Michigan Evaluation of School-based Health
Baseline Clinic Service Records:
Children's use of school-based health care services

Lauren Lichty
Department of Psychology

Miles McNall
Community Evaluation and Research Center
University Outreach and Engagement

Brian Mavis
Office of Medical Education Research & Development
College of Human Medicine

Laura Bates
Community Evaluation and Research Center
University Outreach and Engagement

Michigan State University

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Copies of this report are available from:

Community Evaluation and Research Center
University Outreach & Engagement
Michigan State University
Kellogg Center, Garden Level
East Lansing, Michigan 48824
Phone: (517) 353-8977
Fax: (517) 432-9541
E-mail: outreach@msu.edu
Web:
http://outreach.msu.edu/cerc/publications.asp

or

Michigan Department of Community Health
Web: http://www.michigan.gov/cahc

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Executive Summary

Purpose of the Evaluation

The primary purpose of the Michigan Evaluation of School-based Health (MESH) Project is to evaluate the impact of state-funded clinical school-based health centers[1] (SBHCs) on the health outcomes, school attendance, and healthcare costs of children attending schools with SBHCs. This evaluation is based on a sample of youth and their parents from 16 middle and high schools with and without SBHCs located throughout the state of Michigan. The overall aim of the evaluation is to determine if students attending schools with SBHCs experience better health outcomes and lower healthcare costs associated with emergency room use. This report presents results from an analysis of the SBHC service records of students who received services between July 1, 2006 and June 30, 2007 at any of the nine MESH study sites with an SBHC. The analyses of SBHC service records focused on the conditions for which students sought medical attention and the services they received.

Participants

We received parental consent for a total of 1134 students, representing 26% of eligible sixth and ninth grade students across all schools. Among students with parental consent, 793 were enrolled in schools with SBHCs; however, not all parents agreed to have their children's SBHC service records released. Ultimately, service records were received for 726 participants (276 middle school students and 450 high school students).

Key Findings

Health Center Visits

Of the 726 participants for whom SBHC service records were obtained, 48% (n=348) visited their school's SBHC at least once between July 1, 2006 and June 30, 2007. In total, these 348 participants visited their SBHC 1,444 times. The number of visits each student made to the health canter ranged from 1 to 59, with a median of two visits per person. Clinic users did not differ significantly from non-users in terms of gender, age, or ethnicity.

Diagnoses

For this report we summarized data on primary diagnoses in two ways: by *visit* and by *individual*. Examining data by visit allowed us to see how often SBHC staff members were confronted with a diagnosis, as each *time* an individual presented with a diagnosis was counted. Thus, some youth were counted multiple times for a single diagnosis. Examining the diagnoses by *individual* allowed us to assess the *prevalence* of each diagnosis within our student sample, because each student who presented with a certain primary diagnosis was counted only once.

There are thousands of distinct diagnostic codes (i.e., ICD-9 Codes) that are organized into 17 diagnostic categories. We examined the most frequent diagnoses by category and by individual code.

   Most common diagnostic categories per visit versus individual. As Table 1 shows, the four most common diagnostic categories were the same when measured per visit or per individual; however, the fifth most common category was different. Whereas the Endocrine and Immunity diagnostic category was the fifth most common across all *visits*, the Musculoskeletal System and Connective Tissue diagnostic category was fifth most common across all *users*. The higher frequency of Endocrine-related *visits* resulted from one individual user who sought repeated care for diabetes.

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[1] School-based health centers are known in Michigan as Child and Adolescent Health Centers.

Table 1. Most Common Diagnostic Categories per Visit and per Individual

Diagnostic Category	Visit		Individual	
	Percentage	Rank	Percentage	Rank
Symptoms, Signs, & Ill-defined Conditions	24%	1	23%	1
Respiratory System	18%	2	19%	2
Injury & Poisoning	15%	3	18%	3
Nervous System & Sense Organs	8%	4	9%	4
Endocrine, Nutritional & Metabolic, Immunity	7%	5	--	--
Musculoskeletal System & Connective Tissue	--	--	6%	5

Most common diagnostic codes per visit versus individual. Table 2 shows the most commonly used diagnostic codes per visit and per individual. Generally, the differences in frequency of various diagnoses for visits and for individuals were minimal, indicating that most individuals were diagnosed with each condition only once between July 1, 2006 and June 30, 2007. However, three individuals were diagnosed with psychological/physical stress (not classified by other codes) on 11 or more visits, and one individual was seen for diabetes on more than 40 occasions. In addition, some individuals were treated repeatedly (ranging from 2 to 6 visits) for head and neck symptoms (n=19), abdomen and pelvis symptoms (n=11), throat problems (n=6), headaches (n=8), and sinusitis (n=3).

Table 2. Most Common Diagnostic Codes per Visit and per Individual

Diagnosis	Code		Visit			Individual	
		N	Percentage	Rank	N	Percentage	Rank
Physical exam	V20.2*	155	11%	1	143	13%	1
Symptoms of head & neck	784	87	9%	2	58	5%	3
Immunizations	V03-V06*	75	5%	3	71	7%	2
Diabetes	250.03	52	4%	4	2	<1%	90
Other symptoms of abdomen & pelvis	789	52	4%	5	34	3%	4
Acute pharyngitis	462	44	3%	6	32	3%	5
Headache	784.0	41	3%	7	29	3%	6
Psychological/ physical stress, not elsewhere classified	V62.89	37	3%	8	7	1%	29
Preventive counseling	V65.3*	25	2%	9	21	2%	8
Acute upper respiratory infection	465.9	25	2%	10	20	2%	7
Dysmenorrhea (painful menstruation)	625.3	21	1%	12	18	2%	9
Acute sinusitis (unspecified)	461.9	21	1%	11	14	1%	10

*Some v-codes were collapsed to improve interpretability. See appendix for details.

