USE OF PREVENTIVE HEALTH SERVICES BY CHILDREN WITH SPECIAL HEALTH CARE NEEDS ENROLLED IN MEDICAID IN NORTH CAROLINA, 2002

EXECUTIVE SUMMARY

OBJECTIVES

The care provided to children with special health care needs (CSHCN) has long been of interest to the Centers for Medicare and Medicaid (CMS) as well as the NC Division of Medical Assistance. In 2001, CMS defined CSHCN as children who were in either Medical Assistance for the Disabled (MAD), Medicaid for the Blind (MAB), foster care, receiving foster care assistance, or receiving specific Title V services. The Division of Medial Assistance chose to add to the CMS definition those children who were "self-identified" by their parent at the time of Medicaid application. The "self-identification" is based on the responses to a questionnaire developed by the Foundation for Accountability (FAACT) regarding the child's medical visits, medication and equipment use, and specialty care. The primary goal of this study was to assess the status of health care for children with special health care needs enrolled in NC Medicaid, with a special focus on administration and documentation of preventive services, health and developmental screening services, treatment planning, and care coordination.

METHODS

A random sample of ten provider counties for the Community Care of North Carolina's Carolina Access and Access II systems of care were drawn to include provider practices caring for children age 18 and younger with special health care needs. The children were included in the study if they were enrolled in their system of care for a minimum of 11 out of 12 months in 2002, were still enrolled in December 2002, and if they had claims with a service date in 2002 that contained one or more specific diagnoses or supplementary classification codes. The diagnoses or supplementary classification codes fell into one or more of 43 diagnostic and procedural categories that included chronic physical and developmental conditions as well as rehabilitative and therapeutic procedures. The Medical Review of North Carolina, Inc., reviewed medical charts for the 1,736 children selected, and abstracted information on demographics, medical record documentation standards, immunizations, Health Check visits, laboratory tests, and other medical, assessment, treatment, and referral services. The medical chart data were analyzed for all children with special health care needs, and by gender, race, system of care, and age group. Frequency and percentage distributions were produced, and the chi-square test of independence was used to test for statistically significant relationships between variables. Data for 6 - 24 month old children with special health care needs were compared to data obtained for children of the same age group included in the Health Check and Immunization Study,[5] published in 2002.

RESULTS

The results of this study show that baseline data such as inclusion of allergy information, a medication list, and a problem list was provided in 84%-93% of all charts reviewed. A complete immunization record for immunizations required by age 6 months was found for only 24%, and a complete immunization record for immunizations required by age 18 months was found for only 11% of the charts reviewed. Using an extended immunization schedule based on the Center for Disease Control's Advisory Committee on Immunization Practices' (ACIP) recommended 2002 Childhood Immunization Schedule[3] plus an additional month before and after the recommended vaccination window, vaccination compliance for specific immunizations varied between 3% and 79%. Lab tests were documented in 10%-27% of the charts, using an extended schedule based on Health Check Billing Guide 2002[4] recommendations plus an additional month before and after the recommended lab test administration window. The lab tests reviewed included the mandatory lead and sickle cell screenings. Continuation and coordination of care as evidenced by referrals and referral follow-ups was found in 34% of the charts. A non-formalized treatment plan was found in 67% of the charts. A formalized treatment plan, however, was found in only 7% of the charts reviewed. Assessment and documentation of Health Check visit components varied widely. Components such as height, weight, heart, lungs, abdomen, and nose/mouth assessments were documented in 93%-98% of the charts while risk assessments such as tobacco use and exposure, alcohol use and exposure, substance use and exposure, sexuality issues, and anticipatory guidance were only documented in 10-17% of the charts reviewed. Written developmental assessments were documented in 25% of the medical charts. Significant differences for administration and documentation of preventive services, health and developmental screening services, treatment planning, and coordinated care were found for characteristics such as gender, race, system of care, and age group. Written developmental assessments, for instance, varied significantly by race (American Indian: 40.0%, African American: 34.3%, Caucasian/White: 21.8%, and other races: 13.2%), system of care (CCNC/Carolina Access II: 31.5%, CCNC/Carolina Access I: 18.2%, and SouthCare: 12.5%), and age group (ages 0-4 years: 36.2%, and ages 5-9 years: 3.2%). Compared to children included in the Health Check and Immunization Study of October 2002, children with special health care needs ages 6 - 24 months had a markedly higher percentage of medical record components administered as required, higher percentages in a number of required Health Check Visit components (including written developmental assessments, 25% vs. 17%), considerably higher compliance with all required immunizations at ages 6-17 months, and ages 18-24 months, and with specific immunization requirements.

CONCLUSIONS

In comparing children with special health care needs to children included in the Health Check and Immunization Study, which included a cross section of children ages 6-24 months enrolled in Medicaid with no particular health problems, the status of care for children with special health care needs, in terms of preventive care and health and developmental screenings, was found to be better. This is desirable for children that are at an increased risk for chronic physical,

developmental, behavioral, or emotional conditions. Treatment planning and coordination of care were not studied in the Health Check and Immunization Study nor in any other recent study by the NC Division of Medical Assistance, so no comparisons could be made. The data obtained in this study are intended to serve as baseline measures of preventive care, health and developmental screenings, treatment planning, and coordination of care for the group of children with special health care needs, and will help in developing future initiatives focusing on children with special health care needs.

INTRODUCTION

Managed Care programs in North Carolina

The North Carolina Division of Medical Assistance (NC DMA) utilizes four systems of care to deliver medical services to NC Medicaid recipients. In addition to traditional fee-for-service, there are three managed care programs:

- Community Care of North Carolina's Carolina Access program (CCNC/CAI) is a primary care case management program (PCCM) covering all 100 counties in NC that links Medicaid recipients to primary care physicians who provide preventive and acute care as well as referrals to medically necessary specialty care. Participating physicians are paid management fees per linked recipient to manage and coordinate recipients' medical care.

- Community Care of North Carolina's Carolina Access II program (CCNC/CAII, formerly known as Carolina Access II/III) is a program that expands the PCCM program to include targeted case management as well as disease management initiatives. A community-based program, physician networks managed by local administrative entities develop strategies to coordinate and provide care for recipients. Currently, this program operates in 92 counties and has 14 physician networks. The NC DMA and the Office of Rural Health and Research have plans to expand the program to all 100 counties in the near future.

- Health Care Connections is a risk-based program that currently operates in Mecklenburg county only. One Managed Care Organization (MCO), WellPath, Inc., doing business as SouthCare, is under contract with the NC DMA to provide preventive, acute, and specialty care under a capitated arrangement. There are no current plans by the Division to expand Health Care Connections to other areas of the State.

The care provided to Children with Special Health Care Needs (CSHCN) has long been of interest to the Centers for Medicare and Medicaid (CMS) as well as the NC Division of Medical Assistance. The Division draws on specific Title V services utilization, eligibility categories, and a self-identifying questionnaire to determine the NC CSHCN population enrolled in Medicaid. In 2001, CMS defined CSHCN as children who were in either Medical Assistance for the Disabled (MAD), Medicaid for the Blind (MAB), foster care, or receiving foster care assistance, or who were receiving specific Title V services identified by particular billing provider numbers, provider types, provider specialties, and procedure revenue codes on paid Medicaid claims. NC DMA also chose to include children who were "self-identified" by their parent at the time of Medicaid application, based on the responses to a questionnaire regarding the child's medical visits, medication and equipment use, and specialty care. DMA staff felt that the use of Title V services and eligibility categories alone (as specified in 42 CFR §438.50 of the 1932 Social Security Act) may not capture children with certain chronic medical conditions as having special health care needs. The special needs questionnaire was developed by the Foundation for

Accountability (FAACT) and tested and validated for use on the Consumer Assessment of Health Plans Survey (CAHPS) instrument.

The primary goal of this study was to assess the status of health care for children with special health care needs enrolled in NC Medicaid, with a special focus on administration and documentation of preventive services, health and developmental screening services, treatment planning, and coordinated care. Prevention, screening, treatment planning, and coordinated care facilitate improved health outcomes for children with special health care needs. The study was developed in context of the "medical home" concept that describes a primary care provider service approach that is characterized by accessibility, family-centeredness, continuity, comprehensiveness, coordination, compassion, and cultural effectiveness (see: North Carolina Statewide Medical Home Implementation Plan, Promise to the State[1]). It analyzes and reports on data abstracted from medical charts of a sample of children with special health care needs. The results of this study will be used as a source for baseline measurement and to develop future initiatives using "medical home" concepts to improve the care provided to children with special health care needs.

METHODS

Defining children with special health care needs

Determining how to identify children with special health care needs proved to be a difficult task. The Division of Medical Assistance's Quality Management section, the Medical Policy section, nurses, and lead persons in the Child Service Coordination (CSC), Children's Special Health Services (CSHS), and Children's Developmental Services Agency (CDSA, formerly known as Developmental Evaluation Center (DEC)) programs contributed significantly to a working definition of children with special health care needs for this project.

In a first step, children with special health care needs were defined using the following two strategies:

1. Children age 18 and younger receiving specific Title V services in North Carolina were considered for inclusion in the group with special health care needs. Title V services in North Carolina include Children's Special Health Services, Child Service Coordination Services, and services of Children's Developmental Services Agencies. Eligibility information for children receiving these services does not include an indicator for special health care needs. Key personnel of Children's Special Health Services, Child Service Coordination, and Children's Developmental Services Agencies were contacted and asked for their input on how to identify children with special health care needs. The selection process for children with special health care needs receiving Title V services was based on specific billing provider numbers, provider types, and provider specialties for the physicians serving children with special health care needs, as well as information from paid claims for services rendered to the identified children. In addition CPT codes used prior to HIPAA changes were included in the selection process.

