 0.5284$)

• Odds ratio results:
  • 10+ hour restart and 34+ hour restart methods were found not to be significantly different [$OR_{10+,34+} = 1.02, 95\% \text{ CI} = (0.87, 1.19)$]
  • Both the 10+ hour restart and 34+ hour restart methods were associated with significantly higher risk than the SBP [$OR_{10+,SBP} = 1.37, 95\% \text{ CI} = (1.16, 1.62); OR_{34+,SBP} = 1.35, 95\% \text{ CI} = (1.09, 1.67)$]
Summary

• SBP appears to be used more frequently among drivers:
  • with less CMV driving experience
  • who did not report having arthritis or dizziness, vertigo, or another balance disorder
  • who did not report taking medications regularly
  • with longer drive and work hours

• SBP was associated with no higher—and, for some comparisons, even a lower—risk than the other shift-restart methods

• Future work & Limitations
Acknowledgements & Contact Information

Thank you to NSTSCE

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Resources


