

PROGRAM EVALUATION

Evaluation of Safe Kids Week 2001: prevention of scald and burn injuries in young children

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Objective: To evaluate Safe Kids Week 2001—a national public awareness campaign on scald and burn prevention—run by Safe Kids Canada.

Design: Random digit dial telephone survey.

Setting: Canada.

Subjects: Parents or guardians of children under 9 years. Two groups of parents were compared, those “exposed” to the campaign (defined as having “seen, heard, or read anything about scald and burn prevention during the period 28 May to 3 June 2001”) and those “unexposed” to the campaign.

Intervention: Burn safety information was disseminated via the media, 5000 retail stores, and 348 community partners across Canada. The campaign emphasized four key messages: (1) Lower your water temperature, hot tap water could burn your child! (2) Make sure your child is safe in the kitchen. (3) Keep hot drinks away from your child. (4) Check your smoke alarms regularly.

Outcome measures: Change in parental knowledge and behavior.

Results: A total of 29 871 telephone numbers were called, with a household refusal rate of 27%. Nationally, 14% of parents were exposed to the campaign and 504 parents were interviewed, 251 in the “exposed” group and 253 in the “unexposed” group. Parents exposed to Safe Kids Week 2001 were 1.5–5 times more likely to be aware of key campaign messages, and 2–3 times more likely to test and lower the water heater temperature, compared with unexposed parents.

Conclusion: Safe Kids Week 2001 reached a significant proportion of parents of young children. In addition, the campaign appeared to increase burn safety knowledge and lead to behavior changes among exposed parents, compared with unexposed parents.

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Burn injuries are among the most devastating of all childhood injuries. Children with severe burns require prolonged hospitalization for pain control, fluid balance, and multiple surgeries.¹ In addition, rehabilitation is lengthy and hypertrophic scarring at the burn site may lead to contractures, impaired bone growth, and functional disability. The physical and psychological effects of burn injuries are life long.

Each year in the United States, burn injuries account for more than 1000 deaths and 20 000 hospital admissions among children and youth (0–19 years).¹ The burn fatality rate in children and youth in Canada (1990–92 data) is 1/100 000/year, with 80 deaths annually, whereas, the burn hospitalization rate is 23/100 000/year, with 1700 admissions annually.² Scald burns, that is those resulting from contact with hot liquid or steam, account for 1% of all burn fatalities, 80% of all burn admissions, and 44% of all burn related emergency department visits by children.² Of all scald burns, 10%–15% are tap water scalds.^{3–5}

Safe Kids Canada is a non-profit organization dedicated to the prevention of childhood injury. The primary goal of the organization is to disseminate information on injury prevention strategies to parents, health care professionals, and policy makers. Safe Kids Week—a national annual public awareness campaign run by Safe Kids Canada—is a key dissemination activity. The focus of Safe Kids Week 2001 was burn prevention, with an emphasis on scald burns in general, and tap water scalds in particular.

The aim of this study was to evaluate the effectiveness of Safe Kids Week 2001. Specific objectives were to determine if the educational campaign increased parental knowledge of scald and burn injury risks to children, and whether the cam-

paign prompted specific behavioral changes by parents that would reduce the risk of scald and burn injuries to their children.

METHODS

Intervention

Burn safety information was disseminated to parents during Safe Kids Week (28 May to 3 June 2001) via the media, retail stores, and community partners. The media campaign consisted of news conferences, press releases, and video for local television stations. The one week campaign resulted in 35 million media impressions via television (46 broadcasts), radio (25 broadcasts), and print (46 clippings). The retail campaign involved 5000 stores across Canada. Participating stores carried prominent displays, point-of-purchase information booklets, and free thermometer cards to test the hot water temperature. (One million information booklets were printed and distributed as were 500 000 temperature testing cards.) A total of 348 community partners across Canada (public health units, community safety organizations) participated in Safe Kids Week. Posters, flyers, and a guide on how to increase public and media awareness were distributed to the community partners. In addition, partners were offered temperature testing cards at cost. The total cost of the campaign was estimated at \$600 000 (Can).

All three campaigns (media, retail, and community partners) emphasized four key messages: (1) Lower your water temperature, hot tap water could burn your child! (2) Make sure your child is safe in the kitchen. (3) Keep hot drinks away from your child. (4) Check your smoke alarms regularly.

