Black spots

Why we fight about black spots

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Injury prevention—need for a consensus between epidemiologists and traffic engineers

In this issue, Morency and Cloutier[1] *(see page 360)* report that, over a 5-year period, motorists injured pedestrians at exactly one quarter of all intersections in central Montreal. Those of us alarmed over unsafe streets will not be surprised by this finding. But I suspect that many of those setting traffic policies will be.

That is because the roads agency in Montreal operates under a policy of fixing collision ''black spots'', where a ''black spot'' is an intersection with eight or more collisions in a 5-year period. Amazingly, seven motorist–pedestrian collisions in 5 years—that's one in every 260 days—is not enough to brand an intersection as dangerous. The black spots approach fixes only 1% of the intersections where a motorist hits a person.

The unspoken premise of this policy seems to be that a high frequency of collisions is evidence of design problems unique to that intersection. However, Morency and Cloutier's report suggests that faults in the road design are not site-specific but are nearly universal.

PERSPECTIVE

Morency and Cloutier approach the data from the perspective of epidemiologists and present the data in terms that make the problem particularly vivid: one quarter of all intersections were the site of a collision over a relatively short period of 5 years. By contrast, traffic engineers identify 22 black spot intersections for fixes.

These two different presentations may result from the different perspectives of the different professions. Engineers, looking for design flaws, examine intersections to identify locations with relatively high collision rates. Epidemiologists examine injury data to identify patterns in victim, vector and environment.

As epidemiologists, Morency and Cloutier map the injury locations in one central borough (their fig 4) and a strong pattern jumps out. Motorists hit pedestrians at nearly every intersection of major streets. That's an important finding. Black spots are not individual intersections but entire corridors. This finding strongly suggests that the City of Montreal should redesign all the intersections of major streets in the central boroughs to make them safer for people walking.

Advocates of fixing black spots might assert that the City can best use its resources by focusing its engineering and construction effort on the 22 black spots. But—owing to regression-to-mean—black spot intersections in one 5-year period may not qualify in another. Further, designing and constructing retrofits for 22 intersections is simpler if those 22 are along a single street than if they are distributed around the city.

Another pattern that Morency and Cloutier show is that more motorists hit pedestrians in the central boroughs than in the outlying areas, which is another important finding. Black spots are not individual intersections but entire neighborhoods. This pattern is consistent with Raford's and Ragland's[2] 2004 analysis of motorist–pedestrian collisions in Oakland, California, published in an engineering journal. Raford and Ragland found that pedestrian injuries were concentrated in downtown Oakland and along the major streets. These consistent results show that changes in intersection design are needed over a widespread area in our cities.

FIXES

Making streets safe for walking requires changes. At the local level, physical changes are needed, and engineers know what fixes work. Large intersections endanger people walking because large intersections take a long time to walk across and motorist-turning speeds are too high. Extending the curbs or squaring off the corners and constructing medians can reduce excessive turning speeds. Also, curb extensions shorten the crossing time for the pedestrians and improve visibility for both parties, and raised medians provide a refuge for the person crossing. Area-wide traffic calming is also needed. Berlin has slowed speeds on 72% of its road network to 30 km/h.[3] These changes maintain motorist mobility while protecting the person on foot.

Policy changes at the national or global level are also needed. The policies directing how local traffic engineers operate the streets come from national publications. These policies encourage traffic engineers to judge the performance of the streets by how well they move motorists and to ignore other uses and users of the street.[4] A classic example of the conflict between moving traffic and walking is right turns on red. Despite evidence that right turns on red increases the risk of a motorist hitting a pedestrian,[5 6] the engineering manual universally used in the US demands at least three collisions per year or ''significant'' conflicts between motorists and pedestrians before restricting right turns on red.[7] In another example, if traffic engineers determine that motorist delay during rush hour is too great, they will try to reduce it by shortening the traffic signal timing. This, of course, means that the street becomes harder to cross on foot. A national engineering guideline on traffic signal timing records the results of a survey of pedestrian speeds. The survey showed that 14% of pedestrians ran rather than walked across the intersection. (Isn't that noteworthy?) In calculating how much time to allocate for people to cross the street, the guideline uses the 85-percentile walking speed, which excludes 15% of walkers whose walking pace is slower—that is, traffic engineers are authoritatively advised to design intersections to provide insufficient time for the mobility-impaired to cross.[8] These policies are typical of policies that fail to protect people walking.

