

# The Impact of 'Bottle Bill' Legislation on the Incidence of Lacerations in Childhood

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**Abstract:** We studied the effect of legislation requiring deposits for beverage containers on the incidence of lacerations in urban children. Records of emergency room visits for lacerations and fractures were reviewed for three years pre-legislation (1980-82) and the immediate post-legislation period (1983). The incidence of total sutured lacerations did not change substantially after the legislation, but glass-related lacerations fell by 60 per cent, due to a reduced incidence in lacerations occurring outside of the home. (*Am J Public Health* 1986; 76:1243-1244.)

## Introduction

Injuries are the leading cause of mortality<sup>1</sup> and the second most common cause of morbidity and physician visits in childhood.<sup>2</sup> Lacerations and abrasions account for up to one-half of all childhood non-intentional injuries.<sup>2-6</sup> Various environmental agents, both natural and man-made, contribute to this type of injury. One of the most common of these is broken glass.

On January 17, 1983, the Commonwealth of Massachusetts became the fourth New England state to enact legislation requiring mandatory monetary deposits on beverage containers. By providing an incentive for improved container recycling, this "Bottle Bill" was expected to have a primarily conservational and environmental impact. The purpose of the present study was to investigate the impact of this legislation on visits of children to our emergency ward.

## Methods

We conducted a case-control study of children 18 years of age or younger who presented to the Emergency Service of Children's Hospital, Boston, for the treatment of lacerations. Records of all such individuals residing within a seven postal zipcode area served directly by the Medical Center were reviewed retrospectively. Only cases presenting from May 1 through August 31 of 1980, 1981, 1982, and 1983 were included so as to reflect the season of maximum outdoor activity and peak incidence of minor trauma.

Information was gathered concerning the age and sex of the child, date of injury, need for suturing or admission, incidence of subsequent complication, and involvement of glass as a causative agent. Glass-related lacerations were further categorized as having occurred within the home (designated as "house glass") or outside of the home (designated as "outdoor glass"). Lacerations were considered "complicated" if they were associated with infection or admission.

Children with fractures who resided in the same residential areas and presented to the Emergency Service during the designated time periods were used as controls. Odds

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ratios and their 95 per cent confidence intervals<sup>7</sup> were calculated for each category of laceration using the 1980 four-month time period as the basis for comparison (all odds ratios for 1980 = 1.00).

## Results

A total of 2,032 lacerations and 695 fractures were treated during the four time periods considered. Information regarding the etiology of the laceration was available from 98.8 per cent of all charts. Twenty-four cases (1.2 per cent) lacked sufficient information for analysis. These were evenly distributed in all years, and were excluded from the study. Of the remaining 2,008 lacerations, 1,969 (84 per cent) required suturing. The frequency was relatively stable by year, with a slight decline in both lacerations and fractures in 1982 (Table 1).

The odds ratios of laceration for each year (Relative to 1980) are given in Table 2. An odds ratio of 1.00 suggests that the ratio of the annual incidence of category-specific lacerations to fractures was identical to that of 1980. In the intervention year, 1983, the odds ratio was 0.32 (0.21, 0.49) for glass-related sutured lacerations, a substantial drop from 1981-82. The odds ratio for 1983 outdoor glass-related sutured lacerations fell to 0.29 (0.19, 0.45). During this same time period (1981-83), the small number of household glass-related sutured lacerations remained relatively constant [odds ratio = 0.81 (0.26, 2.51)].

Broken bottles were implicated in the majority (83 per cent) of cases citing a specific outdoor source. However, only 57 per cent of all records of glass-related injuries included such information. Of those, proportionately fewer occurred post-legislation (56 per cent) cited broken bottles, than those occurring pre-legislation (86 per cent). Indoor glass-related lacerations were caused exclusively by broken drinking glasses and window panes.

The proportion of non-sutured wounds due to outdoor glass also decreased in 1983. Outdoor glass was involved in 11 per cent of all non-sutured lacerations in the pre-legislation period, as opposed to 8 per cent in 1983.

