Introduction

Keeping children safe, healthy, in school, and ready to learn should be a top priority for both healthcare and educational systems. School absence affects performance and contributes to school drop-out as well as having economic and social repercussions for individuals, families, and communities (Pennington and Delaney, 2008). Attendance predicts drop-out and achievement (NASN, 2012).

Repeated studies have identified school nurses reduce absenteeism and a higher nurse to student ratio is related to better attendance (NASN, 2012). School nurses are significantly less likely to dismiss a student from school early than non-licensed personnel (Pennington and Delaney, 2008).

School nurses also address the issue of student absenteeism by intervening in situations of chronic or extended absences. Serving as a care coordinator, school nurses interact and communicate with families of students with special needs. The school nurse is a counselor, helping families connect with healthcare
services, financial resources, shelter, food and health promotion. Creating, updating, and implementing individualized healthcare plans and working comprehensively to create an environment where students will achieve academic success and maintain optimal health is fundamental (McClanahan & Weissmueller, 2015).

As part of the National Association of School Nurse’s nation-wide data collection effort known as Step Up and Be Counted, Montana school nurses participated in collecting data on their encounters with students throughout the 2014-15 school year. Their data were aggregated and entered into a standardized data set that will be used to describe the work of school nurses around the nation and show their effect on student health and education.

Through this data collection project, we aimed to assess the workload of Montana school nurses. Measures collected include the number of students a nurse tends to see in a day in the health room, the outcomes of these encounters including the percent of encounters that result in the student being sent home, and the frequency of visits to the school nurse among students with chronic health conditions, including diabetes and asthma, relative to the general student population.

**Methods**

Each month, RN school nurses who are members of the Montana Association of School Nurses were asked to collect and report aggregate numbers of student encounters. These counts were reported in three categories depending on the student outcome of each encounter: returned to class, sent home, or 911 called. In addition, the aggregate numbers of encounters that were related to asthma and diabetes were reported. Methods of record keeping and data collection were not specified and likely varied between nurses.

The submitted data were merged by the nurse’s name with the State of School Nursing in Montana Survey data (State of School Nursing in MT Survey, 2015). This allowed the encounter counts to be standardized by school-level denominators including student enrollment, school nurse FTE, and the estimated number of students with asthma or diabetes.

To account for varying number of student school days per month, the number of student school days for each month was estimated by applying the monthly school days from the academic calendar of a large Montana school to all participating schools. The analysis took this into account by estimating encounters per day from the monthly aggregate count divided by the number of days in the month.
Results

Overall, 28 of the 107 RN school nurses in Montana submitted data for all or part of the 2014-15 school year. Table 1 shows the number of nurses submitting data, their combined number of student encounters reported, their combined FTE, and their combined number of enrolled students represented by month.

Table 1. Summary of Submitted Data per Month, Step Up survey, 2014-15 school year

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</thead>
<tbody>
<tr>
<td>Number of Nurses who Submitted Data*</td>
<td>15</td>
<td>18</td>
<td>16</td>
<td>22</td>
<td>19</td>
<td>17</td>
<td>16</td>
<td>16</td>
<td>10</td>
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<tr>
<td>Combined Reported Student Encounters</td>
<td>5,855</td>
<td>6,737</td>
<td>3,856</td>
<td>8,504</td>
<td>6,078</td>
<td>8,710</td>
<td>7,307</td>
<td>6,440</td>
<td>3,246</td>
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<tr>
<td>Asthma-related Encounters</td>
<td>113</td>
<td>80</td>
<td>79</td>
<td>104</td>
<td>80</td>
<td>120</td>
<td>155</td>
<td>179</td>
<td>54</td>
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<tr>
<td>Diabetes-related Encounters</td>
<td>990</td>
<td>1,105</td>
<td>1,130</td>
<td>1,100</td>
<td>619</td>
<td>345</td>
<td>617</td>
<td>727</td>
<td>1,003</td>
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<tr>
<td>Represented Student Enrollment</td>
<td>11,578</td>
<td>17,085</td>
<td>24,795</td>
<td>25,154</td>
<td>20,826</td>
<td>20,795</td>
<td>21,255</td>
<td>20,320</td>
<td>16,367</td>
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<td>Represented Students with Asthma</td>
<td>875</td>
<td>1,087</td>
<td>1,538</td>
<td>1,191</td>
<td>1,343</td>
<td>1,091</td>
<td>1,229</td>
<td>1,153</td>
<td>936</td>
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<tr>
<td>Represented Students with Diabetes</td>
<td>51</td>
<td>72</td>
<td>91</td>
<td>96</td>
<td>92</td>
<td>80</td>
<td>84</td>
<td>78</td>
<td>63</td>
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<tr>
<td>Represented Nurse FTE</td>
<td>12.1</td>
<td>15.1</td>
<td>16.6</td>
<td>21.4</td>
<td>18.2</td>
<td>18.2</td>
<td>15.6</td>
<td>16.4</td>
<td>10.7</td>
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<tr>
<td>Student Days</td>
<td>21</td>
<td>21</td>
<td>17</td>
<td>15</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

