ARTICLE

School Nursing Services

Use in an Urban Public School System

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Objective: To describe the quantity and type of school health services provided by nurses in Boston Public Schools.

Setting: In 2001, the 63 024 students enrolled predominantly belonged to minority groups (48% black, 28% Hispanic, and 9% Asian) and were eligible for a free or reduced-price lunch (71%).

Main Outcome Measure: Analysis of the 2001-2002 Boston Public Schools Health Services database.

Results: A total of 63 024 students generated 721 291 individual encounters with 93.5 full-time equivalent school nurses, including episodic care (57.8%), medication administration (31.5%), procedures (6.2%), and screening (5.1%). A total of 2420 students had an individual health care plan for the administration of medications and procedures during the school day. Students with individual health care plans averaged 117.9 encounters per year with school nurses, and students without averaged 7.2 encounters per year. Outcomes of encounters included school dismissal (3.0%); verbal communication with parents (10.6%), school staff (3.9%), and community agencies or health care providers (1.1%); and referral to a primary care provider (4.6%) or emergency services (<0.1%).

Conclusions: Some school-age children receive a large amount of health care from school nurses in Boston Public Schools. We estimate that these children are 8 times more likely to see a school nurse than a pediatric health care provider. These school nurses were involved in the care of children with mental health and chronic health care needs. Despite the extensive amount of care, little is known about the efficacy of the care provided or the effect of these services on health care use.

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More than 95% of children between the ages of 5 and 17 attend school.[1] Most schools offer school nursing services.[1,2] To date, the medical care that children receive at school has not been included in descriptions of patterns of health care use.[3-5]

Changes in our society are increasing the demand for school health programs and, in particular, school nursing services. These changes include higher proportions of working parents, increased outpatient management of chronic illness, shorter hospital stays, higher rates of immigration, and larger numbers of children dependent on medical technology mainstreamed into the classroom. These changes have increased the number of children attending school with active health needs.[6] A recent national survey of parents of school-age children found that 83% support providing health care in school.[7] Furthermore, the literature suggests an association between health and academic achievement.[8-10] Although causal relationships have not been shown conclusively, it has been suggested that school health services may be integral to current efforts to implement educational standards.[11]

Health services provided in schools support educational and health outcomes.[12] Although the amount and types of health services available to children vary across schools, districts, and states, the most common health care providers to render school health services are school nurses.[1] *Healthy People 2010*[13] calls for an increase in the proportion of schools with a nurse to student ratio of at least 1:750. In 2000, 77% of schools nationwide reported having a full- or part-time school nurse, and 41% reported a ratio of at least 1:750.[2] School-based health centers are another provider of school health services. Although there is overlap between the health problems addressed by the school nurse and in school-based health centers, the health centers function more like outpatient primary care

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centers. The providers, often nurse practitioners, perform well-child examinations and prescribe medications to address health issues. Some clinics provide additional services such as counseling, dental, and nutrition services. There are 1498 school-based health centers across the country, and 2% of school-age children have access to one.[7,14]

Although only a small amount of the research in school nursing has examined health outcomes, there is some suggestion that school nursing care can benefit child health.[15] Fryer and Igoe[16] found a positive correlation between high nurse to student ratios and child well-being. In a 2002 review of the literature, Stock et al[17] found 15 citations describing school nurse–led interventions that demonstrated positive health outcomes, such as higher rates of immunization, lower rates of injuries at school, and lower asthma severity. Positive health outcomes associated with school-based health centers have been well documented. These include increased access to care; higher use of mental health, substance abuse, and dental services; decreased use of urgent and emergent care; and, most recently, fewer school absences.[14,18-25]

Research that examines the health services provided by school nurses and the effect they have on the health care system is lacking.[26] The objective of this study is to describe the quantity and type of school health services provided by nurses to students enrolled in a large urban public school district.