Study design

A national random digit dial telephone survey was used to gather information on parental knowledge and behavior in relation to scald and burn injury prevention. All three digit prefixes across Canada were identified from published exchanges, and random four digit suffixes were generated using statistical software. The sampling frame of telephone numbers was generated using the Waksberg-Mitofsky approach.⁶ To improve the response rate, each telephone number was called at least six times, including day time and weekends. A log of the reasons for non-response, for example, business telephone number, fax number, no answer after six attempts, refusal to participate, inability to complete the questionnaire, was maintained.

The study population of interest was parents or guardians of children under 9 years. Exposure to Safe Kids Week 2001 was defined as having “seen, heard, or read anything about scald and burn prevention during the period May 28 to June 3, 2001”. Detailed data from two groups of parents—those “exposed” and those “unexposed” to the national campaign—were collected via telephone interview. The study was approved by the Research Ethics Board at the Hospital for Sick Children.

Measurements

Telephone interviews were conducted between 28 June and 12 July 2001 (3–5 weeks post-campaign) and took an average of 14 minutes to complete. Interviews were conducted by trained interviewers using a standardized questionnaire. The 38 item questionnaire was pilot tested on five parents with children under 9 years of age. The telephone interview assessed parental knowledge and behaviors in relation to scald and burn safety in children. For example, parents unprompted knowledge of the four key messages of the campaign was assessed. In addition, parents were asked if they would support national legislation mandating safe hot water temperatures. With respect to safety behaviors, parents were asked if they had ever tested the temperature of the hot water in the home. Of those who tested the hot water temperature after Safe Kids Week 2001, parents were asked if the temperature testing card had been used, what the water temperature was, and whether the water heater thermostat was lowered subsequent to testing. The prevalence of specific scald safety behaviors in the kitchen were also assessed, and data on smoke alarm ownership and maintenance were collected. Last, sociodemographic data—parent age, sex, education, marital status, family composition, and tenure of dwelling (rent or own) were gathered.

Analysis and sample size

Sociodemographic characteristics and study outcomes (parental awareness and safety behaviors) were described using simple proportions, with the χ^2 test or Fisher’s exact test used to test for differences between the two groups (exposed and unexposed). The likelihood of an awareness or behavior in the exposed group, compared with the likelihood in the unexposed group, was quantified using the “relative risk”, along with 95% confidence intervals. Last, stratified analysis was used to take into account differences between the two groups on potential confounding variables.

For each outcome, attributable fractions were also calculated.⁷ Attributable fractions are public health measures that quantify the amount of “disease” that can be attributed to a specific exposure (under the assumption that the exposure-outcome relationship is causal). For this study, the exposure was Safe Kids Week 2001, and the outcomes were awareness and behavior change. The attributable fraction exposed is the proportion of disease that can be attributed to a specific exposure among exposed individuals, whereas, the population attributable fraction is the proportion of disease that can be attributed to a specific exposure in the total population (which includes both exposed and unexposed persons).

The baseline frequencies of key outcomes (awareness of key messages and behavior changes) were estimated to be between 10%–50%. Given an alpha level of 5% and a “clinically important difference” of 20% (absolute), 220 parents per group (exposed and unexposed) provided >90% power to detect a 20% effect size across the range of baseline frequencies.

RESULTS

A total of 29 871 telephone numbers were called. Of these, 4392 (15%) were non-residential numbers. Of the 25 479 residential telephone numbers, contact could not be established for 9638 (38%). Of the 15 841 residential numbers where contact was established, 4286 households (27%) refused to participate and 9818 households (62%) were ineligible (no children under 9 years in the household). Of the 1737 households with children under 9 years, 504 interviews were completed; 251 respondents in the “exposed” group and 253 respondents in the “unexposed” group. (The remaining 1233 respondents were ineligible as the required sample size for the unexposed group had already been met.)

Exposure

In total, 14% of parents of children under 9 years recalled seeing, hearing, or reading about scald and burn prevention during Safe Kids Week 2001 (251/1737). There were no regional differences in exposure to the campaign across Canada. Of the exposed group, 38% of parents received burn safety information from media sources only, 18% received information from community events only, and 6% received information from retail stores only. The remainder of exposed parents received burn safety information from a combination of these sources.