2. Drawing from the Medicaid eligibility system information, children age 18 and younger with a special needs code indicating that they were either disabled, in foster care or in other out-of-home placement, receiving foster care or adoption assistance, or with other self-identified special needs were also included. (See Appendix, Table 1, for detailed information on selection criteria for this first step.)

Children selected by the approaches described above were included in the preliminary group of special health care needs children if they were enrolled in their system of care for a minimum of 11 out of 12 months in 2002, and if they were still enrolled in December 2002. These specifications define continuous enrollment according to HEDIS 2002 guidelines[2] (p. 30).

For this subgroup of children, a list of all diagnoses or supplementary classification codes (V-codes) listed on any claims for services rendered in 2002 was produced. All diagnostic fields were queried. Each child was counted only once for any specific diagnosis or V-code no matter how many claims were submitted with this code, but was counted once for each diagnosis or V-code listed on a claim. Using this list, 43 diagnoses or diagnostic categories and procedural codes recorded on claims in 2002 with considerable frequency were selected by a Quality Management section nurse with the expectation that they would more specifically identify children with special health care needs according to her professional knowledge. Children with one or more diagnoses or V-codes falling in any of the following 43 diagnostic categories and procedural codes on any of their claims in 2002 were included in the study; and again, all diagnostic fields were queried in order to select claims.

Table 1: Diagnostic Categories and V-Codes Used to Select Children with Special Health Care Needs

ICD-9-CM Code	Diagnostic Categories
042	Human Immunodeficiency Virus (HIV) Infection
250-250.93	Diabetes
281.0	Pernicious Anemia
282.6-282.69	Sickle Cell Anemia
286.0-286.3	Hemophilia
204.0-208.9	Leukemia
331.4	Obstructive Hydrocephalus
342.0-342.92	Hemiplegia and Hemiparesis
343-344.42	Cerebral Palsy
345-345.91	Epilepsy
348.3	Encephalopathy
348.1	Anoxic Brain Damage
359-359.2	Muscular Dystrophy
369-369.9	Blindness

Table continued on next page.

ICD-9-CM Code	Diagnostic Categories
377.75	Cortical Blindness
378.9	Disorder of Eye Movements
379.5-379.59	Nystagmus, etc.
389.1-389.9	Hearing Loss
428-428.9	Congestive Heart Failure
429.3	Cardiomegaly
436	Stroke
478.74	Stenosis of the Larynx
496	Chronic Airway Obstruction (excludes Asthma)
518.81	Acute Respiratory Failure
518.82	Other Pulmonary Insufficiency
536.4-536.49	Gastrostomy Complications
560.1	Paralytic Ileus
579.8	Other Specified Intestinal Malabsorption
593.70	Vesicoureteral Reflux
734	Flat Foot
737-737.39	Curvatures of the Spine
740-759	Congenital Anomalies
996-996.89	Complications Peculiar to Certain Procedures
V13.6-V13.69	Congenital Malformations
V15.1	Heart Surgery
V15.86	Lead Exposure
V21.3-V21.35-	Low Birth Weight
V45.2	Presence of C/S Drainage Device
V55-V55.9	Attention to Artificial Openings
V57-V57.9	Rehabilitation Procedures
V58.0	Radiotherapy
V58.1	Chemotherapy
V79.3	Developmental Handicaps

As a result, the population of Medicaid children with special health care needs in 2002 consisted of:

171 HMO children
9,696 CCNC/Carolina Access children
8,163 CCNC/Carolina Access II children
18,030 children total

Drawing the sample

For a chart review to be undertaken by Medical Review of North Carolina, Inc. (MRNC), the state contracted external quality review organization, a sample was selected from the population of 18,030 kids.

Due to specific characteristics of HMO shadow claims, service provider information is not readily available on encounter claims and had to be retrieved from the HMO directly. For this study, we included all the children with special health care needs managed by providers in the SouthCare network (63 of 171). United Healthcare, the second available HMO in Mecklenburg county in 2002, ceased operations during the study period, which made it impossible for us to retrieve the information for the children enrolled in United Healthcare (108 of the 171). Sixty-two of the children in the SouthCare sample were residents of Mecklenburg County, and one was a resident of Catawba County.

The sample for CCNC/Carolina Access and CCNC/Carolina Access II was created as follows:

Ten provider counties per system of care (CCNC/Carolina Access and CCNC/Carolina Access II) were randomly selected. Only counties with 20 or more children with special health care needs for the specific system of care in this county were included. If a county with less than 20 children was selected, we proceeded to the next random number identifying a county with 20 or more children with special health care needs. For CCNC/Carolina Access, the following counties were selected: Craven, Duplin, Durham, Granville, Iredell, Onslow, Person, Robeson, Rowan and Scotland County. For CCNC/Carolina Access II, Beaufort, Burke, Cleveland, Durham, Lenoir, Madison, Onslow, Robeson, Scotland, and Wilson Counties were chosen. The study objective was to review and analyze about 1,700 charts for CCNC/Carolina Access I and CCNC/Carolina Access II, in addition to all of the HMO charts (a total of about 1,800 chart reviews). This equaled 850 charts for CCNC/Carolina Access (of 1,072 total for the selected 10 counties), and 850 for CCNC/Carolina Access II (of 2,672 total), or 79% of the records in the selected counties for CCNC/Carolina Access, and 32% for CCNC/Carolina Access II. The percentage of children to be included in the chart reviews for each county was calculated by selecting 79 percent (CCNC/Carolina Access) and 32 percent (CCNC/Carolina Access II) of all the special health care needs children in each of the 10 counties. This assured that children in big and small counties had an equal opportunity to be selected.

Data abstraction

The Division of Medical Assistance's Quality Management and Medical Review of North Carolina's staffs developed a medical chart review abstraction tool (and accompanying data dictionary) to obtain and log information on the sample of children with special health care needs. Data was collected on demographics, medical record documentation standards, immunizations, Health Check visits, laboratory tests, and other medical, assessment, treatment, and referral services. (For more detail see the attached medical chart review abstraction tool in the Appendix Exhibit 1.) Nurses specifically trained for data abstraction visited the selected children's medical providers, and abstracted medical chart data under the guidance of MRNC, using the medical chart abstraction tool. The abstraction data were collected in an electronic data base, cleaned, and delivered to the State Center for Health Statistics for subsequent data analysis.

Data analysis

The children with special health care needs medical chart data were analyzed for all children with special health care needs, and by gender, race, system of care, and age group. Data for 6 - 24 month old children with special health care needs were compared to data obtained for children of the same age group included in the Health Check and Immunization Study,[5] published in 2002. Frequencies and percentages were presented in tables throughout the analysis section. The chi-square test was used to investigate if gender, race, system of care, or age group was associated with items like the administration of specific immunizations or the presence of Health Check visit components. The chi-square test of independence indicates the presence of a statistically significant relationship between, for example, system of care and immunization completeness for children with special health care needs. If a value was presented in a table under the column Statistical Significance Testing (Chi-Square), it meant that there was evidence that, for example, the immunization completeness for children with special health care needs varied significantly by system of care. The value shown in the table represents the p-value of the test statistic. The smaller this p-value, the more likely that the relationship observed is not due to chance. On one occasion, the Fisher's exact test was used in place of the chi-square test due to the occurrence of cells with expected frequencies of less than 5. For the chi-square test to be valid, the expected value for each table cell has to be 5 or higher. The results for the Fisher's exact test are interpreted similarly to the chi-square test results, as described above.

RESULTS

All children with special health care needs

Table 2: Total Number of Chart Reviews by Demographic Characteristics of the Children with Special Health Care Needs		
Demographic Characteristics	**Number**	**Percent**
Gender:		
Male	1,021	58.8
Female	715	41.2
Race:		
African-American	674	38.9
American Indian	124	7.2
Caucasian/White	539	31.1
Other	397	22.9
Age:		
0-4 years	572	33.0
5-9 years	434	25.0
10-14 years	514	29.6
15-18 years	216	12.4
System of Care:		
CCNC/Carolina Access	837	48.2
CCNC/Carolina Access II	860	49.5
SouthCare	39	2.3
Total	1,736	100.0

About 41% of children with special health care needs included in the study were female; and about 59% were male (see Table 2). Most children were African American (39%), followed by White (31%), other races (23%, includes Hispanic ethnicity), and American Indian (7%). A third of the children studied were 4 years and younger, and a quarter were 5-9 years old. About 30% were 10-14 years old, and about 12% were age 15-18 years. The age of the children referenced throughout the study was calculated as of December 31, 2002, the last day of the study period. Children linked to CCNC/Carolina Access and CCNC/Carolina Access II were represented in similar numbers in this study (48% and 50%). Only 2% of the children with special health care needs included in the chart review were linked to SouthCare.

