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Limited Linkages Between Secondhand Smoke Discovery and Delivery:

More a Speed Bump than a Gap

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The Harris et al.¹ paper in this issue of the *American Journal of Preventive Medicine* reports a network analysis of citation patterns among 1877 papers related to secondhand smoke published between 1965 and 2005. The primary conclusion is that there is not much crossover citation between *discovery research* on the physical or health effects of secondhand smoke and *delivery research* that evaluates interventions to reduce secondhand smoke exposure. The authors suggest that this low level of cross-citation between these two networks could be slowing the diffusion of innovation and a lack of cooperation and communication among investigators doing these two different kinds of work.

The fact that there are not a lot of direct linkages between discovery and delivery research is not so much evidence of a gap between these two different literatures, but a reflection of the fact that the objects and subjects of the work are fundamentally different, one dealing primarily with biology and the other with policy and politics. The lack of direct citations, particularly of delivery research by discovery research does not mean that the people working in these two areas are not aware of each other's work. As someone who works in both areas, I have been impressed at the commitment of discovery investigators to the communicating of their work to people interested in developing and evaluating policy actions based on this research, as well as identifying questions of policy relevance. At the same time, those working on delivery have been interested in keeping abreast of the biological and physical science and how it can be used to shape policy. Much of this communication, however, takes place in meetings and workshops, not through the literature itself.

From this perspective, it is not surprising that those papers identified by Harris et al.¹ as forming the bridge between the two citation networks (Table 4 of their paper) all dealt with effects on exposure or major endpoints (lung cancer, heart disease, effects asthma) and defined populations (bartenders, workers, children). One would expect this, rather than linkages between, say, papers on the cellular effects of tobacco smoke exposure on vascular endothelium and the political process of passing local smokefree ordinances.

Based on my personal experience in both the discovery and delivery domains, as well as in direct advocacy, I was surprised that the three papers that seemed to be most used in policy

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debates—Repace's 1980 *Science* paper² identifying secondhand smoke as a potent indoor air pollutant that caused 3000 cases of lung cancer annually (212 citations in Web of Science on March 1, 2009); Hirayama's 1981 *British Medical Journal* paper³ linking passive smoking with lung cancer in nonsmoking women (463 citations); and Glantz and Parmely's 1991 *Circulation* paper⁴ linking passive smoking and heart disease (324 citations)—did not figure more prominently in the Harris et al. networks. Only the Hirayama paper even appeared, and not as a major paper.

There are several possible explanations for the difference in the Harris findings and my intuition: My experience and expectations may be biased, and there may be inherent limitations in the way the data from Web of Science forms the basis of the statistical analysis. (The abstract from Repace's paper, for example, did not appear in Web of Science.) Most likely, studying linkages between two bodies of *research* misses the actual use of the research for policy *implementation*, which involves citations in other channels, such as public hearings or the media.

Harris et al.¹ also show that one important channel for bridging these two networks comes from major consensus reports, such as the U.S. Surgeon General's reports on smoking and health. This result is not surprising, because these consensus documents are a convenient way to cite a large body of literature in a single citation, and also because they are prepared with multiple audiences in mind, including people working outside the narrow disciplines of each study.

In a great example of scientific understatement, Harris et al. note that these reports "typically do not contain the most recent scientific discoveries and may be out of date as soon as they are published." This problem arises from two sources: First, such consensus documents are prepared only rarely—the first Surgeon General report on Involuntary Smoking appeared in 1986⁵ and the second one did not appear until 20 years later, in 2006.⁶ Second, the peer-review process and, in the case of Surgeon General's reports, the political clearance process, can take months if not years.

The obvious conclusion from these findings is that there is a need to shorten the interval between updating such consensus documents and to speed up the process of writing them. The difficulty in implementing this recommendation is that preparing these reports is costly, and it is precisely the level of scrutiny that each goes through that makes them so credible. If the Surgeon General says that passive smoking causes a disease, you *know* it causes that disease. At the same time, this extreme caution, combined with the fact that these reports take so long to complete, can lead to a serious understatement of the evidence on the health effects of secondhand smoke, which could reduce the value of these reports to ensure that policy decisions are based on the best, most current, science.

The link between secondhand smoke and breast cancer provides a good example of this problem. In 2005, the California Environmental Protection Agency (CalEPA) published a comprehensive risk assessment of the health effects of secondhand smoke that concluded that secondhand smoke caused breast cancer in younger, primarily premenopausal, women.⁷ The 2006 Surgeon General report, published the following year did not go as far: it concluded that the link between secondhand smoke and breast cancer in younger women was suggestive (one step below causal).

Even though it was published a year after the CalEPA report, however, the Surgeon General's report drew its conclusion based on older data because of the very slow process by which the reports are developed and approved. Specifically, while both the Surgeon General and CalEPA identified similar and substantial magnitude risks associated with passive smoking in younger women (around 1.7⁸), the Surgeon General did not go the final step of "causal," citing the 2004

Surgeon General's report on active smoking's conclusion that there was no evident that active smoking caused breast cancer. The conclusion in that 2004 report was based on literature from 2000 and earlier. (In contrast to the Surgeon General's reports, the CalEPA is required by law to see that its air toxics risk assessments reflect the best available *current* science, so new citations were being added throughout the process of peer reviewing and approving the report. As a result, the report, released in 2005, contained relevant citations from 2005.) Since most of the evidence linking both passive and active smoking with breast cancer was published after 2000, when the 2004 Surgeon General report "closed the books" on new studies, we are left with a situation in which women, health professionals, and public health advocates are relying on a conclusion that is now based on a literature that is nearly a decade old.

While it is unlikely that the increasingly cautious⁸ process of producing Surgeon General's reports (and other similar consensus documents) will speed up, one could work for a model more similar to the CalEPA, in which the process more routinely adds new information throughout the review period. This is easier said than done, and it may be that the best solution would be to encourage the preparation and publication of more review papers while at the same time working to change the culture of tobacco control so that it treats these consensus documents as a foundation, not the last word, on the science. These reports, while extremely useful, need to be appreciated for what they are, generally out of date before they are published, and extremely cautious. They should be considered an historical statement and not a statement of current scientific understanding.

Doing so would probably not affect the shape of the networks that Harris et al. identified or two parallel related literatures with some practical cross-links, but it could speed the diffusion of discovery into the policymaking process and accelerate the movement toward a smokefree society.

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