Study population

There were no differences between exposed and unexposed parents on age, education, marital status, family composition, or tenure of dwelling (see table 1). Exposed parents, however, were more likely to be female, compared with unexposed parents (79% v 68%, respectively).

Knowledge: key messages

Parents were asked to identify steps or actions that could be taken to protect children from scalds and burns in the home. Unprompted, 23% (57/251) of exposed parents mentioned lowering the hot water heater temperature as a means of preventing scalds, compared with 14% (35/253) of unexposed parents (p=0.01). In addition, 12% (31/251) of exposed parents recommended keeping children out of the kitchen while cooking, compared with 8% (21/253) of unexposed parents (p=0.14). In total, 4% (10/251) of exposed parents mentioned keeping hot drinks out of the reach of children, compared with 1% (2/253) of unexposed parents (p=0.02). There were no unprompted mentions of smoke alarms as a strategy to prevent burns in the home by either group (exposed or unexposed). Table 2 presents the relative risks

Table 1 Sociodemographic characteristics of parents exposed and unexposed to Safe Kids Week

Characteristic	No (%) exposed (n=251)	No (%) unexposed (n=253)	p Value
Age <35 years	111 (44)	120 (48)	0.47
Female	199 (79)	170 (68)	0.02
University education	110 (44)	115 (46)	0.71
Single parent	39 (15)	36 (14)	0.68
≥2 children	120 (48)	117 (47)	0.73
Rent home	64 (26)	70 (28)	0.58

Table 2 Relative risks (exposed v unexposed) and attributable fractions (exposed and population) for the key campaign messages

Key messages	Awareness exposed*	Awareness unexposed*	RR (95% CI)	AFe (%)	AFp (%)
(1) Lower your water temperature	23 (57/251)	14 (35/253)	1.64 (1.12 to 2.41)	39	8
(2) Make sure your child is safe in the kitchen	12 (31/251)	8 (21/253)	1.49 (0.88 to 2.52)	33	6
(3) Keep hot drinks away from your child	4 (10/251)	1 (2/253)	5.04 (1.12 to 22.77)	80	36
(4) Check your smoke alarms regularly	–	–	–	–	–

*Values are % (number/total number).

AFe, attributable fraction among exposed; AFp, population attributable fraction; CI, confidence interval; RR, relative risk (exposed v unexposed).

Table 3 Relative risks (exposed v unexposed) and attributable fractions (exposed and population) for hot water testing behaviors

Behavior	Frequency exposed*	Frequency unexposed*	RR (95% CI)	AFe (%)	AFp (%)
Tested water temperature, before Safe Kids Week 2001	14 (34/251)	13 (34/253)	1.01 (0.65 to 1.57)	–	–
Tested water temperature, after Safe Kids Week 2001	12 (27/217)	6 (14/219)	1.95 (1.05 to 3.61)	49	12
Lowered water temperature, after Safe Kids Week 2001	6 (13/217)	2 (4/219)	3.28 (1.09 to 9.90)	70	24

*Values are % (number/total number).

AFe, attributable fraction among exposed; AFp, population attributable fraction; CI, confidence interval; RR, relative risk (exposed v unexposed).

Table 4 Self reported scald prevention behaviors in the kitchen among parents exposed and unexposed to Safe Kids Week 2001

Behavior	No* (%) exposed (n=251)	No* (%) unexposed (n=253)	p Value	RR (95% CI)
Keep children out of the kitchen when cooking	135 (54)	135 (54)	0.92	1.01 (0.86 to 1.19)
Cook on the back burners of the stove	102 (41)	119 (47)	0.15	0.86 (0.71 to 1.05)
Turn pot handles to the back of the stove	210 (84)	214 (85)	0.78	0.99 (0.92 to 1.07)
Ensure electrical cords are not dangling from counter	203 (81)	220 (87)	0.07	0.93 (0.86 to 1.01)
Let food cool before serving to children	186 (74)	195 (77)	0.44	0.96 (0.87 to 1.06)

*Number reporting "always" to the question: "How often do you . . .".
CI, confidence interval; RR, relative risk (exposed v unexposed).

(exposed v unexposed) and attributable fractions (exposed and population) for the key messages.