METHODS

STUDENT POPULATION IN BOSTON PUBLIC SCHOOLS

Boston Public Schools (BPS) include 131 schools serving about 63 000 students from 3 to 22 years of age. Seventy-five percent of school-age children who live in Boston are enrolled in BPS. Of these students, 71% are eligible for free or reduced-price meals, 20% are identified as having mild to severe disabilities and are enrolled in special education programs, and 17% are enrolled in bilingual education. Students predominantly belong to minority groups (48% black, 28% Hispanic, and 9% Asian).[27]

SCHOOL NURSING SERVICES IN BPS

During the 2001-2002 school year, there were 93.5 full-time equivalents (FTEs) of nursing staff and 10 FTE paraprofessional assistants working in the schools providing direct services to students and staff. The general policies and procedures were identical to those now in place. Students could request permission to see the school nurse at any point during the school day. In addition, teachers and parents often referred children for assessment and management of health care needs. Students who received medications or had procedures performed (such as blood glucose monitoring) by the nurse on a routine or as-needed basis did so as part of an individual health care plan (IHCP), which always included a physician's or nurse practitioner's order. The only exception to this was a standing order for epinephrine to treat anaphylaxis.

The system's mean FTE school nurse to student ratio was 1:674, with a range of 1:23 to 1:1300 in different schools. Lower ratios exist at schools with a higher proportion of students receiving special education services. School-based management policy required that the nurses report to and be evaluated by the school principal or headmaster. In addition to the school nurses, there were 15 school-based health centers funded and staffed by outside agencies. Students could only seek care at a school-based health center if they were enrolled in a school with one and were registered at the center.

School nursing services were well received in BPS. In a 1997 survey, parents, principals, and teachers gave the highest satisfaction ratings to school nurses.[28]

DATA COLLECTION AND MANAGEMENT

The 2001-2002 BPS Health Services database includes frequencies of specific types of health care encounters between school nurses and students during the 2001-2002 school year. Nurses gathered this information using a standardized data collection process and tool (available from the authors). Each student encounter was recorded and described in a data collection logbook. The descriptors included the child's name, type of encounter (first aid, individual health education, counseling, illness assessment, or other), disposition (return to class, dismissal, or other referral), and communications (with a parent, school personnel, or an external agency). Encounters were given a primary descriptor, and in cases in which an additional type of care was provided, encounters were also described with a secondary descriptor. For example, a child is treated by the nurse after the child was injured in a fight. The nurse provides first aid and discusses alternative ways of resolving conflicts. The nurse documents the encounter, using "first aid" as the primary descriptor and "counseling" as the secondary descriptor. The nurse also tracked specific activities, such as filing an abuse or a neglect report, giving medications, performing procedures, and calling 911. By convention, encounters in which medications were given or procedures were performed were not also counted as episodic encounters. At the end of each month, nurses tallied the total number of each encounter type (episodic encounters, medication administration, and medical procedures) and case management activities from the logbook and counted screenings, classroom presentations, and support groups that they conducted at the school. This report was submitted monthly to a regional nurse leader. These nurses determined the total number of each encounter type in their geographic area and submitted a monthly report to the central office.

DATA ANALYSIS

Descriptive statistics were used to present the total number of individual student contacts with school nurses, including episodic encounters, medications administered, screenings, and procedures. When the proportion of episodic encounters by type was calculated, equal weight was given to primary and secondary encounter types. A screening encounter could include between 1 and 8 screenings. For the purpose of this analysis, we made the conservative assumption that the total number of screening encounters was the number of students who experienced the most common screening: vision screening (58.1% of the total enrollment). We also assumed that a student did not receive any health screening more than once per year.

The mean yearly encounter rate was determined for the total school population from the sum of screening and episodic encounters. The rate of encounters for children with IHCPs also included all medication and procedure encounters. All nebulizer procedures were counted as medication encounters.

The rate of group activities (classroom presentations and support groups) was determined per FTE nurse, because the number of students involved in such activities varied. The Boston University School of Medicine and Boston Medical Center Institutional Review Board and the BPS Office of Research, Assessment, & Evaluation reviewed and approved this study.

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Table 1. Distribution of Encounters

Variable	No. (%)
Episodic care	416 650
Illness assessment*	212 751 (34.4)
First aid*	126 054 (20.4)
Health education*	113 618 (18.4)
Counseling*	30 056 (4.9)
Other*	136 311 (22.0)
Medication administration	227 105
Psychotropic agents	161 513 (71.1)
Asthma medications	35 368 (15.6)
Antibiotics	6105 (2.7)
Over-the-counter drugs	1733 (0.8)
Insulin	1467 (0.6)
Epinephrine	9 (<0.1)
Other	20 910 (9.2)
Procedures	44 369
Blood glucose assessment	11 067 (24.9)
Blood pressure measurement	9878 (22.3)
Peak flow monitoring	7607 (17.1)
Nasogastric or gastric tube care	5615 (12.7)
Catheterization or catheter care	4630 (10.4)
Nebulizer treatment†	3478 (7.8)
Chest physiotherapy	808 (1.8)
Colostomy or ileostomy care	683 (1.5)
Suction	252 (0.6)
Oxygen care	208 (0.5)
Tracheostomy care	142 (0.3)
Screening‡	36 645
Vision	36 645 (100.0)
Hearing	34 262 (93.5)
Height and weight	30 571 (83.4)
Pediculosis	11 681 (31.9)
Postural	11 203 (30.6)
Dental	7902 (21.6)
Nutrition	5509 (15.0)
Total	721 291

