SAFETY INVESTIGATION MANUAL
CHAPTER 4: DIAGNOSING CRASH PATTERNS

Online Training

Presented by:
Dr. Chris Monsere, Professor
Portland State University
Diagnosing Crash Patterns

- Primary goal: diagnose safety issues and propose solutions
  - Based on office data and field reviews
- Crash data is the starting point
- Searching for patterns and trends in crashes
  - Crash type
  - Vehicle type involved
  - Time of day
  - Spatial groupings
- Several tools available to assist with this process

Diagram:

1. Data Collection
   - Evaluate Historic Crash Trends / Distributions
   - Complete "Pattern Diagnostics Worksheet"
   - Is there a dominant crash pattern?
     - NO
     - Identify "No Apparent Pattern" for "Crash Patterns to Investigate" on Site Investigation Form
     - YES
     - Identify as "Crash Patterns to Investigate" on Site Investigation Form
2. Crash Data Analysis
   - Can a particular environmental or geometric feature be a possible crash cause?
     - NO
     - Conduct Site Investigation
     - YES
     - Identify Crash-Specific Data Elements to Collect (See Chapter 5)
Crash Pattern Worksheet

• Additional training videos and case studies available.
• Overrepresentation of crash type best for identifying improvements
• Unusual is a clue -- trying to detect a pattern of crashes that are “out of the ordinary”
• Over-represented crash types provide a reliable guide to the remedial action since they are likely to be indicative of some problem
Which of these are unusual?

![Bar chart showing intersections at different locations and times.]

- Location 1
- Location 2
- Location 3

Legend:
- Night
- Day
Now, which of these are unusual?

![](4-Leg Urban Intersections.png)

- **Average (Expected)**
- **Location 3**
- **Location 2**
- **Location 1**

- **Night**
- **Day**
Crash Pattern Worksheet

- Tabulations of typical distributions developed for various crash classifications
  - Segments (by functional class)
  - Intersections (by urban/rural, configuration, and traffic control)
- Calculates probability that an observed percentage of a crash classification exceeds the average of similar locations
  - i.e., is the probability that the observed proportion is “normal”? \( P(\text{Norm}) \)

<table>
<thead>
<tr>
<th>Collision Type (All)</th>
<th>Crash</th>
<th>Obs %</th>
<th>Ex %</th>
<th>( P(\text{Norm}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle</td>
<td>1</td>
<td>5.9%</td>
<td>0.1%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Head-on</td>
<td>0</td>
<td>0.0%</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>Rear</td>
<td>3</td>
<td>17.6%</td>
<td>24.4%</td>
<td>82.2%</td>
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<tr>
<td>Sideswipe-Meet</td>
<td>0</td>
<td>0.0%</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>Sideswipe-Over</td>
<td>1</td>
<td>5.9%</td>
<td>14.4%</td>
<td>92.9%</td>
</tr>
<tr>
<td>Turn</td>
<td>11</td>
<td>64.7%</td>
<td>0.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Parked</td>
<td>0</td>
<td>0.0%</td>
<td>0.1%</td>
<td></td>
</tr>
<tr>
<td>NonCollision</td>
<td>0</td>
<td>0.0%</td>
<td>8.3%</td>
<td></td>
</tr>
<tr>
<td>Backing</td>
<td>0</td>
<td>0.0%</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>Pedestrian</td>
<td>1</td>
<td>5.9%</td>
<td>0.2%</td>
<td>4.0%</td>
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<td>Fixed Object</td>
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<td>0.0%</td>
<td>44.6%</td>
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</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0.0%</td>
<td>7.1%</td>
<td></td>
</tr>
</tbody>
</table>

17 | 100% | 100% |
Crash Rate Calculations

- Pattern Worksheet
  - Crash rate for total crashes
  - Critical crash rate using peer rate
- Crash Rate Calculator Tabs: Segment & Intersection
  - Segment- Overall crash rate, severity-based crash rate, crash density
  - Intersection- Overall crash rate, severity-based crash rate, crash density, crash cost
Collision Diagrams

• Use CrashMagic!
• Spatial patterns of crashes
• Visual representation of crash locations and incidents
• Not drawn to scale with general details
  • Vehicle direction
  • Severity
  • Crash type
• At least 3 years of crash data

Collision Diagram showing five years of crash data. Include severity, pavement conditions, time of day, and light conditions. Indicate vehicle at fault with red arrow. Include description of symbols/abbreviations.