Overview Presentation:

Safety for the Long Haul
Large Truck Crash Risk, Causation, & Prevention

• The first and only comprehensive textbook on large truck safety!
• Published by the American Trucking Associations (ATA).
• Sponsor: ATA Safety Policy David Osiecki, VP of Safety, Security, & Operations
• Author: Ronald R. Knipling, Ph.D.
• Target audiences:
  – Carrier safety managers & other officials
  – Government & industry officials
  – Students
• Purchase at (866) 821-3468 or www.atabusinesssolutions.com/

Industry Acclaim for
Safety for the Long Haul

"Every truck safety professional in the country should read this book. And every trucking company owner or chief executive, upon whom the ultimate responsibility for safety lies, should be familiar with it. And so should the next chief of the Federal Motor Carrier Safety Administration. . . What Ron Knipling . . . has attempted here is to put forth in one document, for the first time, the current best understanding of the theory and practice of truck safety . . . Knipling's style is straightforward and efficient, and he has a passion for the subject that carries him through."


Safety for the Long Haul
Author: Ronald R. Knipling, Ph.D.
• 33 years in truck & traffic safety
  – 18 years in contract R&D, including seven years with the Virginia Tech Transportation Institute
  – 12 years in U.S. DOT, including FMCSA, NHTSA, & FHWA.
• Author of more than 200 truck safety reports & presentations
• Specialty areas include:
  – Crash data analysis
  – Crash causation (LTCCS)
  – Naturalistic driving
  – Driver fatigue
  – Onboard technologies
  – Carrier safety management
  – Risk avoidance
• Accomplished trainer & instructional developer.

A Truckload of Information!
The First Comprehensive Text on Truck Safety

✓ Multifaceted & eclectic: More than 100 topics covered
✓ Fact-filled but non-technical (~ college survey textbook)
✓ 620 pages
✓ 196 illustrations, schematics, & graphs
✓ 156 tables & textboxes on special topics
✓ 18 invited expert commentaries
✓ Glossary, reference citations, & index

Expert Commentators
• Dr. Greg Belenky, Wash. State University
• Dan Blower, UMTRI
• Roger Clarke, Alberta Transportation
• Dr. Leonard Evans; SSS
• Gov. Bill Graves, ATA
• Dr. Rich Hanowski, VTTI
• Bob Inderbitzen, REI Consulting
• Steve Keppler, CVSA
• Dr. Peter Kissinger, AAA Safety Foundation
• Dr. Jerry Krueger, Krueger Consulting
• Gordon Lambert, C. R. England
• Dr. Brenda Lantz, NDSU
• Dave Osiecki, ATA
• Don Osterberg, Schneider National
• Doug Pape, Battelle
• Dave Parker, Great West
• Larry Shelton, America’s Road Team
• Steve Williams, Maverick

Safety for the Long Haul
Book Purposes

Useful Information
• Summarize crash causation safety facts & principles
• Review & recommend crash countermeasures & interventions (carrier emphasis).

New Directions:
• Articulate the need & opportunity for a shift in our national approach to truck safety.
Chapter 1: Introduction & Overview

Crash Fundamentals & Trends

Decline in Fatal Crash Involvement Rates

Pros & Cons of Safety Research Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiments</td>
<td>Determines causation</td>
<td>Narrow</td>
</tr>
<tr>
<td></td>
<td>• Precise</td>
<td>Expensive</td>
</tr>
<tr>
<td>Crash Databases</td>
<td>Problem size</td>
<td>No control group</td>
</tr>
<tr>
<td></td>
<td>• Conditions of occurrence</td>
<td>Superficial</td>
</tr>
<tr>
<td>In-Depth Investigation</td>
<td>In-depth, serious crashes</td>
<td>No control group</td>
</tr>
<tr>
<td></td>
<td>• Error &amp; causal taxonomies</td>
<td>Small Ns</td>
</tr>
<tr>
<td></td>
<td>• Multiple methods</td>
<td>Expensive</td>
</tr>
<tr>
<td>Case-Control,</td>
<td>Criterion-based</td>
<td>Association, not causation</td>
</tr>
<tr>
<td>Correlational Studies</td>
<td>• Many diverse factors</td>
<td>Noisy data</td>
</tr>
<tr>
<td>Naturalistic Driving</td>
<td>Direct observation</td>
<td>Not serious crashes</td>
</tr>
<tr>
<td></td>
<td>• Exquisite exposure data</td>
<td>Triggers are selective</td>
</tr>
<tr>
<td></td>
<td>• Large Ns (e.g., driver risk)</td>
<td>Expensive</td>
</tr>
<tr>
<td>Surveys</td>
<td>Fast &amp; easy</td>
<td>Opinion</td>
</tr>
<tr>
<td></td>
<td>• Flexible</td>
<td>Representativeness</td>
</tr>
<tr>
<td></td>
<td>• Directly taps expertise</td>
<td>problematic</td>
</tr>
</tbody>
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Chapter 2: The Science of Safety: Methods

- Experiments
- Crash Databases
- LTCCS & Other Investigative Studies
- Case-Control & Correlational Studies
- Naturalistic Driving Studies
- Surveys.

