

Evaluation of an Intervention to Reduce Playground Hazards in Atlanta Child-Care Centers

ABSTRACT

In 1988, we identified playground hazards at 58 child-care centers (CCCs) and intervened by showing the director the hazards and distributing safety information. In 1990, we evaluated the 58 intervention CCCs as well as 71 randomly selected control CCCs. Intervention centers had 9.4 hazards per playground; control centers had 8.0. We conclude that the intervention was ineffective. (*Am J Public Health*. 1992;82:429-431)

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Introduction

A 1988 study of child-care centers (CCCs) found that the likelihood of a playground-related, medically attended injury increased as the number of identified playground hazards increased.¹ Part of that study involved an intervention in which we showed the director each identified hazard and distributed playground safety information. In 1990, we revisited these centers to see if the hazards had been corrected.

Methods

Methods for the sample selection and hazard survey have been described.^{1,2} Briefly, 66 of 71 randomly selected CCCs enrolled in an injury study² underwent evaluation for commonly recognized playground hazards³⁻⁶ (see also Table 1) between July and October 1988 (the baseline survey).¹

The intervention consisted of pointing out and explaining each hazard to the CCC director, and distributing results of the injury study² and handbooks on playground safety.^{7,8}

We had two questions: (1) would the intervention result in less hazardous playgrounds (intervention vs control study)? and (2) would specific hazards previously pointed out to CCC directors in 1988 be eliminated (persistence study)?

In April and May 1990, 16 CCC licensing inspectors with the Georgia Department of Human Resources Office of Regulatory Services (ORS) were trained in playground evaluation. Between May and June 1990, two-person teams of these inspectors evaluated all baseline survey CCCs and 71 randomly selected control CCCs (the follow-up survey). Inspectors were not told which CCCs were controls. Inspectors drew a map, inventoried equipment, measured equipment heights and undersurface thickness, listed hazards, noted the director's name and length of incumbency, and formed an overall im-

pression of playground safety (very hazardous, hazardous, average, safe, very safe).

We also reviewed ORS annual licensing evaluations for 1988-1989 for all follow-up survey CCCs.

Intervention vs Control Study

We compared mean and median number of hazards per center and playground, and the inspector's impression of safety. Intervention CCCs were categorized by change in directorship after the intervention in 1988; control CCCs, by a change after September 1, 1988.

Persistence Study

Intervention center playgrounds and equipment were linked to the baseline survey by location and equipment height; those that could not be linked were excluded. Hazards were considered persistent if baseline and follow-up coding categories matched exactly.

Results

Intervention vs Control Study

Of 66 baseline survey CCCs, 58 were open in 1990. These CCCs had 123 playgrounds with 1171 pieces of equipment; the 71 control CCCs had 135 playgrounds and 1021 pieces of equipment. Climbing equipment was the most common piece of equipment. Of 238 climbers at least 4 feet tall, 125 (52.5%) were sited over nonresilient surfaces (earth or grass, concrete);

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This paper was submitted to the journal April 9, 1991, and accepted with revisions August 22, 1991.

TABLE 1—Number and Mean Number of Playground Hazards^a for 58 Intervention and 71 Control Child-Care Centers (CCCs), Atlanta, Ga, 1990

Type of Hazard ^b	Number (Mean) Hazards per Center		Total
	Intervention	Control	
Unrelated to equipment			
Off-limits access	49 (0.8)	63 (0.9)	112
Tripping hazard	54 (0.9)	46 (0.7)	100
Broken fence	40 (0.7)	45 (0.6)	85
Sharp fence wire	36 (0.6)	41 (0.6)	77
Exposed root	37 (0.6)	28 (0.4)	65
Exposed concrete	32 (0.6)	29 (0.4)	61
Exposed rocks	26 (0.5)	33 (0.5)	59
Debris	25 (0.4)	28 (0.4)	53
Broken/unsecurable gate	26 (0.5)	35 (0.5)	61
Briars	28 (0.5)	23 (0.3)	51
Nail	27 (0.5)	16 (0.2)	43
Splintered wood	23 (0.4)	19 (0.3)	42
Other	60 (1.0)	71 (1.0)	131
Total	463 (8.0) ^c	477 (6.7) ^c	940
Equipment-related			
Exposed concrete anchoring	71 (1.2)	67 (0.9)	138
Inadequate clearance	58 (1.0)	56 (0.8)	114
Rocks in fall zone	54 (0.9)	49 (0.7)	103
Exposed nail	47 (0.8)	43 (0.6)	90
Splintered wood	50 (0.9)	39 (0.6)	89
Open "S" hooks on swings	44 (0.8)	44 (0.6)	88
Rusting	27 (0.5)	28 (0.4)	55
Exposed root in fall zone	26 (0.5)	25 (0.4)	51
Sharp objects	29 (0.5)	25 (0.4)	54
Tip-over hazard ^d	25 (0.4)	24 (0.3)	49
Other	179 (3.1)	189 (2.7)	368
Total	610 (10.5) ^e	589 (8.3) ^e	1199

