

# The Role of Evidence in Public Health Policy: An Example of Linkage and Exchange in the Prevention of Scald Burns

Le rôle des preuves sur le plan des politiques  
sur la santé publique : un exemple des liens et  
des échanges dans la prévention des brûlures  
par liquides chauds



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## Abstract

Is sound evidence sufficient to change public health practice and policy? In this paper, we describe a campaign to reduce scald burns among children based on compelling evidence of the effectiveness of an intervention to reduce hot tap water temperature. We provide an overview of the problem and the evidence to support our efforts, the context for addressing the scald problem and the lessons learned about why the relationship between evidence and change in practice is not straightforward.

## Résumé

Des preuves évidentes sont-elles suffisantes pour provoquer un changement dans les pratiques et politiques en matière de santé publique? Cet article décrit une campagne visant à réduire les brûlures par liquides chauds chez les enfants fondée sur les preuves indéniables de l'efficacité d'une intervention consistant à réduire la température de l'eau chaude du robinet. L'article offre une vue d'ensemble du problème des brûlures par liquides chauds ainsi que des données qui soutiennent les efforts accomplis, puis décrit le contexte de cette problématique pour finalement conclure sur les leçons apprises qui indiquent que le lien entre les preuves fournies et les changements de pratique n'est pas évident.

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**O**N APRIL 3, 1875, A YOUNG GIRL NAMED MAGGIE WAS SCALDED BY HOT water from a pail. Maggie was the first patient of The Hospital for Sick Children in Toronto, Canada. To mark the 120th anniversary of the hospital, a health education campaign was launched with the theme of preventing scalds among children. Although much has changed over 120 years, hot water scalds remain a cause of preventable injuries to children.

## Scald Burns: The Problem

Burns are among the most devastating of all injuries. They may be associated with surgery and skin grafting, as well as other long-term consequences such as disfigurement, physical disability and emotional trauma. Each year in Canada, burn injuries are responsible for an average of 77 deaths and 1,740 hospitalizations in children and youth (0–19 years) (Choiniere et al. 1997). Of these, scald injuries account for 70% of hospitalizations and 45% of emergency department visits (Choiniere et al. 1997). Of all scald injuries, 5%–10% are tap water scalds (Choiniere et al. 1997; Feldman et al. 1978).

Tap water burns are of particular importance from an injury prevention focus because these burns can cause extensive and deep injuries covering a large body surface

area. Children (and seniors) are at increased risk for tap water scalds because they cannot react as quickly to hot water and remove themselves from the exposure. There is a logarithmic relationship between water temperature and scald severity. Third-degree (full thickness) burns occur in 2–5 seconds at 60° Celsius, in 10–30 seconds at 55° Celsius and in 5–10 minutes at 49° Celsius (Moritz and Henriques 1947). Current regulations in Canada allow for domestic water heaters to be factory-set at 60° Celsius.

Tap water scalds are preventable. Interventions such as turning down the temperature of household hot water, anti-scald devices and public education programs may be associated with a reduction in the number of scald burns to children (DiGuseppi and Roberts 2000). In the United States, the state of Washington passed legislation in 1983 that required new water heaters to be set at 49° Celsius (Erdmann et al. 1991). In addition, the legislation required warning labels on heaters and annual notices warning of the hazards of hot water and the energy savings associated with lower water temperatures. Following this legislation, Erdmann et al. (1991) showed that tap water scald hospitalizations in children younger than 15 years in two hospitals in Washington declined by 56%. Further, total body surface area burned, surgical intervention, scarring and length of hospital stay were also all reduced. A Canadian study (Webne and Kaplan 1993) demonstrated that when new hot water heaters were installed with the thermostat dial at a lower temperature, the majority of households did not change their pre-set thermostats to higher temperatures.

## The Context

### Moving towards an evidence-based approach

Founded in 1992, Safe Kids Canada is the national injury prevention program of The Hospital for Sick Children in Toronto. In 1997, the organization sought to raise its profile as a source of trusted messages on injury prevention for Canadian parents, public health departments, children's hospitals and community coalitions interested in children's safety. The chosen method was to increase Safe Kids Canada's role in research – its promotion, use and integration of research evidence to inform programs and messages.

