Using Data to Address Bike & Pedestrian Safety Issues
Track: Pedestrian/Bicyclist Safety
Tuesday March 17, 2020
10:45 AM - 12:15 PM

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Maryland’s Pedestrian/Bicyclist Fatality Review: Process, Review and Findings

2020 Lifesavers
National Conference on Highway Safety Priorities
March 17, 2020

NSC: Kim Auman (Project Manager) Erica Zimmerman & Alexis Aviles (Project Coordinators)
MHSO: Jeff Dunckel (Pedestrian-Bicycle Safety Program Manager)
1. Process, Review and Findings
or... 

2. Identifying Contributing Factors and Systemic Countermeasures to Avoid Non-motorist Fatalities in Maryland using Crash Reconstruction Reports from 2016 Fatal Crashes
I need this to be animated with the first view being number 1 with the "or" . . . . and the second animation being number 2

Jeff Dunckel, 2/26/2020
The Reason We Are Here Today

- **VISION:** Zero Deaths

  anything more than zero is unacceptable
MD Pedestrian & Bicyclist Fatalities are Rising

MD Pedestrian & Bicyclist Fatalities:
2009 - 2018

Year
Number of Fatalities
0 20 40 60 80 100 120 140 160
123 110 112 102 120 108 110 127 130 139
MD Pedestrian & Bicyclist Fatalities Compared to Total Fatalities: 2009 - 2018

10 year average = 118

Year
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Number of Ped/Bike Fatalities
123
110
112
102
120
108
110
127
130
139

% of Total Traffic Fatalities
22%
22%
23%
20%
26%
24%
21%
24%
23%
27%

Total Ped/Bike Fatalities
% of Total Traffic Fatalities
Challenges Faced

USAir 427

ValuJet 592

TWA 800
US Aviation Fatalities -- 1990 to 2018
What’s Our Little Black Box?

Crash Reconstruction Reports

State of Maryland Motor Vehicle Accident Report

Report No. DA12345678L Page 1 of 7

Accident Date 01/32/2016 Accident Time 2148

Report Type Fatal

Local Case Number PP 1234567 000 8906

Photos Yes

Investigating Officer Cpl. M. Mouse #3456

Agency and Area DA A5

Supervising Officer 1st Sgt. D. Duck #1234

Code and Municipality 000 – Hyattsville

County 16

Reconstruction / Report of Investigation
Project Overview

- Review crash reconstruction reports of all of Maryland’s 2016 Pedestrian/Bicyclist fatalities (n=127). To take a “deep dive” into crash causation using detailed information beyond limited information provided in the standard crash reports.
- **Goal:** Identify frequently occurring contributing factors and potential countermeasures
- Monthly meetings held to discuss cases in specific counties (5 to 8 cases per session)
- **Phase 2:** Analyze standard crash report database to determine how many identified contributing factors in fatal pedestrian crashes also occur in non-fatal pedestrian crashes.
Multidisciplinary Review Team

Epidemiologist/Researchers

Crash Reconstructionist

Engineers

Community Health Representatives

Planners

Police Officers

Physicians

Program Managers

Emergency Medical Services

Medical Examiner

Office Representative
Sources of Information

One Week Prior to Review:
• Detailed Crash Investigation Report – little black box for pedestrian/bicyclist fatal crashes
• Standard Crash Reports
• Medical Examiner Reports – toxicology results
• Media Reports

Day of Review:
• Presentation by Investigating Officer (whenever possible)
• Video surveillance – when available
• Google maps -- aerial and street view images
Case 2016-127

Summary

Pedestrian
- Age - Gender
- Clothing
- Date/Time of death
- Impairment / Distraction

Driver
- Age - Gender
- Travel Speed
- Impairment / Distraction

Crash Description
- Date/Time of crash
- Weather
- Posted Speed
- Year, Make, Model
- Street Lighting
- Road Features
Scene Photos
Interactive Google Earth Views
“Swiss cheese” model of causation

- Human Factors
- Engineering Factors
- Vehicle Factors
- Environmental Factors
Contributing Factors

**Human:** Speeding, Impaired / Distracted, Crossing Mid-block, Dark Clothing

**Environment:** Dark, Rainy / Wet Road, Vegetation, Obstructed Sight Lines

**Engineering:** Posted Speed, Lack of Crossing Opportunities, Lighting

**Vehicle:** Tinted Glass, Visual Obstructions, Headlights, Vehicle Type
Contributing Factor Classification

**Certain** - Case review and evidence support high confidence the contributing factor was a primary contribution to the pedestrian impact and fatal outcome (established beyond doubt).

**Probable** - Case review and evidence support moderate confidence the contributing factor was a primary contribution to the pedestrian impact and fatal outcome (likely to happen).

**Possible** - Case review and evidence support minimal confidence the contributing factor was a primary contribution to the pedestrian impact and fatal outcome (may or may not have occurred).
Displays of Data from 41 Case Reviews

No conclusions are to be drawn from these data. The data are preliminary and for example only.
2016 Pedestrian Fatal Crashes: Distribution of Pedestrian and Driver Age

Pedestrians n=42; Drivers n=42
2016 Pedestrian Fatal Crashes:

Pedestrian Sex

- Female: 26.2%
- Male: 73.8%

Driver Sex

- Female: 67.4%
- Male: 30.2%
- Unknown: 2.3%

Unknown - hit and run case.

