

VIRGINIA EPIDEMIOLOGY BULLETIN

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Child and Adolescent Drownings in Virginia: A Population-Based Study

Introduction

Drowning continues to be a leading cause of unintentional injury deaths in children and adolescents. In Virginia, as in the United States as a whole, it is the second leading cause of death after motor vehicle accidents in 0-19 year olds (Figure 1). One of the goals in the *Healthy People 2000 National Health Promotion and Disease Prevention Objectives*¹ is to decrease drowning rates in the United States. To begin to reduce these preventable deaths, we must first be able to describe the extent of the problem.

Virginia's geographic location, population distribution, economy, and topography presumably influence the pattern and distribution of drowning deaths. Several studies have specifically described the epidemiology of childhood and adolescent drownings²⁻⁷ but none have examined the problem in Virginia. The purpose of this study was to determine the magnitude of the problem in Virginia and identify areas for prevention interventions.

Methods

A retrospective review was done of all medical examiner (ME) records of children and adolescents aged 0-19 who drowned in Virginia between January 1, 1989 and December 31, 1994. Since the ME's office investigates all cases of accidental deaths, a review of ME records provided an accurate way to identify cases in which the

cause of death was due to drowning. Drowning deaths ruled homicides (5) as well as those involving motor vehicles (4) were included.

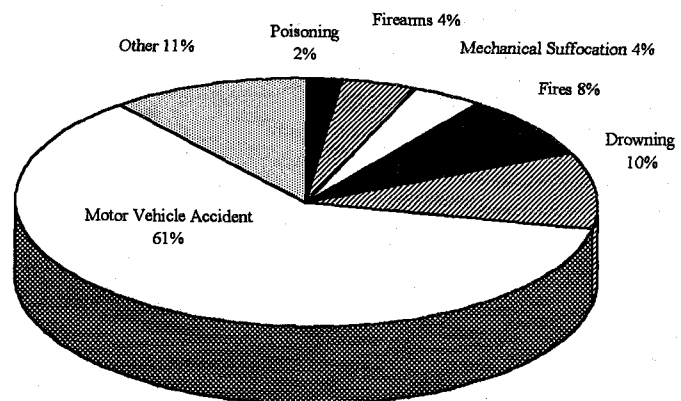
Drowning rates were calculated using age- and race-specific population data from the 1990 Census. While all drownings that occurred in Virginia are described below, 14 cases were excluded when drowning rates were calculated because the victims were not residents of Virginia. In some instances, actual counts were small (<20) and therefore, rates must be interpreted with caution. The geographic regions included in this report refer to the ME Office Districts: Northern, Western, Central and Tidewater. In an attempt to categorize the causes of drowning, we used External Cause of Injury Code (E-Code) descriptors from the *International Classification of Diseases, 9th Revision*.

Results

There were 163 children and adolescents, aged 0-19, who drowned in Virginia between January 1, 1989, and December 31, 1994, resulting in an annualized drowning rate for Virginians aged 0-19 of 1.44/100,000. This is somewhat lower than the national annual rate of 2.10/100,000 persons in this age range.

Drowning rates for children and adolescents varied according to geographic location within Virginia, with the highest rate occurring in the Central Virginia region (2.12/100,000) (Figure 2). The Tidewater and Western regions had the second and third highest rates (1.41 and 1.40/100,000, respectively). Northern Virginia had the lowest rate (0.90/100,000). In Central Virginia, the most frequently reported body of water in which a drowning occurred was a

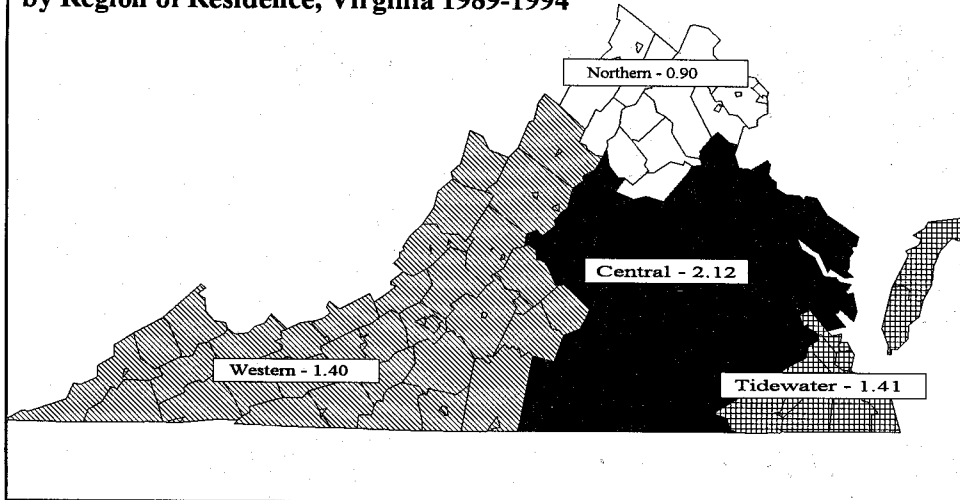
Figure 1. Unintentional Injury Deaths in Virginia
Ages 0-19, 1988-1994



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Figure 2. Drowning Rate/100,000 0-19 Year Olds by Region of Residence, Virginia 1989-1994



pool (24/61, 39%). In the Tidewater region, located along the coast, drowning in a river and drowning in a pool were reported equally (23% for both). In the six years of data that were examined, only six instances were identified in which a child or adolescent drowned in the ocean/bay.