One quick solution was to strengthen a fledgling science advisory committee to become a strong active committee of leading experts in injury and related issues. This group – the National Expert Advisory Committee (NEAC) – would help ensure the scientific credibility of the organization as well as the evidence supporting specific programs and messages.

## Turning evidence into action

Building on The Hospital for Sick Children's scald prevention campaign, NEAC made a decision for Safe Kids Canada to focus on tap water scald prevention. At the time, the initiative was viewed as a potential "quick win" with respect to making a difference in childhood safety. As discussed later in the section Lessons Learned, however, the prevention journey was anything but "quick," and "wins" were difficult and hard fought.

The case for support was developed by conducting an extensive review of interventions for scald prevention in the scientific literature and quantifying the burden of scalds among Canadian children. These data were the foundation for an internal Safe Kids Canada background position paper that examined the issue and provided the rationale for interventions and messages. A dedicated public policy and advocacy staff member was hired to broaden the staff skill set. She was charged with leading the advocacy campaign to reduce water temperature in Canadian hot water heaters. A member of NEAC led the evaluation study to assess the impact of a public education campaign on hot water scald prevention during an annual injury prevention awareness campaign week. The study was subjected to research ethics board approval, peer review of the protocol and ongoing monitoring by other NEAC members. At the same time, a cost-effectiveness study was conducted with the help of a health economist. She assessed the savings to the healthcare system if preventive legislative/regulatory measures were successful in reducing tap water scalds. The results showed (from a direct healthcare cost perspective only) that there would be a \$531 cost saving per scald prevented through reduction of tap water temperatures.

## Conflicting evidence?

Although Safe Kids Canada had collected evidence to support its campaign direction and corresponding messages, other "evidence" was surfacing that would cause controversy. In particular, an electrical company was communicating contrary evidence that a reduction of water temperature in hot water heaters would result in increased exposure to *Legionella pneumophila* among the general population (and particularly in vulnerable populations, such as children and seniors). Legionella is a form of bacterial pneumonia, most commonly affecting immuno-compromised individuals, the elderly and children. The opinion of Safe Kids Canada experts was that this "evidence" was weak and reflected an adversarial stance from an organization that could be damaged by the campaign. In other words, a reduction in the setting of hot water temperature might result in reduced electrical consumption and therefore less revenue.

Legionella is a ubiquitous organism that has been detected in domestic hot water systems (Murray 2005). In a study of domestically acquired legionella infection, however, Strauss et al. (1996) failed to demonstrate an association between hot water

temperature and infection. Furthermore, the incidence of legionellosis in the United States over the period 1984–1999 has shown no discernible change, despite the fact that 28 states adopted legislation to reduce hot water temperature subsequent to the Washington experience (CDC 2001). Both scald burns and legionella infection are public health concerns. A prevailing industry perspective, however, is that prevention of legionella infection takes priority over prevention of tap water scalds (Hockey 2002). This debate warrants an objective review of the scientific evidence and clinical experiences. Such a review could be widely disseminated to relevant interested parties using diverse channels (e.g., hydro and electrical trade publications, plumbing journals and public health communiqués).

### Developing expertise

This opposition drove Safe Kids Canada advisers and staff to become experts in such technical issues as the design of hot water tanks and water heating methods (gas versus electrical heaters) as well as regulatory processes (building and plumbing codes and standards, and the relationship between national and provincial regulatory bodies). It was also important to identify the many players involved in water temperature setting and raise their awareness of this issue and of the overall importance of injury prevention.