We need to put in place policies that do a better job of protecting people walking. A better balance can be struck between protecting people and minimizing motorist delay.

MAKING CHANGES

Morency and Cloutier's citations show that a large body of research, both in Montreal and global, already questions the use of black spots. How much additional research is required before policy is changed? Maybe the publication of Morency and Cloutier's report will convince Montreal to abandon its black spot treatment approach and devote real resources to reducing motorist–pedestrian crashes. I hope so.

How can these lessons be made global? This journal cannot afford to publish a similar article for every city, as useful as that would be. The lessons must be incorporated into the guidelines establishing the standard practices of traffic engineers. After all, it is they, rather than epidemiologists, who make the decisions about our roadways. Making changes at the national or

global level will require injury prevention specialists to engage with the traffic engineers. But how? Traffic engineers have their own conferences and journals, and (sad but true) few engineers read *Injury Prevention*. Conversely, few injury prevention specialists read the engineering literature.

Greater communication might not be enough to bridge the gap if the professions are devoted to different values. But are they, really? Engineering guidelines seem to value a person behind a steering wheel more than a person walking, and to value speed over safety, but do engineers feel the same way? Presumably not when their elderly parents are attempting to cross a downtown street. And although we may presume that *Injury Prevention* readers favor safety over speed while reading the pages of their favorite journal, do we always feel the same way when we're behind our own steering wheels? That's the research we urgently need to publish in *Injury Prevention*—how to bridge the difference between the two professions. Injury prevention specialists need to learn how to convince traffic engineers, at both the local and global level, of the value of safe streets.

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Research–practice gap

Bridging the gap between research and practice: a continuing challenge

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More commitment to deal with the research–practice gap

How best to put evidence into effective practice to achieve an intended reduction in morbidity, mortality or disability has long been an issue of concern in research on injury field. Research-to-practice gaps have always existed and progress in this subject has been slow. Factors that contribute to this problem include lapses in communication between researchers and practitioners, and service delivery issues such as lack of public awareness, poor financing and a non-supportive political atmosphere. Scientific publications of research on intervention effectiveness, which do not provide information useful for widescale public health dissemination, also add to the problem.[1] Additional issues cited by public health practitioners are that interventions may be too narrowly focused, complex, difficult and costly, or may not engage or meet the perceived needs of the community.[2–4] Once established, prevention programs must be sustained with adequate infrastructure and long-term intensity, requiring substantial resource investment.[2]

The process described in the article by Brussoni *et al*[5] ***(this issue, p 373)***, began with the academic team accessing systematic reviews or meta-analyses to synthesize information from existing research and evaluation studies on a specific topic (eg, smoke alarm programs) to determine effectiveness of strategies.[6] The researchers then convened local practitioners, policy makers and other professionals with the goal of planning potential programmatic action to deal with a targeted injury problem for which prevention strategies have proved successful. The process culminated with the production of an ''effective action briefing''. We applaud the authors and *Injury Prevention* for providing a forum to continue these discussions.

By providing summaries of a large number of research or evaluation studies, a well-conducted systematic review can be invaluable to practitioners. In public health, the focus on evidence-based interventions has led to several frameworks with which to assess the rigor of the available research. One of the most widely cited is the ''hierarchy of evidence'', which places greater weight on evidence that comes from more rigorous study designs.[7 8] However, there is growing recognition that even evidence-based guidelines from tightly controlled trials, ideally controlled by random assignment, may not be a sufficient framework to weigh all of the information needed to design an intervention appropriate for a community.[9–12] These methods do not take into consideration the diverse circumstances of public health practice,[3 9] and many appraisals of evidence do not distinguish between failure of the intervention concept or theory versus failure of implementation.[10]

Even proved effective interventions can be rendered ineffective at any stage of the process, including the initial concept and planning stage (represented in the article by Brussoni *et al*[5]). In addition, the complexities of program design and delivery including inadequate reach into the target population, facing unanticipated community obstacles, lack of participant acceptance or compliance and many of the barriers noted in this paper may lead to failure.[13–16] The emerging discipline of translational research, which focuses on the process of moving evidence-based programs from their development into widespread practice, may provide valuable information about factors associated with successful implementation.[17] This method may generate knowledge to help reduce the theory–practice gap but will ''require long-term commitment among researchers, practitioners and policy makers''.[18]

The paper by Brusonni *et al*[5] recommends practice field meetings to facilitate communication between researchers, public health practitioners, policy makers, managers and other