Drowning rates for individuals aged 0-19 also varied by race, sex and age group. Blacks (2.36/100,000) and males (2.24/100,000) had rates greater than the statewide average.

As expected, most drownings (82%) occurred in the spring and summer. The most frequently reported time of day was during the afternoon and evening (12 Noon-10 PM). Although this time block represents only 10 hours of the day, 81% of those for whom time of death was known drowned during this period.

The most frequent causes of drowning as categorized by E-Code descriptors were "Accidental Drowning or Submersion While Engaged in a Sport or Recreational Activity" (29%), "Accidental Drowning in Pools" (25%), and "Accidental Fall Into Water or Drowning Not Otherwise Specified" (22%) (Figure 3). There were eleven children and adolescents who drowned in a bathtub; six were two years old or younger. In each of these six cases, a parent, relative, or other adult was responsible for the child at the time but left the room momentarily to perform a brief task.

When the data were examined by age group, children under five and adolescents aged 15-19 had the highest rates (2.14/100,000 for both) (Figure 4). Children under five represent 26% of the population of 0-19 year olds in the state, yet they accounted for 36% of all the drownings in this study. Forty-four percent of children under five drowned in swimming pools or hot tubs and all of the swimming

pools were residential. Most (80%) of the children who drowned in swimming pools were in the care of a parent, relative or other adult at the time of the incident.

Five-to-nine year olds represent 25% of the population of 0-19 year olds in the state, but accounted for only ten percent of all drownings in the study. Black males had the highest drowning rate in this age group (1.71*/100,000). Six of these children (38%) drowned in swimming pools, four of which were public and two residential.

Children and adolescents aged 10-14 also represent about a quarter (23%) of Virginia's population of 0-19 year olds, but they accounted for only 15% of all the drownings identified. Black males in this age group again had the highest drowning rate (3.27* per 100,000). In half of these cases (52%), the individual was engaged in a sport or recreational activity such as playing or wading in the water, or fishing. In this group, 76% drowned in rivers, lakes or other bodies of water.

Adolescents aged 15-19 represent 26% of the population of 0-19 year olds in the state, yet they accounted for the highest percentage of all drownings in this study (39%). Asian males, black males and white males had the highest drowning rates (6.61*, 6.47*, and 3.02/100,000, respectively).

Almost half (44%) of 15-19 year olds drowned while engaged in a sport or recreational activity such as wading or fish-

ing and most (89%) drowned in bodies of water such as rivers or lakes. Sixteen percent of 15-19 year olds drowned as a result of a watercraft-related incident. Three quarters (76%) of this group were in the presence of one or more persons at the time of the drowning incident.

Eighty-four percent of cases in the 15-19 year age group had an ethanol and/or drug analysis performed on autopsy. Of those tested, 49% had a detectable blood ethanol and/or drug level, including prescription and street drugs. Twenty-five percent of those tested had a blood ethanol level between 0.05% and 0.09%; 11% had detected levels between 0.10% and 0.32%.

