

Safe at School: A Virginia Experience

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OBJECTIVE — The Commonwealth of Virginia passed legislation in 1999 requiring non-medical school personnel to assist students with the management of type 1 diabetes when school nurses were unavailable. This study was designed to determine which school personnel in Virginia currently assist type 1 diabetic students with insulin administration and management of hypoglycemia and to determine if these students are being cared for in a safe manner.

RESEARCH DESIGN AND METHODS — Parents of children with type 1 diabetes who attended public school in Virginia during the previous year and who were receiving their diabetes care at the University of Virginia diabetes clinics were asked to participate in an anonymous survey. The survey asked parents which school personnel were responsible for their child's diabetes care while at school and which persons helped with specific care tasks including blood glucose monitoring, insulin administration, and assistance with treatment of hypoglycemia. Questions were asked regarding the occurrence and treatment of hypoglycemia and any adverse effects of such treatment.

RESULTS — A total of 185 parents whose children attended 153 different schools responded, 69% of whom reported that a full-time school nurse was assigned to their child's school. In other schools, teachers, administrators, coaches, and cafeteria workers supplemented part-time nurses in assisting students with diabetes management tasks. Although hypoglycemia was not a rare event (75% of students experienced a median of five episodes per year), only one severe event requiring the use of glucagon was reported. In that case, glucagon was administered appropriately by a part-time school nurse, and the student experienced no adverse effects related to the treatment.

CONCLUSIONS — Students with type 1 diabetes can be cared for safely during the school day by a variety of trained medical and nonmedical personnel. The occurrence of one severe hypoglycemic event among 185 students suggests that as many as 3% of students could experience severe hypoglycemia in a given school year. Legislation that permits nonmedical school personnel to assist students with their diabetes management could make the diabetic children's school day safer and improve their overall glucose control.

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In 1999, the Virginia General Assembly passed legislation providing for the care of public school students diagnosed with type 1 diabetes (1). This legislation directed that any public school in the state, regardless of size, having one or more students with type 1 diabetes in attendance, must have at least two instructional, administrative, or other employees instructed in the administration of insulin and glucagon. These nonmedical personnel would act only when no registered

nurse, physician, physician assistant, or nurse practitioner was present. The legislation further provided immunity from liability to such nonmedical personnel under the Good Samaritan law and exempted these persons from the nursing and medical practice acts when performing such diabetes treatment. The Virginia Board of Nursing was directed to develop, in coordination with the boards of medicine and education, guidelines for the training of the nonmedical personnel.

Written authorization for the routine administration of insulin and emergency administration of glucagon from a health care provider is required, as is parental consent.

We recently surveyed families of students with type 1 diabetes attending public school in Virginia to determine which school personnel currently assist students with insulin administration and management of hypoglycemia and to evaluate whether students are cared for in a safe manner while in attendance at school. Such information could be extremely important to advocacy groups such as the Safe at School Task Force of the American Diabetes Association or to legislators from states without laws to protect and assist students with type 1 diabetes.

RESEARCH DESIGN AND METHODS

Parents of children with type 1 diabetes attending the University of Virginia diabetes clinics and who attended public schools in Virginia during the previous year were asked to participate in an anonymous survey. The survey was approved by the University of Virginia Institutional Review Board, and informed consent was obtained in every case. The survey was administered September through December 2005. Demographic information including child's age, grade in school, school name, and school district was requested. Parents were asked which person(s) were responsible for their child's diabetes care while at school and which person(s) helped with specific care tasks including blood glucose monitoring, insulin administration, and the treatment of low blood glucose. Parents were asked also whether the student performs aspects of diabetes care such as blood glucose monitoring and insulin administration his- or herself while at school. Specific questions regarding the occurrence and treatment of mild or severe (loss of consciousness, inability to treat oneself) hypoglycemia were asked. If a hypoglycemic episode had required the administration of glucagon, information regarding its administration and adverse effects was obtained. Finally, parents were allowed to respond to an open-ended question that allowed them to explain any concerns they may have had regarding their child's diabetes management at school. The survey responses