Pedestrians n=42; Drivers n=43
2016 Pedestrian Fatal Crashes: Time of Crash

- Dark (9PM - 5AM), 46.3%
- Dusk (5PM - 8PM), 22.0%
- Daylight (8AM - 4PM), 17.1%
- Dawn (6AM-7AM), 14.6%

41 Crashes
2016 Pedestrian Fatal Crashes: Lighting at Time of Crash

- Dark, 71%
- Daylight, 24%
- am Twilight, 5%

41 Crashes
2016 Pedestrian Fatal Crashes: Vehicle Type

- Sedan, 60.0%
- Pickup Truck, 13.3%
- SUV, 17.8%
- Minivan, 4.4%
- Commercial Truck, 2.2%
- Bus, 2.2%

42 vehicles
2016 Pedestrian Fatal Crashes: Vehicle Model Year (2010-2016 vs Older)

42 vehicles

- Newer Model Year: 62.2%
- Older Model Year: 37.8%
2016 Pedestrian Fatal Crashes:
Top Contributing Factors
197 Contributing Factors Identified

- Crossing Issues: 14.7%
- Dark Clothing: 12.2%
- Impaired Ped/Bicyclist: 7.1%
- Poor Street Lighting: 6.1%
- Limited/No Crosswalks: 6.1%
- Exceeded the Speed Limit: 6.1%
- Roadway Topography: 2.5%
- Failed to Obey Traffic Signal: 2.5%
2016 Pedestrian Fatal Crashes: Number of Contributing Factors by Classification

- **CROSSING ISSUES**: Certain 28, Probable 1, Possible 1
- **DARK CLOTHING**: Certain 13, Probable 4, Possible 7
- **IMPAIRED PED/BICYCLIST**: Certain 12, Probable 2
- **POOR STREET LIGHTING**: Certain 2, Probable 4, Possible 6
- **LIMITED/NO CROSSWALKS**: Certain 1, Probable 5, Possible 6
- **EXCEEDED THE SPEED LIMIT**: Certain 7, Probable 1, Possible 4
- **ROADWAY TOPOGRAPHY**: Certain 2, Probable 3
- **FAILED TO OBEY TRAFFIC SIGNAL**: Certain 5

197 Contributing Factors Identified
### 2016 Pedestrian Fatal Crashes: Total Crossing Related Contributing Factors and Subcategories

<table>
<thead>
<tr>
<th>Issue</th>
<th>Certain</th>
<th>Probable</th>
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</thead>
<tbody>
<tr>
<td>Total Crossing Issues</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>Improper Crossing (Crossing Midblock)</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Illegally in Roadway (In Travel Lane)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Failed to Obey Traffic Signal</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Ped Signal Required Activation</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Illegally in Roadway (Because of Stopped Vehicle)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Failed to Obey Stop Sign</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

29 Crossing Related Contributing Factors Identified

Legend: **Blue** = Certain, **Red** = Probable
2016 Pedestrian Fatal Crashes: Details of Pedestrian Impairment

- Impaired Alcohol >=0.16: 8 Certain, 1 Probable
- Impaired Not Further Specified: 4 Certain, 1 Probable
- Impaired by Controlled Dangerous Substance: 1 Certain, 1 Probable
2016 Pedestrian Fatal Crashes: Details For Pedestrian Clothing

- **Dark Clothing**:
  - Certain: 13
  - Probable: 3
  - Possible: 3

- **Mixed Clothing**:
  - Certain: 1
  - Probable: 4
“Swiss cheese” model of causation

**Human Factors** –
- (P) – Dark Non-reflective Clothing
- (D) – Didn’t stop when another car stopped at crosswalk

**Vehicle Factors** – Dark Window Tinting

**Environmental Factors** – Rainy/Foggy Night

**Engineering Factors** – distance
Future Plans for Analysis

• Speed
  — Exceeding posted speed vs excessive speed (yet to be defined)
  — Posted speed – is it too high for area?
• Homelessness / no fixed address
• Ped driver license status – non-drive, suspended/revoked, current driver
• Vehicle movement at the time of crash – left turn, right turn, proceeding straight
What have we learned?

• The Process
• The Review
• The Findings
  – Human Factors
    • Pedestrian
    • Driver
  – Vehicle
  – Engineering
  – Environment
  – EMS/Hospital
Change Contributing Factors

Vehicle Factors

Human Factors

Engineering Factors

Environmental Factors

Change Pedestrian Crash Numbers
Change Contributing Factors

**Human Factors** –
(P) – Dark-nonreflective clothing
(D) – Stops when another car stopped at crosswalk

**Vehicle Factors** – Dark Window Tinting

**Environmental Factors** – Rainy/Foggy Night

**Engineering Factors** – Lack of pedestrian signage

Pedestrian Crash Avoided
Wrap-Up
Thank you

Any Questions?
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