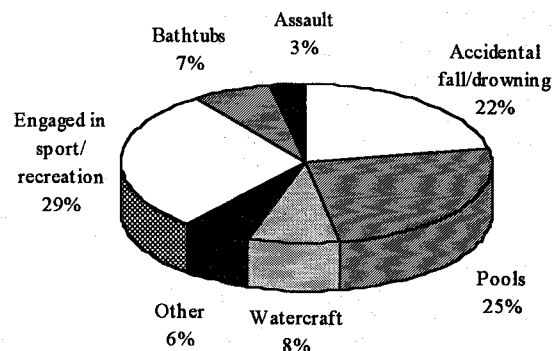
Conclusions

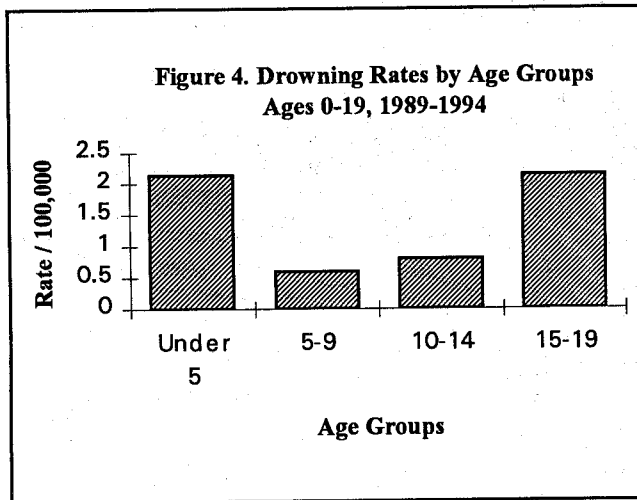
The results of this study indicated that drowning rates varied, sometimes dramatically, by age group, race, sex and geographic location. Some important patterns were detected that offer areas for intervention in an effort to decrease the number of drownings in Virginia. These include:

- Children under five who drowned were frequently in residential pools and other manmade bodies of water when there was a lapse in adult supervision.
- Similarly, more than half of the drownings that occurred in a bathtub could have been prevented if the child had not been left alone for any period of time.
- Adolescents aged 15 - 19 drowned almost exclusively in bodies of water such as rivers and lakes, most often while engaged in some sport or recreational activity with at least one other person present, and
- Alcohol may have been a factor in some of these adolescent drownings.

* Actual count <20.

Figure 3. Drownings in Virginia by E-Code Ages 0-19, 1989-1994





By determining how, when and where drowning deaths occur, and factors that influence their distribution, we can tailor injury prevention strategies to target groups at risk for drowning in Virginia. Submersion resulting in death, however, is only part of the problem. According to data from the National SAFE KIDS Campaign, for every child who drowns, an additional four children are hospitalized for near-drowning. The National SAFE KIDS Campaign also estimated the economic costs of residential pool drownings and near-drownings of young children to be approximately \$450,000,000-\$650,000,000 per year.⁸ Health care providers are uniquely situated to identify and educate families regarding ways to prevent these unnecessary tragedies.

Prevention Strategies

Since the two age groups in Virginia with the highest drowning rates were children five years of age or younger and adolescents 15-19 years of age, these two groups have been targeted for possible prevention activities. Activities include:

- » Ongoing education about the danger of leaving small children unattended around any body of water. There are a number of reports that document the number of children who have drowned as a result of a brief lapse in a caretaker's supervision.⁴ Most people still have to be reminded that small children don't perceive water as a danger, and that it is their nature to explore, a combination of factors that can be fatal in the absence of 100% supervision.
- » Encouraging owners of all residential pools to install 4-sided isolation fencing at least 5 ft. high. The frequency with which children under five drown in pools, especially residential, is well documented. Fenc-

ing that completely surrounds the pool and separates it from the house is widely believed to offer the most protection as it eliminates easy access to a backyard pool from the doors or windows of a house. Studies by the Consumer Product Safety Commission and others have demonstrated that children younger than five have more trouble negotiating a 5 foot tall fence than a 4 foot tall

one.^{9,10} A study in Australia showed that drownings could be reduced by 50% or more by requiring pool fencing.¹¹

- » Discouraging advertisers from glorifying the combination of alcohol, youth and water. Television, during major sporting events, often presents youthful and attractive individuals sporting a beer bottle at the local beach or water resort. This powerful message appears to condone the consumption of alcohol while engaging in water activities.

This article was submitted by Jeanne K. Sanders, RN, MSN, Department of Pediatrics, Division of General Pediatrics, Virginia Commonwealth University; with support from the Division of Child and Adolescent Health, Virginia Department of Health.

References

1. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. Hyattsville, Md.; U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Health Statistics; Washington, D.C. 1993.
2. Warneke, C.L. and Cooper, S.P. Child and adolescent drownings in Harris County, Texas, 1983 through 1990. *Am J Public Health*. April 1994;84(4), 593-8.
3. Hedberg, K., Gunderson, P.D., Vargas, C., Osterholm, M.T. and MacDonald, K.L. Drownings in Minnesota, 1980-1985: a population-based study. *Am J Public Health*. September 1990;80(9), 1071-4.
4. Fife, D., Scipio, S. and Crane, G.L. Fatal and nonfatal immersion injuries among New Jersey residents. *Am J Prev Med* 1991;7(4), 189-93.
5. Quan, L., Gore, E.J., Wentz, K., Allen, J. and Novack, A.H. Ten-year study of pediatric drownings and near-drownings in King County, Washington: lessons in injury prevention. *Pediatrics*. June 1989;83(6), 1035-1040.
6. Wintemute, G.J. Childhood Drowning and near drowning in the United States. *Am J Diseases of Children*. June 1990;144,663-9.
7. Wintemute, G.J., Kraus, J.F., Teret, S.P. and Wright, M. Drowning in childhood and adolescence: a population-based study. *Am J Public Health*. July 1987;77(7), 830-2.
8. Zamula, W.W. *Social Costs of Drowning and Near-drownings from Submersion Accidents Occurring to Children Under Five in Residential Swimming Pools*. Washington, D.C.: Directorate for Economic

Analysis, U.S. Consumer Product Safety Commission; 1987.