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A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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Table 1—Personnel participating in different aspects of diabetes care

Diabetes management	Grade	Medical personnel	Teachers and administrators	Other school personnel	Parent	No one
Who is responsible for your child's diabetes care during the school day?	K-5	88	64	21	16	0
	6-8	97	43	30	15	0
	9-12	81	25	12	6	9
Who provides diabetes care to your child during after-school activities?	K-5	26	40	2	71	2
	6-8	25	37	10	52	18
	9-12	6	16	22	25	46
Who helps your child with blood glucose monitoring?	K-5	84	40	2	19	3
	6-8	85	12	0	30	15
	9-12	33	6	0	13	54
Who helps your child with insulin (calculating dose, drawing it up, and/or injecting boluses)?	K-5	74	29	2	24	7
	6-8	53	8	0	32	22
	9-12	12	1	0	15	75
Who helps treat your child's low blood glucose episodes?	K-5	88	53	14	24	2
	6-8	95	27	17	23	5
	9-12	75	27	10	19	18

Data are percentages unless otherwise indicated. K, kindergarten.

were compiled to conduct a descriptive analysis of diabetes management in Virginia schools.

RESULTS— Surveys were completed by parents of 185 children living in central Virginia, a geographic area of about 60,000 square miles in which there are no metropolitan areas with populations greater than 200,000 people. The respondents represent approximately nine percent of children with type 1 diabetes in Virginia. The children attended kindergarten through 12th grade at 153 public schools located in 62 different school districts. Children's grade levels were approximately evenly divided between lower elementary school grades (kindergarten through 5th, $n = 58$ [31%]), middle school grades (6th through 8th, $n = 60$ [32%]), and high school grades (9th through 12th, $n = 67$ [36%]).

Parents of 95% of the children reported that there was a school nurse assigned to their child's school, while 69% stated that the nurse was assigned full time to their child's school. The part-time school nurses were available for a median of 3.25 h/day. A paid health clinic assistant was available in the schools of five of the nine children who attended a school without a school nurse. Only 20% of the children whose schools had a part-time nurse had a health clinic assistant to assist in their care when the school nurse was absent.

Responsibility for the student's diabetes care during the school day was not limited solely to school medical personnel

(school nurses and clinic assistants) but was shared by teachers and administrators, other school personnel (including secretaries, cafeteria workers, coaches or gym teachers, and bus drivers), and parents (Table 1). For a substantial number of children, administrators and teachers assumed responsibility for diabetes management at least part of the time. Of the nonmedical personnel responsible for the children's diabetes care, 63% were trained by the school nurse, 35% by a parent, and 15% by a trained diabetes specialist. A small number of parents of high school students (9%) responded that "no one" had responsibility for their child's care during school.

Assistance with blood glucose monitoring varied from elementary to high school, with younger children receiving more help with this task from medical and nonmedical personnel than older students. Forty-nine percent of parents reported that of their children were permitted to check their own blood glucose in the classroom (elementary school 41%, middle school 28%, and high school 74%), and 54% of high school students received no assistance with their blood glucose monitoring.

Parents of 89% of the children reported that their child required insulin administration at school during the previous year; 79% of children injected their own insulin. Of children in elementary school grades, 41% injected their own insulin doses, and most (74%) received assistance from a school nurse or other medical personnel. In contrast, 74% of

high school students injected their own insulin, and 25% received assistance.

Parents of 75% of students reported that their child had experienced low blood glucose requiring treatment while at school during the previous school year, with a median of five episodes per student. These episodes of hypoglycemia were usually treated by medical personnel, but teachers, administrators, and other school personnel also assisted with treatment for a substantial proportion of children. Parents of 22% of children of all grade levels reported that they themselves treated their child's low blood glucose at school. Of parents who reported that their children experienced hypoglycemia after receiving insulin at school, only 14% reported that their children became symptomatic. Most reported lethargy, and none reported seizure or loss of consciousness. Most episodes of hypoglycemia were treated with rapid-acting oral carbohydrates. One student did require glucagon administration at school during the previous year. This student, a high school sophomore who received insulin via an insulin infusion pump, was nervous because of a morning exam and did not check her blood glucose or eat before going to school. Her school had a part-time school nurse who was available that day and who administered the glucagon. The student experienced no adverse effects related to the glucagon administration. A rate of 1 in 185 children experiencing severe hypoglycemia requiring glucagon suggests that as many as 3% of diabetic children could experience

serious hypoglycemia in a given school year (95% CI, exact binomial test).