Gender differences in diagnoses. Two significant gender differences emerged: sprains/strains were significantly more common among boys than girls, and disorders of the urinary tract were significantly more common among girls than boys.

Age differences in diagnoses. There were seven significant differences in the most common diagnoses for middle school students versus high school students. Middle school students were diagnosed significantly more frequently than high school students with abdominal and pelvis symptoms, head injuries, nasal cavity and sinus diseases, contusions, and psychological/ physical stress (not classified by other codes). High school students were diagnosed significantly more frequently than middle school students with headaches and acute sinusitis.

Procedures

Services provided by the health center are tracked in two different ways: 1) by the general nature of the visit (TS codes); and 2) by the specific medical procedures provided (CPT codes).

General service categories. Service (TS) codes track the general nature of each visit. For this service period the most common services received were as follows:
- General medical services (42%)
- Health promotion and risk reduction services (25%)
- Immunizations (11%)
- Mental health/counseling services (11%)

Procedures. Table 3 presents the ten most common procedures (based on CPT codes) conducted at the health center during this period.

Table 3. Ten most frequently applied CPT codes

Code	Procedure	N	Percentage
99211*	Office or other outpatient visit (Established patient)	875	42%
Vacc*	Vaccine administration	160	8%
99201*	Office or other outpatient visit (New patient)	156	8%
90801*	Psychological/Social work counseling	105	5%
81002	Urinalysis nonautomated	94	5%
99393*	Preventive Medicine services (Established patient)	77	4%
99420	Health risk assessment test	74	4%
99383*	Preventive Medicine services (New patient)	72	3%
86403	Immunology screening	58	3%
85018	Hematology and coagulation- hemoglobin	57	3%
	Total	636	46%

*Aggregated codes. See appendix for more details.

Whether examining CPT codes or TS codes, it appears that much of the SBHC staff members' time is spent treating acute or chronic illnesses, rather than health promotion/prevention services.

Post-SBHC visit destination

Examining only visits that were made when school was in session, we found that 95% of students were sent back to class after visiting the health center. Less than 5% of students visiting the SBHCs subsequently left school.

Report

Background and Purpose

The State of Michigan funds 45 clinical school-based and school-linked health centers, known as Child and Adolescent Health Centers[2], to provide a wide range of primary care, preventive, and early intervention services to more than 30,000 children at all grade levels throughout Michigan. To date, there has been no state-wide evaluation to assess the impact of these centers on the health outcomes and health care costs of the children they serve. The primary purpose of the Michigan Evaluation of School-based Health (MESH) Project is to evaluate the impact of state-funded[3] clinical school-based health centers (SBHCs) on the health outcomes, school attendance, and healthcare costs of children attending schools with SBHCs. This evaluation is based on a sample of youth and their parents from 16 middle and high schools both with and without SBHCs throughout the state of Michigan. The overall aim of the evaluation is to determine if students attending schools with SBHCs experience better health outcomes and lower healthcare costs associated with emergency room use.

This report presents results from an analysis of the SBHC service records of students who received SBHC services between July 1, 2006 and June 30, 2007 at any of the nine MESH study sites with an SBHC. The analyses of SBHC service records focused on the conditions for which students sought medical attention and the services they received. The baseline health status of children and parents' reports of their children's health, health insurance status, access to and use of health care services, and parents' perceptions of the quality of these services are described in other reports (McNall, Lichty, Forney, Mavis & Bates, 2007; Lichty, McNall, Mavis & Bates, 2008). The MESH project study protocol was reviewed and approved by the Michigan State University and Michigan Department of Community Health Institutional Review Boards.

Methods

Recruitment

Parental consent was obtained through a variety of means, including mailing consent documents and cover letters to the homes of all children in grades six or nine in the selected schools and having research staff attend back-to-school events or parent-teacher conferences. When participation rates remained unsatisfactory in certain schools, we sponsored in-school competitions between classrooms for the most consent forms returned, regardless of whether consent to participate in the study was granted.

As a result of our recruitment efforts, we received parental permission for a total of 1134 students, representing 26% of eligible students across all schools. Of the students with parental consent, 793 were enrolled in schools with SBHCs; however, not all parents agreed to have their children's SBHC service records released. Ultimately, service records were sought and received for 726 participants.

Description of Clinic Records

SBHC clinic staff completed clinical encounter forms documenting medical procedures completed and associated diagnoses made during visits that occurred between July 1, 2006 and June 30, 2007. Information entered on these forms was subsequently entered into databases from which the data for this report were drawn. It is worth noting that there were some visits for which there were no clinical records. For example, a student with no appointment who requested a cough drop would not have

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[2] Also called school-based health centers (SBHCs)
[3] One school-based health center included in this evaluation is not state-funded. This health center follows the same policies, practices, and regulations as state-funded health centers and therefore is appropriate for inclusion in the study

had his or her visit recorded. Thus, the clinical data presented in this report reflect more involved medical visits, but they do not reflect all visits made by students enrolled in this study or all services provided by SBHCs.