During the time periods studied, a total of 31 children required admission for treatment of their lacerations. Eleven of the 31 admissions (36 per cent) were due to glass-related injuries, all of which occurred prior to 1983. Thirty-seven lacerations developed subsequent infection; 15 of these were glass-related. Fourteen of the fifteen associated with glass

TABLE 1—Characteristics of Lacerations by Year

	1980	1981	1982	1983
Fractures	174	170	162	189
Total Lacerations	534	500	477	497
Not Sutured	86	67	72	87
Sutured	448	433	405	410
Not Glass-related	320	320	295	365
Glass-related	128	113	110	45
House glass	8	6	6	7
Outdoor glass	120	107	104	38

**TABLE 2—Risk of Laceration by Category and Year Using Fractures as Controls**

	ODDS RATIO <sup>a</sup>		
	1981 (CI)	1982 (CI)	1983 <sup>b</sup> (CI)
Total Lacerations	0.96 (0.75,1.23)	0.96 (0.74,1.24)	0.86 (0.67,1.10)
Non-sutured	0.80 (0.53,1.19)	0.90 (0.60,1.34)	0.93 (0.64,1.36)
Sutured	0.99 (0.77,1.28)	0.97 (0.75,1.26)	0.84 (0.65,1.08)
Non-glass Related	1.02 (0.78,1.34)	0.99 (0.75,1.30)	1.05 (0.81,1.37)
Glass-related	0.90 (0.64,1.27)	0.92 (0.65,1.31)	0.32 (0.21,0.49)
House Glass	0.77 (0.23,2.50)	0.81 (0.24,2.63)	0.81 (0.26,2.51)
Outdoor	0.91 (0.64,1.29)	0.93 (0.65,1.33)	0.29 (0.19,0.45)

<sup>a</sup>Odds ratio calculated with 1980 = 1.00.

<sup>b</sup>Intervention year.

occurred before 1983. No lacerations resulted in permanent loss of function of the affected body part.

During the study period, no important changes in surgical technique or management of lacerations occurred. Similarly, no known organized clean-up programs took place in the study areas between September 1982 and August 1983.

### Discussion

Following enactment of legislation promoting recycling of beverage containers in Massachusetts, the incidence of glass-related sutured lacerations presenting to our emergency ward appears to have decreased dramatically, dropping by 60 per cent. This reduction in overall glass-related sutured lacerations was apparently due to a drop in those caused by glass outside of the home, as the number of house glass-related lacerations was relatively unchanged. Glass-related admissions and complications in 1983 were virtually eliminated.

We have assumed that the presentation of lacerations to our Emergency Room is a reflection of the true incidence within the study population. This assumption is based on several factors. First, the specific monitoring of suture-requiring lacerations reduces the likelihood that major shifts in emergency room utilization accounts for the observed decline in glass-related lacerations; rather, this would seem to be more likely among children who suffer less serious lacerations. Second, there have been no major changes in the health care delivery system or childhood population during this time period; third, the incidence of fractures and of non-glass-related sutured lacerations paralleled that of glass-

related sutured lacerations in all study periods prior to initiation of the Bottle Bill. The marked departure in 1983 from this relatively stable relationship suggests that any confounding factors would have to have operated selectively upon glass-related sutured lacerations and not other categories of minor trauma.

While other factors could be involved, we hypothesize that the rise in non-glass-related lacerations and fractures in 1983 was due at least in part, to the influence of weather. Weather trends would be expected to influence the incidence of lacerations by shaping patterns of outdoor activity.<sup>8,9</sup> According to National Weather Service observations, the four-month period of 1983 was characterized by fewer days of precipitation than that of the previous three years.<sup>10</sup>

Thus it is our impression that the reduction in glass-related injuries was associated with the implementation of beverage container recycling legislation. By providing incentives for the return of empty containers, this conservational policy has apparently been beneficial to urban children by reducing their exposure to broken glass in the environment.

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