^aNot including inadequate undersurfacing in fall zones.
^bData shown for those hazards recorded 40 or more times in the 129 centers.
^cStandard deviation (SD) = 5.4 for intervention and 5.5 for control CCCs.
^dClimbing equipment accounted for 10 (6 intervention, 4 control) of these hazards.
^eSD = 9.2 for intervention and 8.7 for control CCCs.

only 17 (7.1%) had 3 or more inches of loose-fill undersurfacing.

Intervention and control CCCs had similar licensed capacities. Their playgrounds were designed for similarly aged children. The mean incumbency for intervention center directors was 8.4 years; for control center directors, 8.6 years. No control center directors had received the intervention.

The inspectors identified 2139 hazards (mean = 16.6, median = 13, range = 1–69) in the 129 CCCs. The median number of hazards per playground was 7.0; only 14 of 258 playgrounds had no hazards.

Intervention CCCs had 1.3 more hazards unrelated to equipment than control CCCs had and a mean of 2.2 more equipment-related hazards (Table 1). Intervention CCCs also had higher hazard scores (Table 2). The 32 centers with no change in directorship had higher hazard scores than the 26 centers with a change. Control CCCs with no change in directorship also

had more hazards per playground than those with a change (mean = 9.3, median = 8 vs mean = 7.3, median = 6, respectively). As licensed capacity increased, playground hazard scores decreased (Table 2).

Of 118 intervention playgrounds, 47 (39.8%) were deemed "very safe" or "safe," 42 (35.6%) were "average," and 29 (24.6%) were "hazardous" or "very hazardous"; the corresponding figures for 127 control playgrounds were 43 (33.9%), 44 (34.6%), and 40 (31.5%). These differences were not statistically significant.⁹ For intervention CCCs with no change in directorship, 28.8% of 59 playgrounds were rated "hazardous" or "very hazardous" compared with 20.3% for CCCs with a change. For control CCCs with no change in directorship, 41.5% of playgrounds were rated "hazardous" or "very hazardous" compared with 23.5% for CCCs with a change.

Licensing evaluation reviews revealed that, between 1988 and 1989, play-

ground hazards increased from 85 to 104 for 53 intervention CCCs and decreased from 81 to 73 for 57 control CCCs. The 29 intervention CCCs with no change in directorship went from 49 hazards in 1988 to 63 in 1989. Of the 177 hazards noted in 1989, 41 (23.2%) had been cited in 1988.

Persistence Study

We linked 111 (90.2%) of 123 intervention playgrounds and 589 (51.7%) of 1140 pieces of equipment to baseline. At follow-up, we identified 150 (36.0%) of 417 hazards noted at baseline. For CCCs with a change in directorship, 48 of 153 hazards persisted (31.4%) compared with 102 of 264 hazards (38.6%) for CCCs with no change.

Discussion

At CCCs, most injuries requiring medical attention occur on playgrounds.^{2,10–12} To reduce such injuries, we intervened, showing each director the specific hazards on the playground, explaining why they were problematic, and distributing educational materials.

Despite this intervention, quantitative scores indicate that intervention CCC playgrounds were not less hazardous than control playgrounds. Similar results were obtained from independent data—the annual licensing evaluations.

If the intervention had been effective, we would have expected CCCs with the same "intervention-exposed" director to have lower hazard ratings than CCCs with new, "unexposed" directors. The opposite occurred. Hazard persistence rates and subjective safety ratings were also worse in CCCs with intervention-exposed directors. This does not imply that the intervention had a negative effect. Rather, lower hazard ratings in control CCCs with changes in directorship suggest that leadership changes may be important in reducing hazards.