Student Sample

Clinical data were received for 726 youth enrolled at schools with SBHCs (276 middle school students and 450 high school students). Of the 668 participants for whom demographic data were available,[4] 55% (n=369) were girls, 45% (n=299) were boys, 43% were white, 32% were African American, 12% were Latino, 5% were American Indian, 2% were Asian Pacific-Islander, and 7% identified as "other." Middle school participants ranged in age from 10 to 15 (mean=11.63, median=12.00, and standard deviation=.72). High school participants ranged in age from 12 to 16 (mean=14.39, median=14.00, and standard deviation=.64).
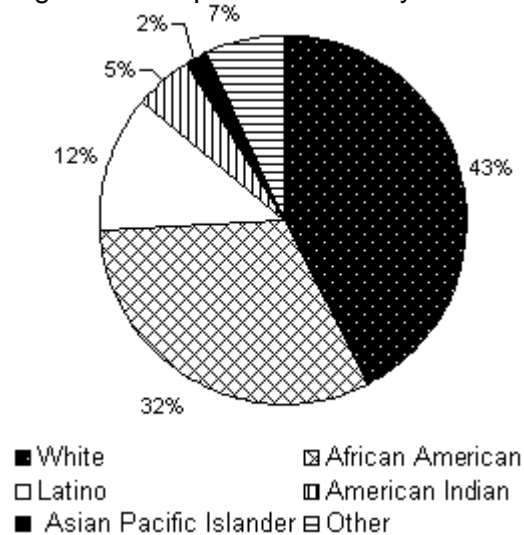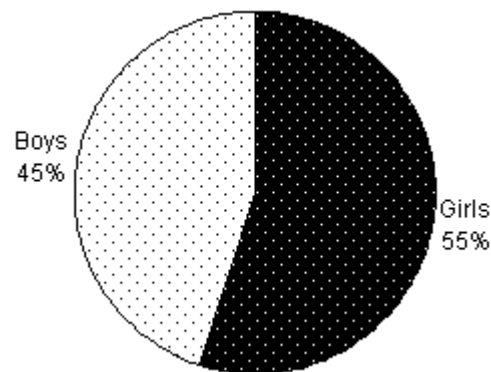
Figure 1. Sample race/ethnicity

Figure 2. Sample gender

■ White   ⊠ African American
□ Latino   ⊞ American Indian
■ Asian Pacific Islander ⊟ Other

Findings

Health Center Visits

Of the 726 participants for whom clinic records were obtained, 48% (n=348) visited their schools' SBHCs at least once from July 1, 2006 through June 30, 2007. The remaining 52% of participants were either not SBHC users, or their use did not result in a visit record (as previously described). In total, these 348 participants visited their SBHCs 1,444 times. The number of visits per person ranged from 1 to 59, with a median[5] of two visits (Table 1). Fifty-eight percent of clinic users were female with an average age of 13 years; 39% were white, 37% were African American, 12% were Latino, 3% were American Indian, 1% were Asian Pacific-Islander, and 9% were "other." There were no significant demographic differences between clinic users and non-users.

Table 1. Number of SBHC Visits

Number of Visits	N	Percentage
0	378	52%
1	115	16%
2	65	9%
3	48	7%
4+	120	4%
Total	726	100%

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[4] All demographic information was taken from participants' responses to the CHIP-AE survey. Not all students for whom clinic data was provided completed a survey; therefore, we do not have complete demographic information for all participants.
[5] We present the median instead of the mean here because the mean number of visits is skewed by a small number of students with a very high number of visits.

Diagnoses

For each medical encounter, SBHCs assign diagnostic codes using the International Statistical Classification of Disease (ICD-9) codes. These codes range from 001-999 and are divided into 17 diagnostic categories: 1) Infectious and Parasitic Disease, 2) Neoplasms, 3) Endocrine, Nutritional and Metabolic, Immunity, 4) Blood and Blood Forming Organs, 5) Mental Disorders, 6) Nervous System and Sense Organs, 7) Circulatory System, 8) Respiratory System, 9) Digestive System, 10) Genitourinary System, 11) Complications of Pregnancy, Childbirth, and Puerperium, 12) Skin and Subcutaneous Tissue, 13) Musculoskeletal System and Connective Tissue, 14) Congenital Anomalies, 15) Conditions in the Perinatal Period, 16) Symptoms, Signs, and Ill-defined Conditions, and 17) Injury & Poisoning.

V-codes are used when an individual presents with circumstances other than a disease or injury classifiable by ICD-9 codes 001-999. This situation can arise in one of three ways: 1) When a person who is not currently sick receives services for some specific purpose (e.g., prophylactic vaccination); 2) When a person receives follow-up treatment for a known disease or injury (e.g., for a cast removal); and 3) When some problem is present which influences the person's health status, but is not in itself a current illness or injury (e.g., an individual experiencing a sore throat who is also diabetic). Multiple ICD-9 codes and V-codes can be applied to a single visit.

In this report we focused on primary diagnoses.[6] We summarized the data in two ways: by visit and by individual. First, we examined the primary diagnoses resulting from *each visit* to the health center. This examination provides insight into the number of times SBHC staff members were confronted with a particular diagnosis. In these analyses, each *time* a youth presented with a diagnosis was counted. For example, one youth who was diagnosed with diabetes visited the SBHC for this problem 50 times. Therefore, the total count for diabetes for this youth would be 50. Second, we examined diagnoses by *individual* to assess the *prevalence* of the various diagnoses across our sample. Each participant might have had multiple diagnoses, but each diagnosis was only counted once per person. For example, the individual who visited the SBHC 50 times for diabetes would only have been counted as one case of diabetes. By including both sets of analyses, we can better understand what conditions SBHC staff are treating over the course of the school year while differentiating whether a particular health problem is chronic within a few individuals or common across the entire sample. Participants made 1,444 visits to their SBHCs and 1,092 distinct diagnoses were made across individuals during those visits.