Ninety-four to ninety-seven percent of children with special health care needs' charts indicated that medical record documentation standards were followed (see Table 3). Medical record documentation standards reviewed included dating of medical chart entries, identification of the author of entries, and the presence of patient identifiers on each page or electronic file. Baseline data such as the problem list, allergy information, and a medication list were present in 84%-93% of all charts reviewed. Preventive services such as immunizations were not documented as often as the baseline data: immunizations required by age 6 months were documented in approximately a quarter of the medical charts reviewed, and immunizations required by age 18 months were only documented for slightly fewer than 11% of the charts reviewed. Assessment of a complete immunization record is based on the Center for Disease Control's Advisory Committee on Immunization Practices' (ACIP) recommended 2002 Childhood Immunization Schedule,[3] published in the MMWR on January 18, 2002, extended by one month before and after each immunization window. Immunizations required for a complete immunization record by age 6 months were: hepatitis B 1 & 2, diphtheria/tetanus/pertussis 1, 2, & 3, haemophilius influenza B 1, 2, & 3, and inactivated poliovirus 1 & 2.

Table 3: Medical Record Components Documented in the Children with Special Health Care Needs Medical Charts		
Medical Record Components	**Number Yes**	**Percent Yes**
All entries dated?	1,678	97.1
All entries identified by author?	1,625	93.6
Each page/electronic file with patient identifier?	1,654	95.3
Problem list?	1,611	92.8
Complete Immunization Record -- Age >= 6 months	422	24.3
Complete Immunization Record -- Age >= 18 months	187	10.8
Allergy information?	1,620	93.3
Medication list?	1,456	83.9
Treatment plan?	1,170	67.4
Formalized Treatment Plan?	76	6.5
Referrals and follow-up	589	33.9

Immunizations required for a complete immunization record by age 18 months were: hepatitis B 1, 2, & 3, diphtheria/tetanus/pertussis 1, 2, 3, & 4, haemophilius influenza B 1, 2, 3, & 4, inactivated poliovirus 1, 2, & 3, mumps/measles/rubella 1, and varicella 1. Continuation and coordination of care as evidenced by referrals and referral follow-up was documented for about a third of the charts reviewed. A treatment plan including diagnosis, plan for treatment or action plan, and evaluation of planned actions was present in more than two thirds of the charts reviewed. A formalized treatment plan that additionally listed patient and parent/guardian and emergency contact information was found in only 7% of the charts reviewed.

Table 4: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs		
Immunizations/Lab Tests	**Number Yes**	**Percent Yes**
Hepatitis B vaccine	588	33.9
Diphteria/Tetanus/Pertussis vaccine	277	16.0
Tetanus/Diphtheria vaccine	1359	78.3
Haemophilius Influenza B vaccine	243	14.0
Inactivated Poliovirus vaccine	423	24.4
Mumps/Measles/Rubella vaccine	449	25.9
Varicella vaccine	540	31.1
Pneumococcal conjugate vaccine	32	1.8
Hemoglobin/Hematocrit	360	20.7
Urinalysis	133	7.7
Lead Screening	161	9.3
Sickle Cell Testing	332	19.1

(Based on ACIP's and Health Check Recommendations for 2002)

Immunizations were evaluated based on the Center for Disease Control's Advisory Committee on Immunization Practices' (ACIP) recommended 2002 Childhood Immunization Schedule.[3] The medical chart abstraction documented that children with special health care needs received the most important recommended vaccinations according to the immunization schedule in the range of 14%-34% (see Table 4). These vaccinations included hepatitis B, diphtheria/tetanus/pertussis, haemophilius influenza B, inactivated poliovirus, mumps/measles/rubella and varicella. The percentage of children with tetanus/diphtheria given as recommended is at 78% due to the fact that most children in the study were not old enough to have had the vaccination and, therefore, should not be counted as "No". Administration of the pneumococcal conjugate was very low with only 2% of the charts reflecting vaccinations according to the schedule. Lab tests were evaluated based on Health Check screening

recommendations published in Health Check Billing Guide 2002, Special Bulletin III, July 2002.[4] Lab tests like hemoglobin/hematocrit and sickle cell testing were administered as recommended for around 20% of the children, and urinalysis and lead screening for less than 10% of the children. (Please see Appendix Table 2, for more details on procedures used to check immunization and lab test compliance.)

Table 5: Immunizations/Lab Tests Administered as Required Using an *Extended* Schedule

Immunizations/Lab Tests	Number Yes	Percent Yes
Hepatitis B vaccine	631	36.4
Diphtheria/Tetanus/Pertussis vaccine	616	35.5
Tetanus/Diphtheria vaccine	1367	78.7
Haemophilius Influenza B vaccine	518	29.8
Inactivated Poliovirus vaccine	743	42.8
Mumps/Measles/Rubella vaccine	546	31.5
Varicella vaccine	564	32.5
Pneumococcal conjugate vaccine	50	2.9
Hemoglobin/Hematocrit	472	27.2
Urinalysis	223	12.9
Lead Screening	171	9.9
Sickle Cell Testing	332	19.1

(Based on ACIP's and Health Check Recommendations for 2002, Extended by 2 Months)

Next, the age ranges for immunization and lab tests were extended to include one additional month before and after the recommendations of ACIP's immunization schedule and the Health Check screening lab test schedule to accommodate for scheduling conflicts or sickness of the child. The percentages increased to 30% - 43% of the children with special health care needs receiving the most important recommended vaccinations (see Table 5) including hepatitis B, diphtheria/tetanus/pertussis, haemophilius influenza B, inactivated poliovirus, mumps/measles/rubella and varicella. For the lab tests, hemoglobin/hematocrit compliance increased to 27% and urinalysis to 13%. The percentages for tetanus/diphtheria administration and lead screening changed only slightly. (Please see Appendix Table 3, for more details on procedures used to check immunization and lab test compliance using an extended schedule.)

Health Check screenings or well child visits are preventive visits reimbursed by Medicaid and are recommended at specific ages: within the first month of life, at 2, 4, 6, 9 or 15, 12, and 18 months, and at 2, 3, 4, and 5 years of age. From age 6 to age 20, Health Check visits are recommended every three years. The required Health Check visit components are to be assessed at each visit and are to be documented in the medical record to qualify for Medicaid reimbursement. For the medical record abstraction aspect of this study, an office visit was considered a Health Check visit if the visit was recorded on a pre-printed routine exam form, or if the reason for the visit stated was well child or Health Check visit, routine exam/routine physical, annual exam, school physical, or sports physical. Table 6 shows which components of a

Table 6: 2002 Health Check Visit Components Documented in the Children with Special Health Care Needs Medical Charts		
Health Check Visit Components	**Number Yes**	**Percent Yes**
Visits by same provider?	797	90.5
Visit date in 2002	884	100.0
Temperature	453	51.3
Pulse	353	40.0
Respirations	240	27.2
Blood Pressure[1]	494	81.8
Head circumference[2]	168	80.0
Height	822	93.1
Weight	869	98.3
Nutrition/Appetite	503	57.9
Subjective eyes/vision screening[2]	68	32.2
Objective eye/vision screening	259	29.3
Subjective ear/hearing screening[3]	115	31.4
Objective ear/hearing screening	227	25.7
Nose/Mouth	821	93.0
Skin	729	82.7
Heart	842	95.4
Lungs	839	95.0
Abdomen	820	92.9
Hips	456	51.6
Neurological status/Tone	686	78.3
Gastrointestinal status	481	54.5
Genitourinary status	664	75.2
Tobacco	152	17.2
Alcohol	92	10.4
Substance Abuse	97	11.0
Sexuality Issues	109	12.3
Past medical history	676	76.6
Anticipatory guidance	134	15.2
Written Developmental Assessment?[4]	70	25.2

Legend:
1: Only assessed for children ages 3 years and older.
2: Only assessed for children ages 0-24 months.
3: Only assessed for children 2 days - 3 years old.
4: Assessment required by age 12 months, 24 months, and 60 months.

Health Check visit were assessed and documented during children with special health care needs' most recent Health Check visit in 2002. Assessment and documentation of a component does not imply that there has been a problem with this particular item, only that the provider assessed the status of the child for this component, as required. For their most recent Health Check visit in 2002, nine out of ten children with special health care needs had weight, heart, lungs, height, nose/mouth, and abdomen assessments documented in their medical charts. Subjective ear/hearing screenings, subjective eye/vision screenings, objective eye/vision screenings, respirations, and objective ear/hearing screenings, on the other hand, were documented in every third or fourth chart only. At Health Check visits, it is standard practice to assess a child's tobacco use or exposure, substance use or exposure, and alcohol use or exposure beginning with prenatal visits, and sexuality issues starting at age 15 months through age 21 years. Issues ranging from exposure to use or abuse are included in the review of these risk assessment components. The item "sexuality issues" covers sexual behaviors of the child as well as child abuse. Tobacco, anticipatory guidance, sexuality issues, substance abuse, and alcohol assessments were least likely to be documented in the children with special health care needs charts: only around 10%-17% of the medical charts reviewed noted a review of these issues. A written developmental

assessment is required by age 12 months, and again by age 2 years, and 5 years for each child. For this study, any written developmental assessment for a child with special health care needs in calendar year 2004 was included if it indicated that the child had an assessment at age 6-30 months or 60-90 months. Twenty-five percent of the charts of the children in the appropriate age range with a Health Check visit in 2004 had a written developmental assessment documented.