9. Elder, J. *Human Factors Analysis: CPSC Child Drowning Study*. Bethesda, Md.: Directorate for Epidemiology, Division of Human Factors, U.S. Consumer Product Safety Commission; September 1987.

10. Present, Paula. *Child Drowning Study, A Report on the Epidemiology of Drownings in Residential Pools to Children Under Age Five*. Washington, D.C.: Directorate for Epidemiology, Division of Hazards Analysis (EPHA), U.S. Consumer Product Safety Commission; September 1987.

11. Milliner, N., Pearn, J. and Guard, R. Will fenced pools save lives? A ten-year study from Mulgrave Shire, Queensland. *Med J Aust*. November 1, 1980;2(9), 510-1.

Course in Hospital Epidemiology

CDC, the Society for Healthcare Epidemiology of America (SHEA), and the American Hospital Association will cosponsor a hospital epidemiology training course May 18-21, 1996, in New York City. The course, designed for infectious disease fellows, new hospital epidemiologists, and infection-control practitioners, provides hands-on exercises to improve skills in detection, investigation, and control of epidemiologic problems encountered in the hospital setting and lectures and seminars on fundamental aspects of hospital epidemiology.

Additional information is available from SHEA Meetings Department, 875 Kings Highway, Suite 200, Woodbury, NJ 08095-3172; telephone (609) 845-1720; fax (609) 853-0411.

Cases of Selected Notifiable Diseases Reported in Virginia.*

Disease	Total Cases Reported, March 1996						Total Cases Reported Statewide, January through March		
	State	Regions					This Yr	Last Yr	5 Yr Avg
		NW	N	SW	C	E			
AIDS	99	4	11	10	21	53	246	232	292
Campylobacteriosis	72	14	14	10	21	13	127	78	84
Giardiasis	38	4	11	8	6	9	58	43	59
Gonorrhea	818	59	69	132	213	345	2387	2898	3259
Hepatitis A	26	1	10	3	6	6	36	46	39
Hepatitis B	21	2	2	4	6	7	38	22	39
Hepatitis NANB	2	0	1	0	0	1	3	0	7
HIV Infection	100	3	6	10	14	67	212	203	297
Influenza	10	9	0	0	0	1	198	878	682
Legionellosis	4	0	1	0	0	3	6	2	3
Lyme Disease	0	0	0	0	0	0	0	2	8
Measles	0	0	0	0	0	0	0	0	4
Meningitis, Aseptic	19	2	8	1	2	6	34	34	44
Meningitis, Bacterial [†]	10	1	1	0	1	7	18	33	29
Meningococcal Infections	4	1	0	0	1	2	15	20	16
Mumps	1	0	0	0	0	1	3	7	13
Pertussis	0	0	0	0	0	0	0	0	4
Rabies in Animals	59	11	9	9	13	17	115	78	66
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	121	30	24	8	25	34	224	161	174
Shigellosis	57	19	18	0	3	17	101	36	68
Syphilis, Early [‡]	97	1	0	1	29	66	250	340	358
Tuberculosis	18	0	3	5	2	8	43	33	66

Localities Reporting Animal Rabies: Accomack 2 raccoons; Albemarle 1 fox, 1 raccoon; Alleghany 1 skunk; Amelia 1 raccoon; Appomatox 1 skunk; Augusta 1 raccoon; Botetourt 1 raccoon; Buckingham 2 skunks; Campbell 1 raccoon; Chesterfield 1 raccoon; Culpeper 1 skunk; Cumberland 1 cat, 1 skunk; Dinwiddie 1 raccoon; Fairfax 5 raccoons; Frederick 1 fox; Goochland 1 skunk; Grayson 1 raccoon; Henrico 1 cow, 1 raccoon; Loudoun 2 raccoons; Lunenburg 1 bobcat, 1 skunk; Middlesex 1 skunk; Northampton 9 raccoons; Northumberland 1 cat; Page 1 raccoon; Pittsylvania 1 raccoon; Prince William 1 fox, 1 raccoon; Richmond County 1 fox; Richmond City 1 raccoon; Rockingham 1 raccoon; Shenandoah 1 raccoon, 1 skunk; Spotsylvania 1 skunk; Tazewell 1 raccoon; Virginia Beach 3 raccoons; Warren 1 raccoon; Washington 2 skunks.

Occupational Illnesses: Asbestosis 17; Carpal Tunnel Syndrome 39; Coal Workers' Pneumoconiosis 19; Lead Poisoning 3; Loss of Hearing 17.

*Data for 1996 are provisional.

[†]Other than meningococcal. [‡]Includes primary, secondary, and early latent.

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