Diagnoses across all visits. Examining the 17 diagnostic categories across all *visits*, we found that approximately three-quarters (72%) of all diagnoses across all visits were from the following five categories (Figure 3):
     a) Symptoms, Signs, and Ill-defined Conditions (24% of diagnoses),
     b) Respiratory System (18%),
     c) Injury and Poisoning (15%),
     d) Nervous System and Sense Organs (8%), and
     e) Endocrine, Nutritional and Metabolic, Immunity (7%).

As its name suggests, the Symptoms, Signs, and Ill-defined Conditions category is applied in circumstances when a more specific diagnosis cannot be made given the facts presented at the time of the visit. For example, this may include circumstances when more than one diagnosis might fit the

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[6] In the clinical data from SBHCs, primary diagnoses were indicated by codes such as: ICD-9_1, Primary Dx, DX1, or 1st Dx.

symptoms, when a follow up visit is needed to assess symptom patterns over time, or when a referral is made to a specialist.

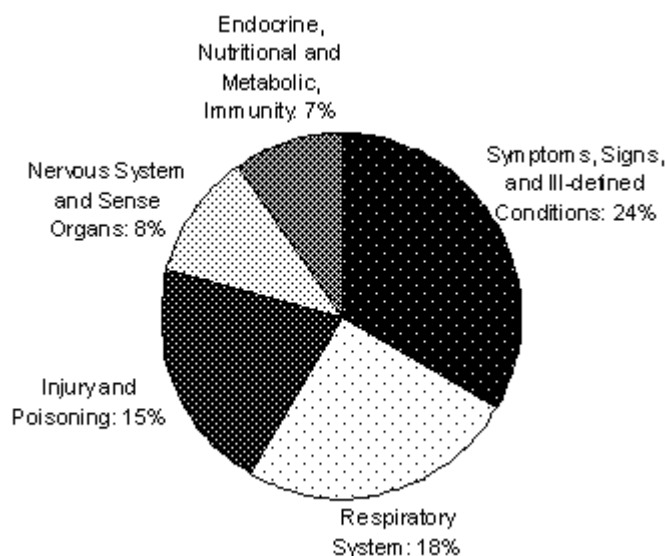Figure 3. Most frequent diagnoses across all visits (N=1444)

Table 2 presents the frequency and percentage of the three diagnostic codes noted most often within each of the five most common diagnostic categories. For example, of the diagnoses falling within the Symptoms, Signs, and Ill-defined Conditions category, 34% were for symptoms involving the head and neck. Of all the diagnoses made from the Respiratory System category, 22% were for acute pharyngitis.

Table 2. The most frequent diagnostic codes within the most common diagnostic categories

Diagnostic Category	Code	Diagnosis	N	Percentage within Category
Symptoms, Signs, and Ill-defined Conditions	784	Symptoms involving the head and neck	87	34%
	789	Symptoms involving the abdomen and pelvis (unspecified)	50	20%
	784.0	Headache	41	16%
Respiratory System	462	Acute pharyngitis (throat)	43	22%
	465.9	Acute upper respiratory infection	24	13%
	461.9	Acute sinusitis	21	11%
Injury and Poisoning	848.9	Sprain and strain (unspecified site)	21	13%
	845	Sprains and strains of the ankle and foot	15	9%
	959.01	Head injury	12	8%
Nervous System and Sense Organs	382.9	Unspecified otitis media (ear)	19	23%
	372.3	Conjunctivitis	9	11%
	346.9	Migraine	8	10%
Endocrine, Nutritional and Metabolic, Immunity	250.03	Diabetes (Type 1, uncontrolled)	52	71%
	278.02	Overweight	6	8%
	250	Diabetes (unspecified)	3	4%

Across all visits, the most common diagnostic codes, including V-codes, were physical examinations (11%), head and neck-related problems (9%) and immunizations (5%) (Table 3).

Table 3. Ten most frequently applied diagnostic codes across all visits

Code	Diagnosis	N	Percentage of all Visits
V20.2*	Physical examination	155	11%
784	Symptoms involving head and neck	87	9%
V03-V06*	Immunizations	75	5%
250.03	Diabetes	52	4%
789	Other symptoms involving abdomen and pelvis	52	4%
462	Acute pharyngitis	44	3%
784.0	Headache	41	3%
V62.89	Psychological or physical stress, not elsewhere classified	37	3%
V65.3*	Preventive counseling	25	2%
465.9	Acute upper respiratory infection	25	2%
	Total	636	46%

*Some v-codes were collapsed to improve interpretability. See appendix for details.

Diagnoses across all SBHC users. Examining the 17 diagnostic categories across all SBHC *users*, we found that approximately three-quarters of all diagnoses were from the following five categories: 1) Symptoms, Signs, and Ill-defined Conditions (23% of diagnoses, n=190), 2) Respiratory System (19%, n=158), 3) Injury and Poisoning (18%, n=145), 4) Nervous System and Sense Organs (9%, n=71), and 5) Musculoskeletal System and Connective Tissue (6%, n=47) (Figure 4).