Results by Gender

Table 7: Chart Reviews by Demographic Characteristics of the Children with Special Health Care Needs, by Gender

Demographic Characteristics	Female		Male	
	Number	Percent	Number	Percent
Race:				
African-American	269	37.7	405	39.7
American Indian	55	7.7	69	6.8
Caucasian/White	240	33.6	299	29.3
Other	150	21.0	247	24.2
Age:				
0-4 years	238	33.3	334	32.7
5-9 years	158	22.1	276	27.0
10-14 years	214	29.9	300	29.4
15-18 years	105	14.7	111	10.9
System of Care:				
CCNC/Carolina Access	353	49.4	484	47.4
CCNC/Carolina Access II	342	47.8	518	50.7
SouthCare	20	2.8	19	1.9
Total	715	100.0	1,021	100.0

The distribution of male and female children with special health care needs across categories of race, age, and system of care was very similar (Table 7).

Table 8: Medical Record Components Documented in the Children with Special Health Care Needs' Medical Charts, by Gender					
Medical Record Components	Female		Male		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	
All entries dated?	690	96.9	988	97.2	
All entries identified by author?	674	94.3	951	93.1	
Each page/electronic file with patient identifier?	680	95.1	974	95.4	
Problem list?	665	93.0	946	92.7	
Complete Immunization Record -- Age >= 6 months	168	23.5	254	24.9	
Complete Immunization Record -- Age >= 18 months	75	10.5	112	11.0	
Allergy information?	679	95.0	941	92.2	0.0215
Medication list?	596	83.4	860	84.2	
Treatment plan?	478	66.9	692	67.8	
Formalized Treatment Plan?	32	6.7	44	6.4	
Referrals and follow-up	244	34.1	345	33.8	

Generally, medical record components (such as dating of entries, identification of author or patient, and preventive services) were documented in a similar fashion for male and female children with special health care needs (Table 8). Presence or absence of allergies, however, was significantly more likely to be documented for female than for male children.

Table 9: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs, by Gender					
Immunizations/Lab Tests	Female		Male		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	
Hepatitis B vaccine	227	31.8	361	35.4	
Diphtheria/Tetanus/Pertussis vaccine	109	15.2	168	16.5	
Tetanus/Diphtheria vaccine	543	75.9	816	79.9	0.0479
Haemophilius Influenza B vaccine	92	12.9	151	14.8	
Inactivated Poliovirus vaccine	162	22.7	261	25.6	
Mumps/Measles/Rubella vaccine	176	24.6	273	26.7	
Varicella vaccine	219	30.6	321	31.4	
Pneumococcal conjugate vaccine	11	1.5	21	2.1	
Hemoglobin/Hematocrit	126	17.6	234	22.9	0.0074
Urinalysis	49	6.9	84	8.2	
Lead Screening	73	10.2	88	8.6	
Sickle Cell Testing	123	17.2	209	20.5	

(Based on ACIP's and Health Check Recommendations for 2002)

Table 9 shows that tetanus/diphtheria and hemoglobin/hematocrit administration varied significantly by gender. The administration of all other immunizations and lab tests was very similar for both male and female children with special health care needs.

Table 10: Immunizations/Lab Tests Administered as Required Using an *Extended* Schedule, by Gender

Immunizations/Lab Tests	Female		Male		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	
Hepatitis B vaccine	243	34.0	388	38.0	
Diphtheria/Tetanus/Pertussis vaccine	244	34.1	372	36.4	
Tetanus/Diphtheria vaccine	545	76.2	822	80.5	0.0317
Haemophilius Influenza B vaccine	199	27.8	319	31.2	
Inactivated Poliovirus vaccine	293	41.0	450	44.1	
Mumps/Measles/Rubella vaccine	208	29.1	338	33.1	
Varicella vaccine	229	32.0	335	32.8	
Pneumococcal conjugate vaccine	19	2.7	31	3.0	
Hemoglobin/Hematocrit	179	25.0	293	28.7	
Urinalysis	87	12.2	136	13.3	
Lead Screening	75	10.5	96	9.4	
Sickle Cell Testing	123	17.2	209	20.5	

(Based on ACIP's and Health Check Recommendations for 2002, Extended by 2 Months)

Using an extended immunization and lab test schedule to include one additional month before and after the recommended time frames, the numbers and percentages increased for almost all of the vaccinations and lab tests studied (Table 10). Again, tetanus/diphtheria administration varied significantly by gender.

Table 11: 2002 Health Check Visit Components Documented in the Children with Special Health Care Needs' Medical Charts, by Gender					
Health Check Visit Components	Female		Male		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	
Visits by same provider?	327	88.6	470	91.8	
Visit date in 2002	370	100.0	514	100.0	
Temperature	190	51.4	263	51.3	
Pulse	147	39.7	206	40.2	
Respirations	107	28.9	133	25.9	
Blood pressure[1]	204	84.0	290	80.3	
Head circumference[2]	78	81.3	90	79.0	
Height	345	93.2	477	93.0	
Weight	366	98.9	503	97.9	
Nutrition/Appetite	212	58.6	291	57.4	
Subjective eyes/vision screening[2]	30	30.9	38	33.3	
Objective eye/vision screening	110	29.7	149	29.0	
Subjective ear/hearing screening[3]	53	34.0	62	29.5	
Objective ear/hearing screening	91	24.6	136	26.5	
Nose/Mouth	344	93.0	477	93.0	
Skin	304	82.2	425	83.0	
Heart	356	96.2	486	94.7	
Lungs	352	95.1	487	94.9	
Abdomen	344	93.0	476	92.8	
Hips	189	51.1	267	52.1	
Neurological status/Tone	282	77.1	404	79.2	
Gastrointestinal status	212	57.5	269	52.4	
Genitourinary status	276	74.6	388	75.6	
Tobacco	75	20.3	77	15.0	0.0424
Alcohol	48	13.0	44	8.6	0.0358
Substance Abuse	51	13.8	46	9.0	0.0239
Sexuality Issues	61	16.5	48	9.4	0.0015
Past medical history	285	77.0	391	76.2	
Anticipatory guidance	64	17.3	70	13.7	
Written Developmental Assessment?[4]	33	25.0	37	25.3	

Legend: 1: Only assessed for children ages 3 years and older.
2: Only assessed for children ages 0-24 months.
3: Only assessed for children 2 days - 3 years old.
4: Assessment required by age 12 months, 24 months, and 60 months.

Health Check visit components were documented similarly for both male and female children with special health care needs with the exception of the components related to tobacco use and

exposure, alcohol use and exposure, substance use or abuse and exposure, and sexuality issues (see Table 11). These assessments were significantly more likely to be documented for female than for male children with special health care needs.

Results by Race

Table 12: Chart Reviews by Demographic Characteristics of the Children with Special Health Care Needs, by Race								
Demographic Characteristics	**African-American**		**American Indian**		**Caucasian/White**		**Other**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Gender:								
Males	405	60.1	69	55.7	299	55.5	247	62.2
Females	269	39.9	55	44.4	240	44.5	150	37.8
Age:								
0-4 years	243	36.1	37	29.8	154	28.6	136	34.3
5-9 years	140	20.8	26	21.0	128	23.8	140	35.3
10-14 years	199	29.5	39	31.5	169	31.4	107	27.0
15-18 years	92	13.7	22	17.7	88	16.3	14	3.5
System of Care:								
CCNC/Carolina Access	325	48.2	51	41.1	278	51.6	183	46.1
CCNC/Carolina Access II	333	49.4	72	58.1	258	47.9	197	49.6
SouthCare	16	2.4	1	0.8	3	0.6	17	4.3
Total	674	100.0	124	100.0	539	100.0	397	100.0

More than two thirds of all children of other races were 9 years old or younger, compared to about half of the children of African American, American Indian, and Caucasian/White races (Table 12). Of the children with special health care needs, approximately half of the African American children, Caucasian/White children, and children of other races were enrolled with CCNC/Carolina Access I, and the other half was enrolled with CCNC/Carolina Access II. About 3 out of 5 children of American Indian race were enrolled with CCNC/Carolina Access II, and 2 out of 5 were enrolled with CCNC/Carolina Access.

Table 13: Medical Record Components Documented in the Children with Special Health Care Needs Medical Charts, by Race									
Medical Record Components	African-American		American Indian		Caucasian/White		Other		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	
All entries dated?	643	96.0	116	94.3	528	98.1	389	98.5	0.0107
All entries identified by author?	627	93.0	115	92.7	510	94.6	371	93.5	
Each page/electronic file with patient identifier?	648	96.1	116	93.6	516	95.7	372	93.7	
Problem list?	620	92.0	117	94.4	501	93.0	372	93.7	
Complete Immunization Record -- Age >= 6 months	153	22.7	27	21.8	131	24.3	110	27.7	
Complete Immunization Record -- Age >= 18 months	73	10.8	9	7.3	53	9.8	52	13.1	
Allergy information?	625	92.7	118	95.2	513	95.2	362	91.2	
Medication list?	554	82.2	115	92.7	474	87.9	313	78.8	<0.0001
Treatment plan?	454	67.4	114	91.9	375	69.6	226	56.9	<0.0001
Formalized Treatment Plan?	34	7.5	0	0.0	27	7.2	15	6.6	0.0298
Referrals and follow-up	223	33.1	55	44.4	198	36.7	112	28.2	0.003

Five of the 11 medical chart components varied significantly by race (see Table 13). For most items, the percent documented for American Indian children were on one side of the spectrum, and the percent documented for children of other races were on the other. American Indian children with special health care needs had the highest percentage of charts that included a medication list, a treatment plan, and had referrals and follow-up documented. They were found to have the lowest percentage of charts with a formalized treatment plan.