CONCLUSIONS— These data show that children with type 1 diabetes can be safely cared for during the school day by a variety of medical and nonmedical personnel. They also demonstrate that blood glucose monitoring, insulin administration, and the treatment of low blood glucose episodes are not rare events in the lives of students with type 1 diabetes during the school day. The need for assistance with monitoring and insulin and/or rapid-acting glucose treatment varies across age groups, with older children more independent at these tasks. However, the single occurrence of severe hypoglycemia among the students whose parents completed this survey occurred in a high school sophomore who could be presumed to be more independent in her monitoring and insulin administration than some of the younger children. In addition, she attended a school that only had a part-time school nurse. This underscores the importance of training nonmedical school personnel in the recognition and treatment of hypoglycemia and affirms the importance of the legislation passed by the Virginia General Assembly in 1999.

Several years ago, we surveyed school districts in Virginia to determine which personnel treated low blood glucose in students with type 1 diabetes attending their schools, and whether or not their schools employed school nurses (2). Although the respondents to that survey were also from central Virginia, the study population did not necessarily coincide with that of the current study. The previous study was a survey of school districts, while the current study is a survey of parents of children with type 1 diabetes. Despite these obvious differences in study populations, the results of the previous survey have important relevance to the current information reported above. In 1989, <39% of school districts respond-

ing (62% of all Virginia school districts) stated that a school nurse had primary responsibility for treating hypoglycemia in students with type 1 diabetes. However, less than one-half of those school districts had a school nurse present in each school, and nearly 10% of the school systems stated that the child with diabetes had primary responsibility for treating his/her own hypoglycemia. Thus, it is reasonable to infer that the number of schools employing school nurses has increased significantly over the past 16 years and that there is significantly more medical care available to these children. This is an important finding, since there was initially great concern that the Virginia legislation might encourage school districts not to hire nurses since nonmedical personnel would be trained to assist in at least some of the medical care of their students; clearly, such has not been the case.

It is interesting to note the numbers of parents of children of all ages who responded that “no one” at the school is responsible for their child’s medical care during the school day or that they themselves assist with blood glucose monitoring, insulin administration, and treatment of low blood glucose episodes. As a child with diabetes matures and becomes more independent, it seems reasonable that day-to-day management tasks would be assumed by that child, especially during the school day. However, although 92% of respondents indicated that they feel their child is safely cared for at school, a surprising number of parents of younger children responding to the survey stated that they themselves were responsible for their child’s care during the school day. Those responses may reflect insecurity with the medical care available in their child’s school and suggest that parents need to be involved in the planning for their child’s attendance at school and in discussions with school personnel regarding medical support available during the school day.

Our study has several limitations. The survey instrument was not validated and relied on parental recall of events from the previous school year. We have sampled students in only one region of Virginia, and schools might provide different diabetes care in different regions. Severe adverse events are, fortunately, rare, and although our sample represents about nine percent of the state’s diabetic school children, this sample is not powered to predict the frequency of rare events with any precision.

The American Diabetes Association has developed the Safe at School Statement of Principles (3), which encourages all school districts to identify individuals who will be responsible for the safe management of students with type 1 diabetes during attendance at school. Ideally, those responsible persons would be school nurses trained in the management of type 1 diabetes. In those situations where school nurses are unavailable, the Virginia legislation has been suggested as a model of how nonmedical personnel could be trained and codified to assist these children with day-to-day and emergency treatment of diabetic students. Although the data presented above suggests that this is both a practical and safe alternative, more research is needed to adequately assess the abilities of nonmedical personnel to assist students in the school day management of diabetes.

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