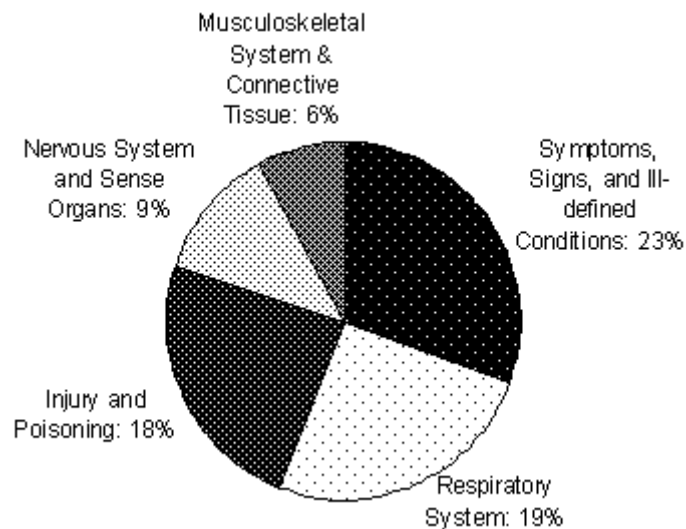Figure 4. Most frequent diagnoses across SBHC users (N=348)

Table 4 presents the frequency and percentage of the three most frequent diagnostic codes across all SBHC users within each of the five most common diagnostic categories.

Table 4. The most frequent diagnostic codes within the most common diagnostic categories across all SBHC users

Diagnostic Category	Code	Diagnosis	N	Percentage within Category
Symptoms, Signs, and Ill-defined Conditions	784	Symptoms involving the head and neck	58	31%
	789	Symptoms involving the abdomen and pelvis (unspecified)	34	18%
	784.0	Headache	29	15%
Respiratory System	462	Acute pharyngitis (throat)	32	20%
	465.9	Acute upper respiratory infection	21	13%
	461.9	Acute sinusitis	14	9%
Injury and Poisoning	848.9	Sprain and strain (unspecified site)	13	9%
	845	Sprains and strains of the ankle and foot	11	8%
	959.01	Head injury	10	7%
Nervous System and Sense Organs	382.9	Unspecified otitis media (ear)	13	18%
	372.3	Conjunctivitis	8	11%
	346.9	Migraine	7	10%
Musculoskeletal System and Connective Tissue	719.46	Pain in joint (lower leg)	8	17%
	729.5	Pain in limb (soft tissue)	7	15%
	719.45	Pain in joint (pelvic region and thigh)	3	6%

Across all SBHC users, the most prevalent diagnoses, including V-codes, were physical examinations (13%), immunizations (7%), and head and neck-related problems (5%) (Table 5).

Table 5. Ten most frequently applied diagnostic codes across SBHC users

Code	Diagnosis	N	Percentage of all Diagnoses
V20.2*	Physical Exam	143	13%
V03-V06*	Immunizations	71	7%
784	Symptoms involving head and neck	58	5%
789	Other symptoms involving abdomen and pelvis	34	3%
462	Acute pharyngitis	32	3%
784.0	Headache	29	3%
465.9	Acute upper respiratory infection	21	2%
V65.3*	Preventive counseling	20	2%
625.3	Dysmenorrhea (painful menstruation)	18	2%
461.9	Acute sinusitis (unspecified)	14	1%
	Total**	440	40%

*Some v-codes were collapsed to improve interpretability. See appendix for details.
**In this analysis across SBHC users, each person may have received different diagnoses. The total number of unique diagnoses received across the 348 SBHC users in our sample was 1,092.

Gender differences in diagnoses. Comparing the 10 most common diagnostic codes for girls versus boys, two differences emerged: sprains/strains were significantly more common among boys (2%) than girls (<1%)(Phi= -.05; p<.05), and disorders of the urinary tract were significantly more common among girls (1%) than boys (0%)(p<.05)[7].

Age differences in diagnoses. Comparing the 10 most common diagnostic codes for middle school versus high school students, seven significant differences emerged. Specifically, there were five codes that appeared in the middle school students' "top 10" that did not appear in the high school students' "top 10," and two that appeared only on the high school "top 10" list. Table 6 lists each of these codes, the codes' frequency, percentages, and the results of tests of significant differences between middle school and high school SBHC user codes.

Middle school students were diagnosed significantly more frequently than high school students with the following conditions:

- Abdominal and pelvis symptoms
- Head injuries
- Nasal cavity and sinus diseases
- Contusions
- Psychological/physical stress (not classified by other codes)

High school students were diagnosed significantly more frequently than middle school students with headaches and acute sinusitis.

Table 6. Age differences in the ten most frequent diagnoses across SBHC users

Code	Diagnosis	Middle School		High School		Significance Test
		N	Percent	N	Percent	
789	Other abdomen and pelvis symptoms	25	7%	9	1%	Phi=-.15; p<.05
784.0	Headache	1	<1%	28	4%	Phi=.10; p<.05
959.01	Head injury	8	2%	2	<1%	Phi=-.09; p<.05
924.9	Contusion (unspecified site)	6	2%	3	<1%	Phi=-.06; p<.05
461.9	Acute sinusitis (unspecified)	1	<1%	13	2%	p<.05*
V62.89	Psychological or physical stress, not elsewhere classified	6	2%	1	<1%	p<.05*
478.1	Other diseases of nasal cavity and sinuses	6	2%	2	<1%	p<.05*

*Fisher's exact test was used because the expected count for at least one cell was less than 5.

Diagnoses across visits vs. across SBHC users. When the frequencies of diagnostic categories across visits and users were compared, one difference emerged. Whereas across all *visits*, the Endocrine, Nutritional and Metabolic, and Immunity diagnostic category was the fifth most common, across all *users*, the Musculoskeletal System and Connective Tissue diagnostic category was the fifth most common. Upon closer examination, we found that the higher prevalence of endocrine-related diagnoses across visits was a function of a single person, mentioned previously, who sought repeated care for diabetes. When diagnoses were examined across users, endocrine-related diagnoses were not among the most common.