Table 14: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs, by Race									
Immunizations/Lab Tests	African-American		American Indian		Caucasian/White		Other		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	
Hepatitis B vaccine	228	33.8	42	33.9	171	31.7	146	36.8	
Diphtheria/Tetanus/Pertussis vaccine	107	15.9	19	15.3	96	17.8	53	13.4	
Tetanus/Diphtheria vaccine	521	77.3	88	71.0	392	72.7	356	89.7	<0.0001
Haemophilius Influenza B vaccine	89	13.2	15	12.1	76	14.1	61	15.4	
Inactivated Poliovirus vaccine	164	24.3	28	22.6	134	24.9	95	23.9	
Mumps/Measles/Rubella vaccine	165	24.5	29	23.4	124	23.0	131	33.0	0.0031
Varicella vaccine	221	32.8	33	26.6	138	25.6	146	36.8	0.0013
Pneumococcal conjugate vaccine	12	1.8	6	4.8	8	1.5	5	1.3	
Hemoglobin/Hematocrit	159	23.6	30	24.2	91	16.9	80	20.2	0.0269
Urinalysis	54	8.0	1	0.8	55	10.2	23	5.8	0.0016
Lead Screening	58	8.6	15	12.1	44	8.2	43	10.8	
Sickle Cell Testing	153	22.7	15	12.1	74	13.7	90	22.7	<0.0001

(Based on ACIP's and Health Check Recommendations for 2002)

Administration of three immunizations and three lab tests varied significantly by race for the children with special health care needs studied (Table 14). Tetanus/diphtheria, mumps/measles/rubella, and varicella immunization compliance differed by race, with Caucasian/White and American Indian children having the lowest percentage of immunizations against mumps/measles/rubella and varicella at the recommended age, and children of other races having the highest percentage immunized against these diseases. Hemoglobin/hematocrit, urinalysis, and sickle cell testing also differed significantly by race.

Table 15: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs, Using an *Extended* Schedule, by Race									
Immunizations/Lab Tests	**African-American**		**American Indian**		**Caucasian/White**		**Other**		**Statistical Significance Testing (Chi-Square)**
	Number Yes	**Percent Yes**	**Number Yes**	**Percent Yes**	**Number Yes**	**Percent Yes**	**Number Yes**	**Percent Yes**	
Hepatitis B vaccine	241	35.8	44	35.5	185	34.3	160	40.3	
Diphtheria/Tetanus/Pertussis vaccine	235	34.9	39	31.5	191	35.4	149	37.5	
Tetanus/Diphtheria vaccine	523	77.6	88	71.0	396	73.5	358	90.2	<0.0001
Haemophilius Influenza B vaccine	197	29.2	34	27.4	150	27.8	135	34.0	
Inactivated Poliovirus vaccine	294	43.6	46	37.1	218	40.5	183	46.1	
Mumps/Measles/Rubella vaccine	192	28.5	37	29.8	164	30.4	153	38.5	0.0061
Varicella vaccine	229	34.0	35	28.2	142	26.4	156	39.3	0.0002
Pneumococcal conjugate vaccine	17	2.5	8	6.5	14	2.6	10	2.5	
Hemoglobin/Hematocrit	196	29.1	40	32.3	141	26.2	95	23.9	
Urinalysis	80	11.9	12	9.7	77	14.3	54	13.6	
Lead Screening	66	9.8	13	10.5	45	8.4	47	11.8	
Sickle Cell Testing	153	22.7	15	12.1	74	13.7	90	22.7	<0.0001

(Based on ACIP's and Health Check Recommendations for 2002, Extended by 2 Months)

Using an extended immunization and lab test schedule to include one additional month before and after the recommended time frames, more immunizations and lab tests qualified for administered as required (Table 15). Using the extended schedule, tetanus/diphtheria, mumps/measles/rubella, and varicella immunization administration, and sickle cell testing varied significantly by race. Children of other races tended to have the highest compliance.

Table 16: 2002 Health Check Visit Components Documented in the Children with Special Health Care Needs' Medical Charts, by Race									
Health Check Visit Components	African-American		American Indian		Caucasian/White		Other		Statistical Significance Testing (Chi-Square)
	# Yes	% Yes	# Yes	% Yes	# Yes	% Yes	# Yes	% Yes	
Visits by same provider?	327	91.3	51	91.1	238	92.3	179	86.5	
Visit date in 2002	360	100.0	56	100.0	259	100.0	207	100.0	
Temperature	190	52.8	38	67.9	135	52.1	90	43.7	0.0102
Pulse	149	41.4	44	78.6	92	35.5	68	33.0	<0.0001
Respirations	95	26.4	34	60.7	66	25.5	45	21.8	<0.0001
Blood pressure[1]	192	83.5	29	80.6	160	84.7	113	75.8	
Head circumference[2]	75	82.4	13	81.3	39	69.6	39	86.7	
Height	337	93.6	50	89.3	235	90.7	198	96.1	
Weight	351	97.5	55	98.2	255	98.5	206	99.5	
Nutrition/Appetite	215	61.3	26	47.3	145	56.4	116	56.9	
Subjective eyes/vision screening[2]	29	31.9	2	12.5	24	42.9	13	28.3	
Objective eye/vision screening	119	33.1	12	21.4	74	28.6	54	26.2	
Subjective ear/hearing screening[3]	56	33.3	3	11.1	40	44.4	16	20.3	0.0007
Objective ear/hearing screening	99	27.5	10	17.9	65	25.1	53	25.7	
Nose/Mouth	333	92.5	55	98.2	238	91.9	193	93.7	
Skin	305	85.0	46	82.1	216	83.4	160	77.7	
Heart	342	95.0	55	98.2	246	95.0	197	95.6	
Lungs	341	94.7	56	100.0	245	94.6	195	94.7	
Abdomen	337	93.6	56	100.0	232	89.6	193	93.7	0.0289
Hips	175	48.6	24	42.9	137	52.9	120	58.3	
Neurological status/Tone	286	80.1	43	79.6	208	80.6	147	71.7	
Gastrointestinal status	202	56.3	44	78.6	140	54.1	95	46.1	0.0002
Genitourinary status	272	75.6	40	71.4	197	76.1	155	75.2	
Tobacco	61	17.0	10	17.9	60	23.2	20	9.7	0.0021
Alcohol	37	10.3	3	5.4	41	15.8	11	5.3	0.0016
Substance Abuse	43	11.9	3	5.4	42	16.2	9	4.4	0.0003
Sexuality Issues	46	12.8	4	7.1	46	17.8	13	6.3	0.0015
Past medical history	281	78.1	41	73.2	185	71.4	168	81.6	
Anticipatory guidance	70	19.4	20	35.7	22	8.5	22	10.7	<0.0001
Written Developmental Assessment?[4]	35	34.3	8	40.0	17	21.8	10	13.2	0.0045

Legend:
1: Only assessed for children ages 3 years and older.
2: Only assessed for children ages 0-24 months.
3: Only assessed for children 2 days - 3 years old.
4: Assessment required by age 12 months, 24 months, and 60 months.

Twelve of the 30 Health Check visit components studied varied significantly by race (see Table 16). For most components, children with special health care needs of other races were most likely to have the lowest percentages of the components documented, and American Indian and Caucasian/White children were likely to have the highest percentages of the Health Check visit components documented. Among the items that differed significantly were standard procedures such as the evaluation of vital signs (temperature, pulse, and respirations) as well as risk assessments such as tobacco, alcohol, and substance (ab)use and exposure, and sexuality issues, and written developmental assessments. Written developmental assessments were most likely to be documented for children of American Indian race (40%). Documentation of written developmental assessments was less likely for children of African American (34.3%), Caucasian/White (21.8%), or other race (13.2%).

Results by System of Care

Table 17: Chart Reviews by Demographic Characteristics of the Children with Special Health Care Needs, by System of Care

Demographic Characteristics	CCNC/Carolina Access		CCNC/Carolina Access II		SouthCare	
	Number	Percent	Number	Percent	Number	Percent
Gender:						
Male	484	57.8	518	60.2	19	48.7
Female	353	42.2	342	39.8	20	51.3
Race:						
African-American	325	38.8	333	38.7	16	43.2
American Indian	51	6.1	72	8.4	1	2.7
Caucasian/White	278	33.2	258	30.0	3	8.1
Other	183	21.9	197	22.9	17	46.0
Age:						
0-4 years	245	29.3	314	36.5	13	33.3
5-9 years	192	22.9	232	27.0	10	25.6
10-14 years	259	30.9	244	28.4	11	28.2
15-18 years	141	16.9	70	8.1	5	12.8
Total	837	100.0	860	100.0	39	100.0

For children with special health care needs enrolled in CCNC/Carolina Access and CCNC/Carolina Access II, the ratio of males to females was about 3:2 and for SouthCare, the ratio was approximately 1:1 (Table 17). For CCNC/Carolina Access and CCNC/Carolina Access II, the highest percentage of children with special health care needs were African American. Children associated with SouthCare were most likely to be of other race, followed by African American.

Fifty-two percent (CCNC/Carolina Access) to 64% (CCNC/Carolina Access II) of the children with special health care needs were younger than 10 years old.