* A unique set of nurses submitted data each month, with some nurses submitting data every month and others submitting only on some months. The students represented in each months report are those enrolled at the schools from which a nurse submitted data that month.
The median number of encounters per nurse (Full Time Equivalent (FTE)) per day was 13.4. The median number of encounters per 1000 students per day was 15.5. The frequency of student encounters varied widely between reports. The distribution of these frequencies was positively skewed. While half of reported frequencies were in the range of 1 to 13 encounters per nurse FTE per day, the other half ranged from 14 to 75 encounters. Likewise, for encounters per 1000 students per day, half of reports ranged from 1 to 15 encounters while the other half ranged from 16 to 114 encounters. The interquartile ranges, or the ranges of the central 50% of frequencies, were from 7 to 31 encounters per nurse per day or from 7 to 34 encounters per 1000 students per day. (Figure 1)

Large portions of student encounters with school nurses are for needs related to asthma and diabetes. Overall, about 13% of encounters were related to diabetes while 2% were related to asthma. The median frequency of student encounters for asthma was 2.1 encounters per 1000 students with asthma per day. For diabetes encounters, the median frequency was 450 per 1000 students with diabetes per day. (Figure 2) This is in addition to the non-asthma and non-diabetes encounters the students with these conditions may have. However, there were much fewer students with diabetes than there were with asthma in the average school enrollment. The median number of asthma-related encounters per day per nurse FTE was 0.2 while the median number of diabetes-related encounters per day per nurse was 2.1.
The student outcomes of encounters with school nurses were classified into three categories: Stay in School, Sent Home, or 911 Called. The large majority of encounters, 90%, resulted in the student staying in school. 10% of encounters resulted in the student being sent home. Only 0.2% of encounters resulted in 911 being called for the student. (Figure 3)

The median rate at which nurses sent students home was 1.2 students per 1000 students per day. The interquartile range, or the range of the middle 50% of rates, was from 0.7 students to 2.1 students per 1000 students per day.

**Discussion**

Based on these data, in a school of 1000 students, about 16 encounters with a school nurse per day could be expected. One or two students would be sent home by the school nurse each day. 911 would be called about once every 6 weeks. Over the course of a school year, a nurse working full time could expect to have about 2400 encounters with students, with 33 of these being asthma-related and 380 diabetes-related. 911 would be called for students about 5 times. Students would be sent home about 240 times.

Data collected in the Step Up and Be Counted survey indicate that school nurses in Montana are keeping students in school (Figure 3). Students were sent home by a school nurse at a rate of about 1.2 students per 1000 students per day. Ninety percent of students seen by a registered, professional school nurse in the health room returned to class. The frequency at which students are sent home at schools without a school nurse was not measurable by this survey.

In the 2015 State of School Nursing in Montana Survey, the nurse-reported prevalence of asthma among Montana students in districts with a school nurse was estimated to be about 6% which, while lower than state and national prevalence estimates, is an indicator that school nurses have approximate knowledge of which children have asthma (State of School Nursing in MT Survey, 2015). Yet, only 2% of school
nurse encounters resulted from students seeking assistance because of asthma. This particularly low rate of encounters could be in part due to self-management by children with asthma. A factor contributing to this could be a Montana state law enacted in 2005 that allows students who have a Medication Authorization form on file with the school to carry and self-administer their rescue asthma medication (MCA 20-5-420).

In contrast, the nurse-reported prevalence of diabetes (Types 1 and 2) was less than 1%, yet 13% of school nurse encounters were diabetes-related. Diabetes management in children and adolescents requires complex daily management skills and health services must be provided to students with diabetes to ensure their safety in the school setting (AADE, 2008). For example, children are monitoring their blood glucose levels several times a day, calculating carbohydrate contents of meals, and dosing insulin to achieve blood glucose within a target range (Bobo, et al., 2011). A registered, professional school nurse is required to develop an individualized healthcare plan for each student with diabetes and to provide continued oversight for the implementation and evaluation of the effectiveness of the plan in the school setting (ANA/NASN, 2011).

While these data provide a partial image of the workload of Montana school nurses, the data was collected by a relatively small, self-selected sample of Montana school nurses and therefore may not be generalizable to the experiences of other school nurses. In addition, due to the small sample size and high variability in the frequency of student encounters, we were unable to examine any correlation between the school nurse to student ratio and the rate at which students were sent home from school. Future data collection would benefit from increased school nurse participation.
Citations