Safety behaviors

Before Safe Kids Week 2001, 14% (34/251) of exposed parents had tested the temperature of the hot water in the household, compared with 13% (34/253) of unexposed parents ($p=0.97$). After Safe Kids Week, 12% (27/217) of exposed parents tested the hot water temperature, compared with 6% (14/219) of unexposed parents ($p=0.03$). Of the 41 parents who tested after Safe Kids Week, 67% (18/27) of exposed parents and 50% (7/14) of unexposed parents could not remember the temperature of the hot water ($p=0.33$).

In total, 6% of parents in the exposed group (13/217) lowered the temperature of the hot water heater, compared with 2% of parents in the unexposed group (4/219), $p=0.03$. Only one parent did not have access to the water heater. This parent (in the exposed group) approached the landlord who lowered the water heater temperature. Table 3 provides the relative risks (exposed v unexposed) and attributable fractions (exposed and population) for these scald prevention behaviors.

Stratified analyses (taking into account the unequal distribution of female respondents between exposed and unexposed groups) did not change the associations between exposure to Safe Kids Week 2001 and the key outcomes (awareness of key messages and safety behaviors).

Ten parents picked up a temperature testing card from a retail store during the campaign. Seven of these parents (70%) tested the tap water temperature, compared with 10%

(20/207) of parents in the exposed group who did not pick up a card ($p<0.001$) and 6% (14/219) of parents in the unexposed group ($p<0.001$). Support for federal legislation for a maximum hot water heater temperature to prevent tap water scalds in children was strongly and equally supported by both exposed (187/251, 74%) and unexposed parents (185/253, 73%).

Self reported scald prevention behaviors in the kitchen by the two groups (exposed and unexposed) are described in table 4. Of interest, relatively few parents put a lid on hot drinks such as coffee or tea in the home, with no difference between exposed (13%, 33/251) and unexposed parents (11%, 28/253), $p=0.50$. When driving, however, the majority of parents put a lid on hot drinks, with again no difference between exposed (63%, 159/251) and unexposed parents (59%, 149/253), $p=0.32$.

All parents in the survey reported at least one smoke alarm in the household. Only one third of parents, however, checked the functioning of the smoke alarm monthly, with no difference between exposed (34%, 85/251) and unexposed parents (31%, 79/253), $p=0.53$. The majority of parents changed the smoke alarm batteries yearly, with no significant difference between exposed (90%, 225/251) and unexposed parents (85%, 214/253), $p=0.11$.

DISCUSSION

This national random digit dial telephone survey showed that 14% of Canadian parents of children under 9 years were aware of Safe Kids Week 2001. Parents "exposed" to Safe Kids Week were 1.5–5 times more likely to be aware of key campaign

messages, compared with unexposed parents. Exposed parents were also 2–3 times more likely to test and lower the water heater temperature, compared with unexposed parents. There were no differences between exposed and unexposed parents on specific scald prevention behaviors in the kitchen, nor on smoke alarm ownership and maintenance.

This study had several strengths. First, the survey was national in scope, with random sampling of the population of interest. In addition, to improve the response rate, a minimum of six calls were made. To minimize information bias, a standardized data collection instrument was used, along with computer assisted telephone interviewing technology. Last, stratified analysis was used to take into account the effect of potential confounding variables.

A limitation of the study is that many potentially eligible households were missed because of refusal to participate or failure to achieve contact. If all such eligible households had been unexposed, the frequency of campaign penetration could have been as low as 7%. In addition, parents were not randomly allocated to the intervention. This was not feasible, however, given that Safe Kids Week 2001 was a national educational campaign. Of note, exposed and unexposed parents were similar on all but one of the measured sociodemographic characteristics. Exposure and outcome data were also based on self report. Given the biases associated with recall and self report for safe water temperatures, direct measurement of hot water temperatures, before and after Safe Kids Week 2001, would have been ideal.⁸ Last, knowledge and behavior change are only intermediate steps in the injury prevention pathway. In other words, definitive evidence of program effectiveness would require data showing changes in burn injury rates.