Table 18: Medical Record Components Documented in the Children with Special Health Care Needs' Medical Charts, by System of Care

Medical Record Components	CCNC/Carolina Access		CCNC/Carolina Access II		SouthCare		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	
All entries dated?	814	97.7	825	96.4	39	100.0	
All entries identified by author?	781	93.3	809	94.1	35	89.7	
Each page/electronic file with patient identifier?	795	95.0	822	95.6	37	94.9	
Problem list?	798	95.3	776	90.2	37	94.9	0.0002
Complete Immunization Record -- Age >= 6 months	175	20.9	238	27.7	9	23.1	0.0050
Complete Immunization Record -- Age >= 18 months	76	9.1	108	12.6	3	7.7	
Allergy information?	773	92.4	809	94.1	38	97.4	
Medication list?	752	89.8	676	78.6	28	71.8	<0.0001
Treatment plan?	602	71.9	531	61.7	37	94.9	<0.0001
Formalized Treatment Plan?	53	8.8	23	4.3	0	0.0	0.0025
Referrals and follow-up	260	31.1	309	35.9	20	51.3	0.0073

Six of the 11 medical record components studied varied significantly for the different systems of care (Table 18). Children enrolled with CCNC/Carolina Access II providers were most likely to have a complete immunization record for immunizations required at age 6 months whereas children enrolled with CCNC/Carolina Access providers were most likely to have a problem list and a medication list in their charts. Very few charts included a formalized treatment plan. Children linked to CCNC/Carolina Access I providers were the most likely to have a formalized treatment plan (8.8%). Children enrolled with SouthCare were most likely to have a (non-formalized) treatment plan and documentation of referrals and follow-up.

Table 19: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs, by System of Care							
Immunizations/Lab Tests Given	CCNC/Carolina Access		CCNC/Carolina Access II		SouthCare		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	
Hepatitis B vaccine	235	28.1	341	39.7	12	30.8	<0.0001
Diphtheria/Tetanus/ Pertussis vaccine	114	13.6	157	18.3	6	15.4	0.0333
Tetanus/Diphtheria vaccine	603	72.0	725	84.3	31	79.5	<0.0001
Haemophilius Influenza B vaccine	109	13.0	129	15.0	5	12.8	
Inactivated Poliovirus vaccine	173	20.7	240	27.9	10	25.6	0.0024
Mumps/Measles/ Rubella vaccine	175	20.9	263	30.6	11	28.2	<0.0001
Varicella vaccine	198	23.7	328	38.1	14	35.9	<0.0001
Pneumococcal conjugate vaccine	12	1.4	19	2.2	1	2.6	
Hemoglobin/ Hematocrit	105	12.5	252	29.3	3	7.7	<0.0001
Urinalysis	40	4.8	92	10.7	1	2.6	<0.0001
Lead Screening	69	8.2	87	10.1	5	12.8	
Sickle Cell Testing	89	10.6	237	27.6	6	15.4	<0.0001

(Based on ACIP's and Health Check Recommendations for 2002)

For the children with special health care needs, administration of hepatitis B, diphtheria/tetanus/pertussis, tetanus/diphtheria, inactivated poliovirus, mumps/measles/ rubella, and varicella immunizations as well as hemoglobin/hematocrit, urinalysis, and sickle cell testing varied significantly by system of care. Children enrolled with CCNC/Carolina Access had a lower percentage of vaccinations and lab tests administered whereas children enrolled with CCNC/Carolina Access II had a higher percentage of vaccinations and lab tests administered during the recommended age ranges.

Table 20: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs, Using an *Extended* Schedule, by System of Care							
Immunizations/ Lab Tests Given	**CCNC/Carolina Access**		**CCNC/Carolina Access II**		**SouthCare**		**Statistical Significance Testing (Chi-Square)**
	Number Yes	**Percent Yes**	**Number Yes**	**Percent Yes**	**Number Yes**	**Percent Yes**	
Hepatitis B vaccine	249	29.8	369	42.9	13	33.3	<0.0001
Diphtheria/Tetanus/ Pertussis vaccine	250	29.9	352	40.9	14	35.9	<0.0001
Tetanus/Diphtheria vaccine	606	72.4	730	84.9	31	79.5	<0.0001
Haemophilius Influenza B vaccine	216	25.8	290	33.7	12	30.8	0.0017
Inactivated Poliovirus vaccine	301	36.0	423	49.2	19	48.7	<0.0001
Mumps/Measles/ Rubella vaccine	211	25.2	323	37.6	12	30.8	<0.0001
Varicella vaccine	210	25.1	340	39.5	14	35.9	<0.0001
Pneumococcal conjugate vaccine	20	2.4	29	3.4	1	2.6	
Hemoglobin/ Hematocrit	128	15.3	340	39.5	4	10.3	<0.0001
Urinalysis	77	9.2	142	16.5	4	10.3	<0.0001
Lead Screening	74	8.8	92	10.7	5	12.8	
Sickle Cell Testing	89	10.6	237	27.6	6	15.4	<0.0001

(Based on ACIP's and Health Check Recommendations for 2002, Extended by 2 Months)

Using an extended immunization schedule, 7 out of 8 vaccinations varied significantly by system of care (see Table 20). Haemophilius influenza B administration was found to differ significantly in addition to hepatitis B, diphtheria/tetanus/pertussis, tetanus/diphtheria, inactivated poliovirus, mumps/measles/ rubella, and varicella. Similar to when the regular Health Check schedule was applied, three out of the four lab tests varied significantly by system of care using an extended Health Check schedule. In every case, CCNC/Carolina Access II had the highest rate of compliance.

Table 21: 2002 Health Check Visit Components Documented in the Children with Special Health Care Needs' Medical Charts, by System of Care							
Health Check Visit Components	CCNC/Carolina Access		CCNC/Carolina Access II		SouthCare		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	
Visits by same provider?	363	91.4	415	89.6	19	90.5	
Visit date in 2002	397	100.0	466	100.0	21	100.0	
Temperature	282	71.2	158	33.9	13	61.9	<0.0001
Pulse	176	44.4	161	34.6	16	76.2	<0.0001
Respirations	148	37.4	76	16.3	16	76.2	<0.0001
Blood pressure[1]	220	79.1	263	83.5	11	100.0	
Head circumference[2]	69	83.1	92	76.7	7	100.0	
Height	356	89.9	445	95.5	21	100.0	0.0025
Weight	391	98.5	457	98.1	21	100.0	
Nutrition/Appetite	187	48.6	307	66.3	9	42.9	<0.0001
Subjective eyes/vision screening[2]	30	35.7	38	31.7	0	0.0	
Objective eye/vision screening	110	27.8	147	31.6	2	9.5	
Subjective ear/ hearing screening[3]	49	31.6	65	32.5	1	9.1	
Objective ear/hearing screening	70	17.7	156	33.5	1	4.8	<0.0001
Nose/Mouth	362	91.4	439	94.2	20	95.2	
Skin	314	79.5	394	84.6	21	100.0	0.0156
Heart	372	93.9	449	96.4	21	100.0	
Lungs	370	93.4	448	96.1	21	100.0	
Abdomen	361	91.2	438	94.0	21	100.0	
Hips	159	40.2	289	62.0	8	38.1	<0.0001
Neurological status/Tone	277	70.8	394	84.9	15	71.4	<0.0001
Gastrointestinal status	237	60.0	241	51.7	3	14.3	<0.0001
Genitourinary status	284	71.7	376	80.7	4	19.1	<0.0001
Tobacco	88	22.3	61	13.1	3	14.3	0.0017
Alcohol	48	12.2	42	9.0	2	9.5	
Substance Abuse	51	12.9	43	9.2	3	14.3	
Sexuality Issues	61	15.4	47	10.1	1	4.8	0.0344
Past medical history	321	81.1	336	72.1	19	90.5	0.0026
Anticipatory guidance	84	21.2	48	10.3	2	9.5	<0.0001
Written Developmen-tal Assessment?[4]	22	18.2	47	31.5	1	12.5	0.0297

Legend: 1: Only assessed for children ages 3 years and older.
2: Only assessed for children ages 0-24 months.
3: Only assessed for children 2 days - 3 years old.
4: Assessment required by age 12 months, 24 months, and 60 months.

Table 21 shows that 16 of the 30 Health Check visit components studied varied significantly by system of care. There was no consistent pattern as to which system of care had the higher rate of compliance. Standard procedures such as vital sign checks including temperature, pulse, and respiration varied significantly as well as documentation of height and evaluations of nutrition/appetite, objective ear/hearing, skin, hips, neurological status/tone, gastrointestinal and genitourinary status. Tobacco use and exposure, sexuality issues, past medical history, anticipatory guidance, and written developmental assessments differed significantly by system of care as well. CCNC/Carolina Access II had the highest percentage of written developmental assessments documented (31.5%), followed by CCNC/Carolina Access I (18.2%) and SouthCare (12.5%). As was mentioned earlier, an assessment documented for tobacco use and exposure, and sexuality issues, or documentation of past medical history, anticipatory guidance, and developmental assessments does not imply that the child assessed had any problems in any of the areas; it simply shows that the provider carried out and documented the required assessments.