To determine whether the frequency with which diagnostic codes were used reflected chronic conditions among a few individuals versus common conditions across several individuals, we compared the frequency of diagnostic codes across visits and SBHC users (Table 7). With the

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[7] Fisher's exact test was used because the expected count for at least one cell was less than 5.

exception of the Diabetes Type I uncontrolled diagnostic code, the differences between visits and users was minimal, ranging from six visits for one SBHC user for acute sinusitis to one visit per user for Diabetes-unspecified. Most SBHC users received each diagnosis only once. However, conditions in the Symptoms, Signs, and Ill-defined Conditions and Respiratory System categories were associated with the highest number of repeat visits, with several individuals diagnosed four or more times with head and neck symptoms (n=3), abdomen and pelvis symptoms(n=1), acute pharyngitis (n=2), and headaches (n=1). The vast majority of individuals with these diagnoses sought care at their SBHC only once or twice (85-93% of participants).

Examining V-codes across visits and across users, we found that most of the physical examination and immunization visits were made by different individuals (i.e, there were only 12 repeat visits by individuals seeking physical exams and 4 repeat visits for immunizations). However, repeated care was sought for psychological/ physical stress, with three individuals seeking care on 11 or more occasions.

Table 7. Comparing most frequently applied diagnostic codes across visits and SBHC users

Code	Meaning	Across all visits N=1,444		Across all SBHC users N=1,092	
		N	Percentage	N	Percentage
V20.2*	Physical Exam	155	11%	143	13%
V03-V06*	Immunizations	75	5%	71	7%
784	Symptoms involving head and neck	87	6%	58	5%
789	Other symptoms involving abdomen and pelvis	52	4%	34	3%
462	Acute pharyngitis	44	3%	32	3%
784.0	Headache	41	3%	29	3%
465.9	Acute upper respiratory infection	25	2%	21	2%
V65.3*	Preventive counseling	25	2%	20	2%
625.3	Dysmenorrhea (painful menstruation)	21	1%	18	2%
461.9	Acute sinusitis (unspecified)	21	1%	14	1%
250.03	Diabetes	52	4%	2	<1%
V62.89	Psychological/physical stress, not elsewhere classified	37	3%	7	1%

*Some v-codes were collapsed to improve interpretability. See appendix for details.

Comparing self-reported health conditions to clinic data. Of the students participating in the MESH study, 958 completed the *Child Health and Illness Profile—Adolescent Edition (CHIP-AE)* [8] during the 2006-2007 school year. The CHIP-AE includes a medical conditions section in which participants are asked about health conditions they have experienced in the previous 12 months or diagnoses they have ever received from a medical practitioner. While there are several limitations to comparing the survey data to the clinic data [9], a comparison of the two provides a rough sense of whether students are seeking treatment at their SBHC for the health conditions they report. To perform the comparisons, forty-two medical conditions included on the CHIP-AE were organized into

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[8] © Johns Hopkins University 1995, 2000

[9] There are three major limitations in this comparison: time frame of the survey administration relative to the clinic records, sample differences, and limited medical conditions included in the survey. The surveys were often completed in the spring of 2007, thus participants could not report on conditions that emerged after that date and before June 30, 2007. In addition, the survey sample includes both students at schools that do not have SBHCs and students at schools with SBHCs that did not have parental consent for their medical records to be released. In addition, not all students whose medical records were released completed the CHIP-AE. Finally, the CHIP-AE only includes a limited selection for medical conditions, often referred to in lay-person terms. Therefore, there will not be one-to-one correspondence with the refined coding system available in the clinical records.

the ICD-9 diagnostic categories. Table 8 presents a comparison of the five most common diagnostic categories (by user) in the clinical data to the self-reported conditions that emerged from the survey data.

Comparisons of clinical and survey data showed broad consistency between the diagnostic categories most frequently applied at SBHC visits and the conditions students reported on the CHIP-AE, suggesting that students were, in fact, seeking care at their SBHCs for the health conditions they most frequently reported. For example, the four most common diagnostic categories were the same in the clinic data and the survey data, although the order of the top four was slightly different. Whereas the Symptoms, Signs, and Ill-defined Conditions category was the most common category for the clinical data, it was the fourth most common category for the self-report data. However, this difference may be due to the limited number of conditions (only one) on the CHIP-AE that fit into this category. Another difference between the clinical and survey data was that students did not report experiencing as many musculoskeletal-related conditions on the CHIP-AE as were diagnosed in the clinic records. Whereas the Musculoskeletal diagnostic category was the fifth most common for the clinical data, the Skin and Subcutaneous Tissue category (n=278, 5%) was the fifth most common for the survey data. It is possible that the latter category is less common in the clinical data because the conditions in this category are conditions for which students are less likely to seek care at their SBHC (e.g., acne).

Table 8. ICD-9 Diagnostic Categories by Users and CHIP-AE Medical Conditions

Diagnostic Category	ICD-9 Categories (Clinic Records)			CHIP-AE Medical Conditions (Self-Report)*		
	Rank	N	Percentage	Rank	N	Percentage
Symptoms, Signs, & Ill-defined Conditions	1	190	23%	4	465	8%
Respiratory System	2	158	19%	1	2332	40%
Injury & Poisoning	3	145	18%	2	1451	25%
Nervous System & Sense Organs	4	71	9%	3	518	9%
Musculoskeletal System & Connective Tissue	5	47	6%	7	167	3%

*In total, there were 36,169 responses to the 42 conditions, with 5,809 responses (16%) indicating participants had indeed experienced at least one of the 42 conditions at least once.