## Building Consensus: Dealing with Opposition

It became clear that a lone voice (Safe Kids Canada) would not be sufficient to effect regulatory change, given the opposing views. Endorsement and support from like-minded organizations for changing water temperature in tanks would be critical. To that end, Safe Kids solicited over 300 letters of support from various organizations and also advocated for organizational positions on the issue (e.g., the Canadian Paediatric Society, Canadian Public Health Association and Canadian Medical Association). The general public was also made aware of the importance of reducing water temperature through a Safe Kids Week annual campaign. The focus of this week-long event was to promote national, provincial and local messaging related to scald prevention. Testing and lowering household water temperature was a key message within the campaign in an effort to promote behavioural and environmental changes by parents. The scald campaign evaluation study showed that one in eight parents exposed to the campaign tested their water temperature, with 50% lowering the water temperature. Also, most parents (>70%) expressed support for legislation to lower water temperature in hot water heaters (Macarthur 2003).

Notably, the scald prevention campaign included most of the elements in the framework for successful tobacco control identified in the Surgeon General's report, *Reducing Tobacco Use* (US Department of Health and Human Services 2000). This

report identifies five key elements: (1) clinical intervention and management, (2) educational strategies, (3) regulatory efforts, (4) economic approaches and (5) the combination of all these into comprehensive programs. Tobacco control has been widely cited as one of the most successful public health campaigns.

FIGURE 1. Campaign outcomes

<p><b>For the Public</b></p> <ul style="list-style-type: none"><li>• Change to the Ontario Building Code to ensure that hot water heaters are set at the safe temperature of 49° C; this decision is still under review at the national level</li><li>• 35 million media impressions, including national, regional and local prime-time coverage</li><li>• Extensive retail campaign across the country (point-of-purchase educational displays) through partnership with Johnson &amp; Johnson in national department stores and pharmacy chains</li><li>• Popular new water testing tool created; 600,000 were disseminated across Canada in 2001</li></ul> <p><b>For the NGO and Public Health Communities</b></p> <ul style="list-style-type: none"><li>• Won International Association of Business Communicators Ovation Award of Excellence</li><li>• Change in practice with respect to messaging on burn prevention</li></ul> <p><b>For the Research/Academic Community</b></p> <ul style="list-style-type: none"><li>• 4 peer-reviewed publications</li><li>• 1 national and 1 local resident research award</li><li>• Career advancement</li></ul> <p><b>For the Research and NGO/Public Health Communities</b></p> <ul style="list-style-type: none"><li>• Creation of ongoing research and practice coalition (Injury Prevention Across the Life Span, or IPALS), which has secured funding for other joint initiatives related to injury prevention</li><li>• New collaborations with public health, health economists, infection control experts, as well as between NGOs and science representatives</li><li>• National and international presentations at scientific meetings/conferences, including "A Productive Conversation" – a meeting promoting dialogue between the NGO and research communities, sponsored by the Canadian Institutes of Health Research</li></ul>
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## Campaign outcomes

As shown in Figure 1, the campaign led to a range of outcomes. A change in policy on setting of hot water heaters was realized through changes to the Ontario Plumbing Code; however, consensus was not reached to change the Canadian Building Code. Public health departments and other organizations interested in child safety are aware of scald prevention messaging and actively include evidence-based scald prevention messages within their health promotion activities. However, it was by no means a "quick win" campaign. Six years later, the work is ongoing – not only advocating for change, but attempting to ensure that there is not a reversal in Ontario's position with respect to the Plumbing Code.

Other campaign outcomes included public awareness (35 million media impressions, distribution of a water temperature testing instrument), academic outputs

(peer-reviewed publications, presentations) and development of new injury prevention partnerships and research collaborations.

## Lessons Learned

### Interpretation of the evidence

The same body of evidence was interpreted and weighted differently by researchers, NGOs, policy makers and industry. Context and expert opinion as well as evidence played important roles in decision-making.

### Industry interactions

NGOs need to understand early the language and culture of the private sector and to be realistic about the resource implications required for policy change when it affects the private sector. The process is dynamic and resource-intensive.

### Academic lessons

Timelines for researchers and NGOs often do not correspond. This tension forces the researcher to appreciate the need for timely information for policy decision-making. Likewise, the NGO needs to understand the rigour required to provide methodologically sound data. Attempting to balance the motivations and agendas of both the public health sector and the private sector was also a learning experience for the academics involved. A successful collaboration requires active listening, mutual respect as equal partners, and early discussion of timelines and outputs of meaning to all participants.

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