Results by Age Group

Table 22: Chart Reviews by Demographic Characteristics of the Children with Special Health Care Needs, by Age Group

Demographic Characteristics	0 - 4 Years		5 - 9 Years		10 - 14 Years		15 - 18 Years	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Gender:								
Males	334	58.4	276	63.6	300	58.4	111	51.4
Females	238	41.6	158	36.4	214	41.6	105	48.6
Race:								
African-American	243	42.6	140	32.3	199	38.7	92	42.6
American Indian	37	6.5	26	6.0	39	7.6	22	10.2
Caucasian/White	154	27.0	128	29.5	169	32.9	88	40.7
Other	136	23.9	140	32.3	107	20.8	14	6.5
System of Care:								
CCNC/Carolina Access	245	42.8	192	44.2	259	50.4	141	65.3
CCNC/Carolina Access II	314	54.9	232	53.5	244	47.5	70	32.4
SouthCare	13	2.3	10	2.3	11	2.1	5	2.3
Total	572	100.0	434	100.0	514	100.0	216	100.0

Of the children with special health care needs included in the sample, 59% were male, and 41% were female. Table 22 shows that for the 15-18 year old age group, the ratio was more equal: for these, the ratio between males and females was almost 1:1 (51% versus 49%). Children ages 15-18 and 10-14 years were most likely to be of African-American or Caucasian/White race

while children ages 5-9 years were most likely to be either of African-American, Caucasian/White or of other race. In comparison, children ages 0-4 years were most likely to be of African-American race. Older children were more likely to be enrolled with a CCNC/Carolina Access provider whereas children ages 0-9 years were most likely to be enrolled with a CCNC/Carolina Access II provider.

Table 23: Medical Record Components Documented in the Children with Special Health Care Needs Medical Charts, by Age Group									
Medical Record Components	0 - 4 Years		5 - 9 Years		10 - 14 Years		15 - 18 Years		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	
All entries dated?	554	97.2	422	97.7	495	96.9	207	96.3	
All entries identified by author?	544	95.1	410	94.5	471	91.6	200	92.6	
Each page/electronic file with patient identifier?	547	95.6	412	94.9	486	94.6	209	96.8	
Problem list?	533	93.2	399	91.9	477	92.8	202	93.5	
Complete Immunization Record -- Age >= 6 months	254	44.4	165	38.0	3	0.6	0	0.0	<0.0001
Complete Immunization Record -- Age >= 18 months	149	26.1	38	8.8	0	0.0	0	0.0	<0.0001
Allergy information?	535	93.5	412	94.9	473	92.0	200	92.6	
Medication list?	449	78.5	368	84.8	454	88.3	185	85.7	<0.0001
Treatment plan?	393	68.7	280	64.5	347	67.5	150	69.4	
Formalized Treatment Plan?	30	7.6	26	9.3	14	4.0	6	4.0	0.0241
Referrals and follow-up	246	43.0	136	31.3	142	27.6	65	30.1	<0.0001

Five of the eleven medical record components varied significantly by age group (see Table 23). These included the complete immunization records by age 6 and 18 months (based on an extended ACIP schedule, as noted earlier), the medication list, the formalized treatment plan, and referrals and follow-up. For all but the medication list, documentation of these medical record components was higher for children ages 0-4 years and 5-9 years compared to older age groups.

Table 24: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs, by Age Group									
Immunizations/Lab Tests	0 - 4 Years		5 - 9 Years		10 - 14 Years		15 - 18 Years		Statistical Significance Testing (Chi-Square)
	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	Number Yes	Percent Yes	
Hepatitis B vaccine	340	59.4	237	54.6	11	2.1	0	0.0	<0.0001
Diphtheria/Tetanus/Pertussis vaccine	176	30.8	68	15.7	28	5.5	5	2.3	<0.0001
Tetanus/Diphtheria vaccine	571	99.8	434	100.0	332	64.6	22	10.2	<0.0001
Haemophilius Influenza B vaccine	158	27.6	63	14.5	21	4.1	1	0.5	<0.0001
Inactivated Poliovirus vaccine	256	44.8	111	25.6	46	9.0	10	4.6	<0.0001
Mumps/Measles/Rubella vaccine	104	18.2	216	49.8	116	22.6	13	6.0	<0.0001
Varicella vaccine	426	74.5	113	26.0	0	0.0	1	0.5	<0.0001
Pneumococcal conjugate vaccine	32	5.6	0	0.0	0	0.0	0	0.0	<0.0001
Hemoglobin/Hematocrit	194	33.9	94	21.7	54	10.5	18	8.3	<0.0001
Urinalysis	0	0.0	68	15.7	57	11.1	8	3.7	<0.0001
Lead Screening	80	14.0	66	15.2	12	2.3	3	1.4	<0.0001
Sickle Cell Testing	193	33.7	88	20.3	46	9.0	5	2.3	<0.0001

(Based on ACIP's and Health Check Recommendations for 2002)

All vaccinations and lab tests reviewed were significantly different by age group (see Table 24). For almost all vaccinations and lab tests, the highest percentages of recommendation compliance were found for the younger age groups.

Table 25: Immunizations/Lab Tests Administered as Required among Children with Special Health Care Needs, Using an *Extended* Schedule, by Age Group									
Immunizations/Lab Tests	**0 - 4 Years**		**5 - 9 Years**		**10 - 14 Years**		**15 - 18 Years**		**Statistical Significance Testing (Chi-Square)**
	Number Yes	**Percent Yes**	**Number Yes**	**Percent Yes**	**Number Yes**	**Percent Yes**	**Number Yes**	**Percent Yes**	
Hepatitis B vaccine	362	63.3	258	59.5	11	2.1	0	0.0	<0.0001
Diphtheria/Tetanus/Pertussis vaccine	343	60.0	165	38.0	92	17.9	16	7.4	<0.0001
Tetanus/Diphtheria vaccine	571	99.8	434	100.0	340	66.2	22	10.2	<0.0001
Haemophilius Influenza B vaccine	310	54.2	152	35.0	55	10.7	1	0.5	<0.0001
Inactivated Poliovirus vaccine	399	69.8	214	49.3	110	21.4	20	9.3	<0.0001
Mumps/Measles/Rubella vaccine	115	20.1	248	57.1	165	32.1	18	8.3	<0.0001
Varicella vaccine	444	77.6	119	27.4	0	0.0	1	0.5	<0.0001
Pneumococcal conjugate vaccine	50	8.7	0	0.0	0	0.0	0	0.0	<0.0001
Hemoglobin/Hematocrit	244	42.7	130	30.0	75	14.6	23	10.7	<0.0001
Urinalysis	11	1.9	147	33.9	57	11.1	8	3.7	<0.0001
Lead Screening	84	14.7	70	16.1	14	2.7	3	1.4	<0.0001
Sickle Cell Testing	193	33.7	88	22.3	46	9.0	5	2.3	<0.0001

(Based on ACIP's and Health Check Recommendations for 2002, Extended by 2 Months)

The percentage of lab tests and vaccinations on schedule increased for almost all lab tests and vaccinations using an extended vaccination and lab test schedule (Table 25). Vaccination and lab test compliance varied significantly by age group for all lab tests and vaccinations reviewed, and, again, was generally highest in the younger age groups.

Table 26: 2002 Health Check Visit Components Documented in the Children with Special Health Care Needs' Medical Charts, by Age Group									
Health Check Visit Components	0 - 4 Years		5 - 9 Years		10 - 14 Years		15 - 18 Years		Statistical Significance Testing (Chi-Square)
	# Yes	% Yes	# Yes	% Yes	# Yes	% Yes	# Yes	% Yes	
Visits by same provider?	358	85.0	197	94.3	176	96.2	66	97.1	<0.0001
Visit date in 2002	423	100.0	209	100.0	183	100.0	69	100.0	
Temperature	200	47.3	117	56.3	96	52.5	40	58.0	
Pulse	135	31.9	100	48.1	73	39.9	45	65.2	<0.0001
Respirations	96	22.7	66	31.7	43	23.5	35	50.7	<0.0001
Blood pressure[1]	96	66.7	174	83.7	158	86.3	66	95.7	<0.0001
Head circumference[2]	168	80.0							
Height	408	96.5	200	96.2	160	87.4	54	78.3	<0.0001
Weight	420	99.3	207	99.0	178	97.3	64	92.8	0.0026[F]
Nutrition/Appetite	291	69.3	105	51.5	77	43.3	30	44.8	<0.0001
Subjective eyes/vision screening[2]	68	32.3							
Objective eye/vision screening	51	12.1	92	44.2	84	45.9	32	46.4	<0.0001
Subjective ear/hearing screening[3]	115	31.4							
Objective ear/hearing screening	42	9.9	91	43.8	47	42.1	17	24.6	<0.0001
Nose/Mouth	401	94.8	188	90.4	174	95.1	58	84.1	0.0030
Skin	357	84.4	166	80.2	150	82.0	56	81.2	
Heart	409	96.7	193	92.8	177	96.7	63	91.3	0.0435
Lungs	407	96.2	192	92.3	178	97.3	62	89.9	0.0158
Abdomen	402	95.0	187	89.9	171	93.4	60	87.0	0.0235
Hips	237	56.0	95	45.7	92	50.3	32	46.4	
Neurological status/Tone	340	81.2	150	72.5	145	79.7	51	75.0	
Gastrointestinal status	224	53.0	112	54.1	110	60.1	35	50.7	
Genitourinary status	323	76.4	152	73.1	137	74.9	52	75.4	
Tobacco	43	10.2	29	13.9	55	30.1	25	36.2	<0.0001
Alcohol	9	2.1	18	8.7	44	24.0	21	30.4	<0.0001
Substance Abuse	16	3.8	15	7.2	43	23.5	23	33.3	<0.0001
Sexuality Issues	21	5.0	20	9.6	41	22.4	27	39.1	<0.0001
Past medical history	303	71.6	166	79.8	149	81.4	58	84.1	0.0092
Anticipatory guidance	78	18.4	24	11.5	25	13.7	7	10.1	<0.0001
Written Developmental Assessment?[4]	67	36.2	3	3.2					<0.0001

Legend: 1: Only assessed for children ages 3 years and older.
2: Only assessed for children ages 0-24 months.
3: Only assessed for children 2 days - 3 years old.
4: Assessment required by age 12 months, 24 months, and 60 months
F: For significance testing, the Fisher's exact test was used in place of chi-square to account for expected values less than 5 for this component.