*Percentages are based on 618 790 total episodic care encounters, representing the sum of primary and secondary encounters of this type.

†Nebulizer treatments delivered a medication and were included in the procedure encounter total but not in the encounter total.

‡A screening encounter included between 1 and 8 screenings (see the "Methods" section). We made the conservative assumption that the total number of screening encounters was the number of students who experienced the most common screening: vision screening.

Table 2. Disposition of Encounters

Variable	No. (%) of 721 291 Total Encounters
Verbal communication	**112 631**
Parents	76 664 (10.6)
School staff	28 132 (3.9)
Community agencies or health care providers	7835 (1.1)
Dismissal from school	**21 531**
Illness related	18 097 (2.5)
Injury related	3434 (0.5)
Referral	**35 022**
New primary care provider	3490 (0.5)
Existing primary care provider	29 530 (4.1)
Health insurance provider	1058 (0.1)
Emergency services	450 (<0.1)
Department of Social Services report of suspected abuse or neglect	494 (<0.1)

RESULTS

During the 2001-2002 school year, 63 024 students had 721 291 individual encounters with 93.5 FTE nurses. Nurses averaged 7714 encounters per year, or 43 encounters per school day.

TYPES OF INDIVIDUAL ENCOUNTERS

Most encounters involved episodic care (57.8%) and medication administration (31.5%) (**Table 1**). Of 618 790 episodic encounters, most included illness assessment (34.4%), first aid (20.4%), and health education (18.4%). The episodic encounters identified as "other" (22.0%) included a diverse group of student visits such as following up on a sports physical, providing supplies to a student during her menses, and addressing an outbreak of a communicable disease. Among 227 105 medications administered, the most common classes were psychotropic agents (71.1%) and asthma medications (15.6%). The most common procedures performed were blood glucose assessment (24.9%), blood pressure measurement (22.3%), and peak flow assessment (17.1%). Annual health screening encounters most frequently evaluated vision, hearing, and height and weight.

FREQUENCY OF INDIVIDUAL ENCOUNTERS

On average, students without IHCPs had 7.2 episodic and screening encounters with the school nurse during the 2001-2002 school year. Among 2420 students (3.8%) who had an IHCP during the school year, they averaged 117.9 episodic, screening, medication, or procedure encounters during the year.

GROUP ENCOUNTERS

In addition to providing individual health services, school nurses conducted group activities. There were, on average, 12 classroom presentations (eg, sex education, hygiene, and nutrition) and 4 support groups (eg, substance abuse, eating disorders, and anger management) per month led by a school nurse.

DISPOSITION OF ENCOUNTERS

Of all encounters, 10.6% included verbal communication with a parent, 3.9% with school staff, and 1.1% with community agencies or health care providers. Only 4.1% of encounters resulted in referral to an existing primary care provider, and 0.5% resulted in referral to a new provider. One thousand fifty-eight encounters resulted in a referral for health insurance. During the 2001-2002 school year, nurses dialed 911 for emergencies 450 times, filed a report of suspected child abuse or neglect 494 times, and dismissed children from school 21 531 times (3.0% of encounters) (**Table 2**).

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COMMENT

School health, as provided by school nurses, represents a large and accessible part of the child health care system. The large number of visits, totaling more than 721 000 encounters between nurses and students, represents a significant commitment of time, energy, and resources. Based on the 1996 Medical Expenditure Panel Study, we estimate that collectively these children would have had about 90 000 primary care encounters during a 10-month period.[29] Based on this estimate, this group of children made 8 times more visits to school nurses' offices than to primary care offices. Hence, it appears as though there are 8 times more visits to school nurses than to health provider offices for children between the ages of 6 and 17 during a school year.