A recent systematic review evaluated the effectiveness of tap water scald prevention interventions delivered in the clinical setting.⁹ Five randomized trials of educational interventions reported positive effects, with counseled parents twice as likely to test, lower, or maintain a safe hot tap water temperature, compared with control families. A sixth trial compared information plus a free thermometer, with information only. Families provided with the free thermometer were more likely to test and lower the tap water temperature, compared with families receiving information only.

The effectiveness of mass media campaigns on burn and scald prevention have also been evaluated. For example, Katcher showed that a multimedia campaign, which included safety pamphlets enclosed in electrical bills along with educational messages about hot tap water in the media (television, radio, and newspapers), increased parental awareness of tap water scald risks.¹⁰ Waller *et al* evaluated the effectiveness of a national media campaign (“hot water burns like fire”) in New Zealand.¹¹ Tap water measurements before and after intervention in 126 randomly selected homes in Dunedin showed that the proportion of homes with tap water temperatures under 60°C increased from 33% at baseline to 47% at follow up.

Whether educational programs are effective in reducing the burden of scald and burn injuries, however, is less clear. For example, “Project Burn Prevention” in Boston—an educational intervention consisting of mass media, school curricula, and community outreach—showed no difference in burn incidence rates (all types, all ages) in the 12 months after the campaign in the intervention communities, compared with control communities.¹² In comparison, the “Harstad Injury Prevention Study”—a community based educational campaign in Norway—showed long term declines in scald and burn injury rates in children under 5 years in the intervention community, compared with an increase in injury rates in the control community.¹³

IMPLICATIONS FOR PREVENTION

Significant resources—funding, personnel, and community volunteer efforts—are required to conduct Safe Kids Week.

Key points

- Burns are among the most devastating of childhood injuries.
- Safe Kids Week 2001 was a multipronged national public awareness campaign on scald and burn prevention.
- Parents of children under 9 years were surveyed and nationally an estimated 14% of parents were exposed to the campaign.
- Parents exposed to Safe Kids Week 2001 were 1.5–5 times more likely to be aware of key campaign messages, and 2–3 times more likely to test and lower the water heater temperature, compared with unexposed parents.
- Safe Kids Week 2001 reached a significant proportion of parents of young children, and the campaign appeared to increase burn safety knowledge and lead to behavior change.

Therefore, it is important to evaluate the effectiveness of such campaigns. Census data indicate that there are 2.5 million families with children under 9 years in Canada. Therefore, if 14% of such families received information on scald and burn safety during Safe Kids Week 2001, up to 350 000 homes in Canada were exposed to the campaign. (Of note, the frequency of exposure could have been as low as 7%.) In addition, in relative terms, parents exposed to Safe Kids Week were more likely to be aware of key campaign messages, and more likely to test and lower the tap water temperature, compared with unexposed parents.

The “relative risks” generated from the random digit dial survey provide important information about the magnitudes of effect of the campaign on parental knowledge and behavior related to scald and burn prevention. Under the assumption of a causal exposure-outcome relationship, the attributable fractions provide information on the amount of knowledge and behavior that could be attributed to the campaign. For example, the attributable fraction exposed for the key message “lower the tap water temperature” was 39%. In other words, 39% of the awareness of this key message among exposed parents could be attributed to Safe Kids Week 2001. For the other key messages (keep children safe in the kitchen and keep hot drinks out of the reach of children) 33% and 80% of the awareness of these key messages among exposed parents, respectively could be attributed to the campaign. Results were also impressive for the scald prevention behaviors. For example, 49% of the tap water testing behavior among exposed parents could be attributed to the campaign, whereas 70% of the safety behavior of lowering the tap water temperature among exposed parents could be attributed to Safe Kids Week 2001. These attributable fractions must be interpreted with caution, however, as exposure status was based on self report, other sources of safety information were not identified, the intervention was not randomly allocated, and outcomes data were self reported.

CONCLUSION

The primary objective of Safe Kids Week 2001 was to educate parents about scald and burn safety in children. The results of this evaluation study suggest that the campaign reached a significant number of Canadian families, and awareness of the key campaign messages was more likely among exposed parents, compared with unexposed parents. The education campaign also prompted behavior change. For example, one in eight parents exposed to Safe Kids Week 2001 reported testing the tap water temperature, and of these parents, 48% reported lowering the water heater temperature. These data suggest that Safe Kids Week 2001 was an effective injury prevention initiative.

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