Procedures

For each SBHC visit, two distinct codes were applied to track the types of services provided: Current Procedural Terminology (CPT) codes and Tracking Services (TS) codes.[10] Whereas CPT codes indicate specific medical procedures, TS codes denote the general nature of the visit (e.g., general medical services visit, immunization visit, or chronic disease management visit). The CPT codes used most frequently are listed in Table 9. For clarity of reporting, several CPT codes were grouped together (see Appendix A for more details). The CPT codes used most frequently were office visits or other outpatient visits for established patients (42%), vaccine administrations (8%) and office or outpatient visits for new patients (8%). There were no gender or age differences in the frequency with which the most common CPT codes were used.

Table 9. Ten most frequently applied CPT codes

Code	Meaning	N	Percentage
99211*	Office or other outpatient visit (Established patient)	875	42%
Vacc*	Vaccine administration	160	8%
99201*	Office or other outpatient visit (New patient)	156	8%
90801*	Psychological/Social work counseling	105	5%
81002	Urinalysis nonautomated	94	5%

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[10] TS-codes were not available from four sites.

Code	Meaning	N	Percentage
99393*	Preventive Medicine services (Established patient)	77	4%
99420	Health risk assessment test	74	4%
99383*	Preventive Medicine services (New patient)	72	3%
86403	Immunology screening	58	3%
85018	Hematology and coagulation- hemoglobin (Hgb)	57	3%
	Total	636	46%

*Aggregated codes. See appendix for more details.

An examination of TS codes found that nearly half of all visits (42%) were seeking general medical services, and 25% involved health promotion and risk reduction services (Table 10). Immunization services and mental health/counseling services accounted for slightly more than 10% (each) of the services rendered. Consistent with the CPT codes, there were no gender or age differences in the most commonly applied TS codes. Whether examining CPT codes or TS codes, it appears that much of the SBHC staff members' time is spent treating acute or chronic illnesses, rather than health promotion/prevention services.

Table 10. Tracking services codes

Code	Meaning	N	Percentage
TS138	General Medical Service	322	42%
TS132	Health Promotion and Risk Reduction Service	191	25%
TS133	Immunization Service	87	11%
TS134	Mental Health Service/Counseling Service	84	11%
TS130	Chronic disease management service	29	4%
TS140	Vision and hearing service	20	3%
TS131	Family planning service	16	2%
TS137	Substance abuse diagnosis and treatment	5	1%
TS136	STD diagnosis and treatment	3	<1%
TS139	Support services	3	<1%
	Total	760	100

Post-SBHC visit destinations

Health centers track where students are sent after visiting the health center.[11] Table 11 presents the tracking codes for the visits made by participants in our sample. For the 93% of visits occurring while school was in session, approximately 95% of participants were sent back to class after visiting the health center. Less than 5% of students visiting the health centers subsequently left school (i.e., were sent home, sent to a specialty clinic, or sent to the hospital).

Table 11. Student destination after SBHC visits

Code	Meaning	N	Percent
TR100	Returned to class	583	88%
TR101	Sent home	28	4%
TR102	School not in session	44	7%
TR103	Sent to specialty clinic	1	<1%
TR104	Sent to hospital	3	<1%
	Total	659	100%

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[11] Tracking codes were not available from three sites.

Summary of Key Findings

Health Center Visits

Of the 726 participants for whom SBHC service records were obtained, 48% (n=348) visited their school's SBHC at least once between July 1, 2006 and June 30, 2007. In total, these 348 participants visited their SBHC 1,444 times. The number of visits each student made to the health canter ranged from 1 to 59, with a median of two visits per person. Clinic users did not differ significantly from non-users in terms of gender, age, or ethnicity.

Diagnoses

For this report we summarized data on primary diagnoses in two ways: by *visit* and by *individual*. Examining data by visit allowed us to see how often SBHC staff members were confronted with a diagnosis, as each *time* an individual presented with a diagnosis was counted. Thus, some youth were counted multiple times for a single diagnosis. Examining the diagnoses by *individual* allowed us to assess the *prevalence* of each diagnosis within our student sample, because each student who presented with a certain primary diagnosis was counted only once.

There are thousands of distinct diagnostic codes (i.e., ICD-9 Codes) that are organized into 17 diagnostic categories. We examined the most frequent diagnoses by category and by individual code.

> ***Most common diagnostic categories per visit versus individual.*** As Table 12 shows, the four most common diagnostic categories were the same when measured per visit or per individual; however, the fifth most common category was different. Whereas across all *visits*, the Endocrine and Immunity diagnostic category was the fifth most common, across all *users*, the Musculoskeletal System and Connective Tissue diagnostic category was fifth most common. The higher frequency of Endocrine-related *visits* resulted from one individual user who sought repeated care for diabetes.

Table 12. Most Common Diagnostic Categories per Visit and per Individual

Diagnostic Category	Visit		Individual	
	Percentage	Rank	Percentage	Rank
Symptoms, Signs, & Ill-defined Conditions	24%	1	23%	1
Respiratory System	18%	2	19%	2
Injury & Poisoning	15%	3	18%	3
Nervous System & Sense Organs	8%	4	9%	4
Endocrine, Nutritional & Metabolic, Immunity	7%	5	--	--
Musculoskeletal System & Connective Tissue	--	--	6%	5

> ***Most common diagnostic codes per visit versus individual.*** Table 13 shows the most commonly used diagnostic codes per visit and per individual. Generally the differences in frequency of various diagnoses for visits and for individuals were minimal, indicating that most individuals were diagnosed with each condition only once between July 1, 2006 and June 30, 2007. However, three individuals were diagnosed with psychological/physical stress (not classified by other codes) on 11 or more visits, and one individual was seen for diabetes on more than 40 occasions. In addition, some individuals were treated repeatedly (ranging from 2 to 6 visits) for head and neck symptoms, abdomen and pelvis symptoms, throat problems, headaches, and sinusitis.