Chapter 3: Driver Risk

Relative Exposure & Risk for High & Low Risk Groups

<table>
<thead>
<tr>
<th></th>
<th>Worst</th>
<th>Rest</th>
<th>Hours of Driving</th>
<th>At-Fault Events</th>
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<tbody>
<tr>
<td></td>
<td>19%</td>
<td>81%</td>
<td></td>
<td>53%</td>
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<tr>
<td></td>
<td>47%</td>
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</tbody>
</table>

Risk Odds Ratio = 4.9
Major Factors Underlying Driver Risk

- Age & gender
- Physical & medical
- Personality
- Behavioral disorders
- Behavioral indicators

Past Offenses & Crash Risk Elevation

Source: ATRI Driver Crash Prediction Study

Convergence of Events Causing Crashes
The “Swiss Cheese” Causation Model

Adapted from Reason (1990) and Short et al. (2007).

Causes of Fatigue:
the “Gang of Four”
- Individual Susceptibility
- Three Temporal Factors:
  - Circadian valleys
  - Inadequate sleep
  - Excessive time awake

Daily Temporal Factors Affecting Fatigue:
Sleep-Performance “Bathtub”
- Circadian highs & lows
- Sleep
- Hours of wakefulness (>16 hours).

Chapter 4: Driver Error

Chapter 5: Driver Fatigue

Chapter 6: 4-Wheelers

Note: Fault is distributed more evenly in less severe crashes.

Source: Blower, 1998
4-Wheeler Misbehaviors

Alcohol Use in Fatal Car-Truck Crashes

Chapter 7: Vehicle Design & Technologies

Truck Systems & LTCCS Rear-End Crash Involvements

Chapter 8: Roadway & Traffic Environment

Collision Warning Systems; e.g., Side Object, Forward, & Lane Departure

Night Driving: Generally Safe for Trucks

High-Risk Roadway Locations & Conditions; e.g., Undivided Highways

Risk Odds Ratio = 5.3

Source: Hendrix, 2002
Chapter 9: Focus: Selected Crash Types

- Road Departure*
- Head-On
- Rollovers
- Jackknifes
- Rear-End* 
- Lane Change/Merge*
- Backing
- Crossing Path (intersection)

* = “Big 3”

Chapter 10: Carrier Safety Management

Relation Between Selection Scores & Employee Job Performance for Hypothetical Job

Correlation Coefficient (r) = +0.68

Chapter 11: Special Topics in Carrier Operations

How Improved Retention Also Improves Safety (& Vice-Versa!)

Safety Management Performance Matrix

Contributed by Greer Woodruff, J. B. Hunt

Increasing Safety Belt Use

Unbelted & Belted Truck Drivers

Unbelted
Belted

Crash Categories

Driver Injury Severity ($)

Unbelted & Belted Truck Drivers

Unbelted
Belted

Crash Categories

Driver Injury Severity ($)

Unbelted & Belted Truck Drivers

Unbelted
Belted

Crash Categories

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Unbelted & Belted Truck Drivers

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Belted

Crash Categories

Driver Injury Severity ($)
Chapter 12: What About Regulation, Enforcement, & Compliance?

Limitations of Prescriptive Rules

Chapter 13: Beyond Compliance

The Safety Mountain

Adapted from Atkinson (2007)

Watchwords for our drivers . . .

Beware:
4-Wheeler behavior, your own mistakes, risky roads & situations

Behave:
Good judgment & cooperative driving
Comply: With regs & laws

Safety for the Long Haul Seminars

• Dr. Knipling has provided Safety for the Long Haul training to both Con-way Freight and J. B. Hunt for their safety manager training. This seminar series is available to other carriers and trucking associations. If interested, contact Dr. Knipling at (703) 533-2895 or rknipling@verizon.net. The basic series consists of the six modules listed below, though the program can be customized to client needs.

• Basic Seminar Topics:
  – Module A: Introduction & Overview
  – Module B: Crash Risk Factors
  – Module C: Crash Causes
  – Module D: Driver Fatigue & Alertness
  – Module E: Carrier Safety Management

Thanks for your interest!
To order, call (866) 821-3468 or go online at: www.atabusinesssolutions.com

For additional information on the book or related training or consultation, visit www.safetyforthelonghaul.com or contact the author at rknipling@verizon.net.