Almost 2 years after the intervention, 36% of the hazards found at baseline persisted. We cannot assume that the remaining 64% of the hazards were abated. The 1990 survey had 16 evaluators; the 1988 survey had only 3. What one team labeled an "exposed rock," another team may have called a "tripping hazard." Because we counted only exact matches, differences in nomenclature probably led to an undercount of true persistence.

Regulations do not ensure "hazard-free" environments. Although they are not defined, hazardous conditions are prohibited on center grounds. Nevertheless,

inspectors identified 2139 hazards in 129 CCCs. Georgia codes also mandate resilient surfaces beneath climbers without defining resilient. For climbers at least 4 feet tall, earth or grass is not considered a suitable undersurface,¹³⁻¹⁴ and loose-fill undersurfaces (sand, wood chips, etc.) require 6 or more inches in depth.^{3,13-16} Yet few CCCs followed these recommendations. As a result of this study, the State of Georgia has revised CCC regulations (effective March 1, 1991) to provide specific definitions of selected playground hazards.

The lack of better hazard scores in intervention CCCs, the better hazard ratings for intervention CCCs with intervention-unexposed directors, and the higher hazard persistence rates in CCCs with intervention-exposed directors support our conclusion that pointing out and explaining playground hazards to CCC directors, coupled with distributing educational materials, does not reduce hazards. Alternative approaches that need evaluation include rewriting regulations, training agency inspectors better, enforcing regulations more rigorously, educating CCC directors more extensively, and increasing parental awareness—for example, by posting inspection results in a conspicuous place in the CCC. □

Acknowledgments

Portions of the results of this study were presented at a National Institute of Child Health and Human Development workshop in Washington, DC, on March 25, 1991.

The authors thank the 16 Office of Regulatory Services (ORS) inspectors who surveyed the playgrounds; Marjorie Smith, RN, ORS, for providing resources, overall coordination, and impetus for the study; Jo Cato, Day Care Licensing Unit, ORS, for providing staff support and encouragement; Kenneth W. Holt, MSEH, Centers for Disease Control (CDC), and J. Marion Brown, Jr, BS, Georgia Dept of Human Resources (DHR), for field training of evaluators; J. David Smith, BS, and R. Keith Sikes, DVM, MPH, Office of Epidemiology, DHR for support and consultation; Peggy Monkus, BS, Office of Epidemiology, for coding data forms; Owen J. Devine, MS, CDC, for statistical consultation; and Suzanne M. Smith,

Number of Hazards	Mean (Median) Scores				
	Intervention CCCs			Control CCCs	All CCCs
	Same ^a	New ^b	Total		
Per CCC ^c	19.3 (15.5)	17.6 (13)	18.5 (15)	15.0 (11)	16.6 (13)
Per playground, by licensed capacity					
<60 ^d	12.2 (12)	10.8 (10.8)	12.0 (11)	9.5 (8)	10.6 (9)
60–89 ^e	6.2 (7.3)	8.3 (8)	7.3 (7.3)	9.5 (9)	8.3 (7.7)
90–119 ^f	9.5 (8)	8.6 (7.8)	9.1 (8)	6.8 (6.5)	7.9 (7)
≥120 ^g	13.5 (13.5)	7.9 (6.1)	9.0 (6.5)	6.5 (6.5)	7.3 (6.5)
Total ^h	10.1 (9)	8.5 (9)	9.4 (9)	8.0 (7)	8.6 (7.5)

^aDirector who received the educational intervention in 1988 is still the director in 1990.
^bDirector who received the educational intervention in 1988 is no longer the director in 1990.
^cStandard deviations (SDs) = 14.3, 12.6, 13.5, 12.6, 13.1.
^dSDs = 6.1, 1.8, 5.7, 5.5, 5.7.
^eSDs = 3.6, 3.0, 3.4, 5.5, 4.6.
^fSDs = 6.0, 5.8, 5.7, 5.1, 5.5.
^gSDs = 13.4, 7.4, 8.2, 4.1, 5.8.
^hSDs = 6.3, 5.3, 5.8, 5.2, 5.5.

MD, James A. Mercy, PhD, Richard W. Sattin, MD, and Suzanne C. Binder, MD, CDC, for editorial assistance.

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