

SAFE SYSTEM CASE STUDY

Predictive analysis in Montgomery County, MD

KEY TAKEAWAY: Montgomery County developed a predictive, systemwide analysis tool that identifies where crash risk exists across the road network, rather than relying solely on past crash history. By highlighting expected crash patterns, the tool can support earlier, more targeted safety decisions focused on reducing both crash likelihood and injury severity.

SAFETY LEVERS



As part of Montgomery County's Vision Zero program, the county's planning department collaborated with researchers at the University of North Carolina Highway Safety Research Center to develop a [predictive, systemic safety tool](#) that can be used to identify locations where severe and fatal crashes are likely to occur based on roadway, crash and land use data. County staff and researchers examined the potential for severe crash reduction in underinvested areas, finding that some of the biggest gains in road safety could be made in those locations that had been most neglected. The tool can also be used to identify the most appropriate countermeasures to maximize the reduction of severe and fatal crashes, allowing for smarter investment of capital improvement funds.



Montgomery Planning

Instead of focusing only on known problem spots ...

Directing safety improvements only where injury crashes occur or where the public requests them

"Chasing crashes" can cause agencies to leave the same general situations with similar risks at other locations.

... Montgomery County looked for known risk factors

Assessing where serious crashes are likely to occur across an entire roadway network

The predictive, systemic safety tool enables county staff to identify and address the highest-risk locations across the entire roadway network, even if crashes haven't occurred there. This approach is a proactive step toward systemwide change.

Instead of being reactive...

Using only crash data for analysis

Crash data can help us understand where people are killed and injured, but crash data alone cannot tell us where risks exist.

... Montgomery County was proactive

Using hundreds of variables to understand why and where severe crashes occur

The research team worked with the county to aggregate 170 segment variables and 282 intersection variables and then analyzed and modeled those data to better understand why and where severe and fatal crashes occur. Using the analytical tool, the team identified the 200 sites across the network with the highest risk for key crash types. At intersections, these included crashes involving bicyclists, pedestrians at night, and vehicles turning left or traveling straight through. On roadway segments, they included pedestrian crashes and other single-vehicle crashes.

Instead of a narrow approach ...

... Montgomery County took a broad approach

Focusing only on certain roads

Examining high-injury networks highlights only a subset of roads.

Looking at all roads

The team examined all land use area types in the county's Complete Streets Design Guide to identify locations with high numbers of expected crashes across downtown, town center, suburban and country roads.

What levers did this intervention pull?

 **PRIMARY:** The predictive analysis tool identified locations where countermeasures aimed at reducing the **likelihood of crashes** may be most beneficial. Countermeasures matched with locations identified by the analysis include pedestrian crossing improvements (e.g., high-visibility or raised crossings), intersection control changes (e.g., all-way stop control, traffic signals), signal timing strategies (e.g., leading pedestrian intervals, protected left turns, increased all-red clearance intervals) and treatments like improved lighting or centerline rumble strips.

 **SECONDARY:** The predictive analysis tool also identified locations for speed management countermeasures, which reduce the **severity** of crashes that do occur. These include speed cameras, speed humps and lower speed limits.

State and local DOTs can reduce crash injuries by lowering one or more of the following

SAFETY LEVERS:

	EXPOSURE	how much people drive
	SEVERITY	how fast vehicles travel and how heavy they are
	LIKELIHOOD OF A CRASH	how often road users come into conflict

What else can be done?

Rapid-deployment steps: Increase implementation of low-cost or rapid-deployment treatments identified in the analysis, such as increasing use of all-red clearance intervals or installing quick-build versions of treatments like speed humps.

Policy/process trigger: Embed the predictive safety analysis into the project prioritization processes so countermeasures are applied systematically at identified high-risk locations.

Additional policy/process trigger: Build on the tool by identifying locations with a high risk of serious or fatal injury crashes, beyond crashes of all severities.