More specifically, these data demonstrate that school nurses are involved in a large amount of episodic care and spend a significant amount of time attending to children with chronic and mental health needs. Health care provided in the school setting can complement the care provided in the primary care office.[12] School nurses are well positioned to monitor symptoms, ensure medication adherence, impart health knowledge, and reinforce positive attitudes and behaviors on a daily basis. This is an opportunity for pediatric providers to include referrals for school nursing services as part of a patient's treatment plans.

Our data suggest that communication between the school nurses and the health care system is infrequent. More than 89% of encounters were exclusively between the child and the nurse, without communication with an adult who was a care provider or referral to another health care provider. More research is required to uncover the meaning of this observation. It may reflect that most medical problems that arise at school are self-limited or addressed by existing care plans and can be adequately resolved by the nurse. It also may reflect poor coordination of care. There are many barriers to coordination of care across these care settings, including logistics, confidentiality, and undeveloped systems of communication between providers.

Although school nurses perform a significant amount of direct health care, insurers provide no financial support for most health care that is delivered in schools. If a small proportion of this work was shifted to the more traditional health care system, use and financing of health care for BPS students would be substantially different. Fryer et al[30] suggested a method for estimating the dollar value of school health activities. Using 2001 Massachusetts Medicaid reimbursement rates of $22.21 and $34.85 for *Current Procedural Terminology* codes 99211 and 99212, respectively, school nurses in Boston provided services worth more than $17.4 million during the 2001-2002 school year.[31]

Funding for school health services in Boston comes mainly from city and state tax dollars intended for education. Health insurance providers benefit substantially from the care provided by school nurses. When health concerns are addressed in school, it may lead to earlier detection of disease and better health outcomes. Also, when a school nurse adequately addresses a health concern, it may prevent a more costly health care visit. Furthermore, school health services support quality-of-care measures counted in the Health Plan Employer Data and Information Set, such as increased rates of adolescent immunization, access to primary care services, and use of well-child and adolescent care.[32] Policy makers are interested in developing mechanisms for insurers to finance school health services, but crafting the financial arrangements has proven challenging.[33] Despite this, there have been successful examples of partnerships in which managed care organizations support local school health services.[33,34]

This study has several limitations. Individual-level data are unavailable. We have been able to describe school nursing services use for the entire cohort of BPS students but could not describe individual patterns of use, and we do not have information on the prevalence of unmet health needs, health care use, medical homes, or insurance coverage. It is likely that student-level characteristics are related to the amount and type of care that a student accesses in school. Further efforts to assess and improve the effect of school health services on health and educational outcomes would require individual-level data. The second limitation is that our data excluded encounters in the 15 health centers in BPS. Hence, this report underestimates the amount of health care provided in BPS. Third, whether these data can be generalized to other school systems is uncertain. Boston Public Schools students are urban, largely comprise ethnic minorities, and come from low socioeconomic backgrounds, and nurse-student staffing ratios are higher than average.[16] Finally, the validity and reliability of data collection were not assessed, although we believe that these data are likely to underestimate the true number of encounters.

This study is an important first step toward describing what is a large but unexplored part of the health care system. We believe that health care providers, health insurers, policy makers, parents, and educators will be interested in the issues raised by this analysis, including use of care, coordination of care, and administration and funding of school health services. It appears that children are almost 10 times more likely to see a school nurse than a primary care provider, suggesting that school nursing care is accessible. It remains to be seen if the volume of health care encounters during the school day is an opportunity to improve health and educational outcomes or reflects an inappropriately high utilization of care. Despite providing a large amount of care, insufficient coordination of care limits the effect of these health services. This places a burden on parents and diminishes the potential contribution of school nurses and primary care providers to improving the health status of a child. It is unlikely that the effect will be realized without improvement of systems and networks to support better communication and coordination of care. More broadly, little is known about the quality of care provided by school nurses, and it is concerning that the educators who fund and administer the program may not be in the best position to judge the quality or maximize the health benefits of these services. Ideally, health insurers would reimburse for health care delivered in school, and health

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care providers would oversee the provision of health services in schools. Demonstration of positive health outcomes and cost-effectiveness of school nursing services will allow insurance providers to better understand the value of school health services to their panel and perhaps encourage cost-sharing arrangements. Future studies should evaluate the health and educational usefulness and the costs associated with school health encounters.

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