Table 13. Most Common Diagnostic Codes per Visit and per Individual

Diagnosis	Code	Visit			Individual		
		N	Percentage	Rank	N	Percentage	Rank
Physical exam	V20.2*	155	11%	1	143	13%	1
Symptoms of head & neck	784	87	9%	2	58	5%	3
Immunizations	V03-V06*	75	5%	3	71	7%	2
Diabetes	250.03	52	4%	4	2	<1%	90
Other symptoms of abdomen & pelvis	789	52	4%	5	34	3%	4
Acute pharyngitis	462	44	3%	6	32	3%	5
Headache	784.0	41	3%	7	29	3%	6
Psychological/ physical stress, not elsewhere classified	V62.89	37	3%	8	7	1%	29
Preventive counseling	V65.3*	25	2%	9	21	2%	8
Acute upper respiratory infection	465.9	25	2%	10	20	2%	7
Dysmenorrhea (painful menstruation)	625.3	21	1%	12	18	2%	9
Acute sinusitis (unspecified)	461.9	21	1%	11	14	1%	10

*Some v-codes were collapsed to improve interpretability. See appendix for details.

Gender differences in diagnoses. Two significant gender differences emerged: sprains/strains were significantly more common among boys than girls, and disorders of the urinary tract were significantly more common among girls than boys.

Age differences in diagnoses. There were seven significant differences in the most common diagnoses made for middle school students versus high school students. Middle school students were diagnosed significantly more frequently than high school students with abdominal and pelvis symptoms, head injuries, nasal cavity and sinus diseases, contusions, and psychological/physical stress (not classified by other codes). High school students were diagnosed significantly more frequently than middle school students with headaches and acute sinusitis.

Procedures

Services provided by the health center are tracked in two different ways: 1) by the general nature of the visit (TS codes); and 2) by the specific medical procedures provided (CPT codes).

General service categories. Service (TS) codes track the general nature of each visit. For this service period the most common services received were as follows:
- General medical services (42%)
- Health promotion and risk reduction services (25%)
- Immunizations (11%)
- Mental health/counseling services (11%)

Procedures. Table 14 presents the ten most common procedures (based on CPT codes) conducted at the health center during this period.

Table 14. Ten most frequently applied CPT codes

Code	Procedure	N	Percentage
99211*	Office or other outpatient visit (Established patient)	875	42%
Vacc*	Vaccine administration	160	8%
99201*	Office or other outpatient visit (New patient)	156	8%
90801*	Psychological/Social work counseling	105	5%
81002	Urinalysis nonautomated	94	5%
99393*	Preventive Medicine services (Established patient)	77	4%
99420	Health risk assessment test	74	4%
99383*	Preventive Medicine services (New patient)	72	3%
86403	Immunology screening	58	3%
85018	Hematology and coagulation- hemoglobin	57	3%
	Total	636	46%

*Aggregated codes. See appendix for more details.

Whether examining CPT codes or TS codes, it appears that much of the SBHC staff members' time is spent treating acute or chronic illnesses, rather than health promotion/prevention services.

Post-SBHC visit destination

Examining only visits that were made when school was in session, we found that 95% of students were sent back to class after visiting the health center. Less than 5% of students visiting the SBHCs subsequently left school.

Study Limitations

The methods employed in this study have some limitations. First, this study relies on medical encounter data and we cannot attest to the completeness or accuracy of these data. Second, the study sample contains only a portion of SBHC users in any given school, so the results are not necessarily representative of all SBHC users within a given school or across schools. Finally, not all SBHC visits are recorded, and many activities undertaken by SBHC staff, such as school-wide health-promotion campaigns are not reflected in medical encounter data. Consequently, many health-promoting activities undertaken by SBHC staff are not discussed in this report. For a more complete discussion of such activities, please consult McNall et al. (2008).

References

McNall, M., Lichty, L., Forney, J. Mavis, B., & Bates, L. (2007). *Michigan Evaluation of School-based Health baseline child health status report: Descriptive data for the entire sample.* Michigan Department of Community Health. http://outreach.msu.edu/cerc/documents/MESH_Baseline_Report_final.pdf

McNall, M., Greenway, N., Lichty, L., Forney, J., Mavis, B. & Bates, L. (2008). *Michigan Evaluation of School-based Health baseline interview report: School-based health center services and the environment of service provision.* Michigan Department of Community Health.

Appendix A: Revisions to the ICD-9 and CPT Codes

Type of Code	Original Code	Revised Code	Meaning
ICD-9	V03.XX through V06.XX	V03-V06	Immunization/vaccine diagnoses
ICD-9	V20.X, V70.X, V72.3X	V20.2	Physical exam diagnoses
ICD-9	V65.3, V65.4X	V65.3	Preventive Counseling
CPT	New patient 99381-99387 Established patient 99391-99397	99383 99393	Preventive exams, different codes reflect age of patient
CPT	90465-90474, 90476-90749	Vacc	Immunization administration and the specific vaccines used
CPT	New patient 99201-99205 Established patient 99211-99215	99201 99211	Outpatient visits varying in degree of complexity.
CPT	90801-90815	90801	Psychotherapy (time specific and broken down by type of therapy)
CPT	99401-99404	99401	Preventive Counseling (time based codes)