Twenty of the 30 Health Check visit components varied significantly by age group (see Table 26). These included Health Check visits by the same provider, pulse, respirations, blood pressure, height, weight, and nutrition/appetite assessments, objective eye/vision screenings, objective ear/hearing screenings, and evaluations of nose/mouth, heart, lungs, abdomen, and tobacco, alcohol, and substance (ab)use or exposure, sexuality issues, past medical history, anticipatory guidance, and written developmental assessments. Fifteen to eighteen year old children with special health care needs had the highest compliance rates, followed by the group of 0-4 year olds.

Comparison of Children with Special Health Care Needs Ages 6 - 24 Months to Children Included in the Health Check & Immunization Study,[5] published in October 2002

The Health Check and Immunization Study (HC&IS) included children ages 6 months to 24 months as of March 31, 2000. A sample of 1,177 children was drawn from children continuously enrolled between October 1, 1999 and March 31, 2000, and linked to a CCNC/Carolina Access, CCNC/Carolina Access II, or HMO provider. To be included in the study, the children needed to have at least one Health Check visit between October 1, 1999 and March 31, 2000. For the children with special health care needs comparison group (CSHCN), only children ages 6-24 months as of December 31, 2002 were included. These children had to be enrolled in their system of care for 11 out of 12 months in 2002, and still had to be enrolled in December 2002. Of the children with special health care needs, 154 were between the ages of 6 and 24 months, and 138 of them had a Health Check visit documented in 2002. Because of this relatively small number (154), the children with special health care needs data could not be reliably broken down by system of care (as in the Health Check & Immunization Study).

Table 27: Number and Percent of Medical Record Components Documented in Medical Charts for Children with Special Health Care Needs Ages 6-24 Months Compared to Children Included in the Health Check and Immunization Study

Medical Record Components	All CSHCN (N=154)		All HC&IS (1,177)	
	Number Yes	Percent Yes	Number Yes	Percent Yes
Problem List	137	89	697	59
Allergies documented?	139	90	966	82
Past medical history	100	72	504	43
All entries dated?	149	97	1,032	88
All entries identified by author?	146	95	988	84
Each page/electronic file with patient identifier?	147	96	657	56

Children with special health care needs ages 6 - 24 months had a markedly higher percentage of medical record components administered as required compared to children included in the Health Check and Immunization Study of October 2002 (HC&IS) (Table 27). Specifically,

inclusion of a problem list and past medical history into the chart, and identification of the patient on each page/electronic file was found much more often for children with special health care needs than for the children included in the Health Check and Immunization Study.

Table 28: Number and Percent of Health Check Visit Components Documented in Medical Charts, for Children with Special Health Care Needs Ages 6-24 Months Compared to Children Included in the Health Check and Immunization Study

Health Check Visit Components	All CSHCN (N=154)	All HC&IS (1,177)
	Percent Yes	Percent Yes
Past medical history	72	60
Height and weight	90	89
Nutrition/Appetite	79	82
Anticipatory guidance	19	70
Head Circumference	88	92
Written developmental assessments	31	17
Subjective eyes/vision screening[2]	36	14
Objective eye/vision screening	3	5
Subjective ears/hearing screening[3]	33	71
Objective ears/hearing screening	4	31
Hemoglobin/Hematocrit	74	59
Lead Screening		
Lead Screening 1	49	31
Lead Screening 2	3	1
Sickle Cell Testing	44	58

Note: For this comparison, lab tests qualified as administered as required if a date was supplied for the administration of the lab test, no matter if the date was within the time frame recommended by Health Check regulations or not. This was necessary to have similar data for both groups, the children included in the Health Check and Immunization Study and the children with special health care needs.

Children with special health care needs were more likely to have seven of the fourteen Health Check visit components assessed and documented than children included in the Health Check and Immunization Study. Seven components were documented less frequently for children with special health care needs than for children included in the Health Check and Immunization Study (Table 28). In the children with special health care needs study, anticipatory guidance was evaluated as a single item, whereas 3 items in the Health Check and Immunization Study measured a similar concept: counsel/education - child development; counsel/education - healthy lifestyles, practice, and counsel/education - accident, disease prevention. Therefore, comparisons between the different anticipatory guidance measures can only be made with caution. Documentation of medical history of the child (72% vs. 60%), height and weight (90% vs. 89%), administration of written developmental assessments (31% vs. 17%), subjective eyes/vision screening (36% vs. 14%), hemoglobin/hematocrit testing (74% vs. 59%), and lead screening at age 12 months (49% vs. 31%) and 24 months (3% vs.

12%) was higher for children with special health care needs compared to children included in the Health Check and Immunization Study.

Table 29: All Required Immunizations by Age Group and System of Care for Children with Special Health Care Needs Ages 6-24 Months Compared to Children Included in the Health Check and Immunization Study				
	All CSHCN (N=154)		All HC&IS (1,177)	
Immunizations	Number Yes	Percent Yes	Number Yes	Percent Yes
CSHCN 6-17 months	53	75	367	40
CSHCN 18-24 months	50	60	113	42

Note: See Appendix for detailed information on how 3-dose and 4-dose haemophilius influenza B vaccinations were treated in the analysis.

Note 2: For this comparison, immunizations qualified as administered as required if a date was supplied for the administration of the immunization, no matter if the date was within the time frame recommended for the immunization or not. This was necessary to have similar data for both groups, the children included in the Health Check and Immunization Study and the children with special health care needs.

Compliance with all required immunizations at ages 6-17 months, and ages 18-24 months was considerably higher for children with special health care needs than for children included in the Health Check and Immunization Study (see Table 29). Immunizations included for ages 6-17 months were: hepatitis B 1 & 2, diphtheria/tetanus/pertussis 1, 2, &3, haemophilius influenza B 1, 2, & 3 (HIB3 for a 4-dose vaccine only), and inactivated poliovirus 1 & 2. For ages 18-24 months they included: hepatitis B 1, 2, & 3, diphtheria/tetanus/pertussis 1, 2, 3, & 4, haemophilius influenza B 1, 2, 3, & 4 (HIB4 for a 4-dose vaccine only), inactivated poliovirus 1, 2, & 3, mumps/measles/rubella 1, and varicella 1.

Table 30: Number and Percent of Immunizations Administered by Age Group for Children with Special Health Care Needs Ages 6-24 Months Compared to Children Included in the Health Check and Immunization Study						
Immunizations	**All CSHCN (N=154)**	**CSHCN 6-17 months**	**CSHCN 18-24 months**	**All HC&IS (1,177)**	**HC&IS 6-17 months**	**HC&IS 18-24 months**
	Percent Yes	**Percent Yes**	**Percent Yes**	**Percent Yes**	**Percent Yes**	**Percent Yes**
Hepatitis B vaccine						
HEP1	93	92	94	95	94	98
HEP2	95	94	95	80	75	97
HEP3	89	90	88	60	51	93
Diphtheria/Tetanus/Pertussis vaccine						
DTAP1	97	96	98	99	99	100
DTAP2	96	96	96	97	97	99
DTAP3	94	92	96	89	87	98
DTAP4	50	15	80	26	8	88
Haemophilius Influenza B vaccine						
HIB1	97	97	98	99	99	100
HIB2	95	93	96	96	96	98
HIB3	94	90	96	45	30	96
HIB4	59	31	83	11	5	33
Inactivated Poliovirus vaccine						
POLIO1	97	97	96	99	99	100
POLIO2	96	94	96	97	96	99
POLIO3	75	62	87	44	30	93
Mumps/Measles/Rubella vaccine						
MMR1	77	59	93	46	30	98
Varicella vaccine						
VAR1	73	59	84	37	24	84

Note: For this comparison, immunizations qualified as administered as required if a date was supplied for the administration of the immunization, no matter if the date was within the recommended time frame for the immunization or not. This was necessary to have similar data for both groups, the children included in the Health Check and Immunization Study and the children with special health care needs.

Compliance with specific immunizations required tended to be higher for children with special health care needs overall and for children with special health care needs ages 6-17 months in comparison to children included in the Health Check and Immunization Study (see Table 30). Children with special health care needs ages 18-24 months had lower rates of immunization documented than children included in the Health Check and Immunization Study for all but three of the vaccinations (haemophilius influenza B 3, haemophilius influenza B 4, and varicella 1).

SUMMARY AND DISCUSSION

For this study, data from medical charts for 1,736 children with special health care needs were abstracted and analyzed. The primary interest was to assess the status of care for these children related to preventive services such as immunizations and anticipatory age-relevant guidance; health and developmental screenings such as Health Check visits, lab tests, and developmental assessments; treatment planning as apparent in formalized or non-formalized treatment plans; and coordinated care evident in referrals to specialists or organizations outside of the practice, and referral follow-up. The following paragraphs will summarize and discuss the information presented throughout the report focusing on the study goals outlined.

PREVENTIVE SERVICES:

IMMUNIZATIONS

- Among all of the children with special health care needs' charts abstracted, a complete immunization record showing timely receipt of a series of vaccinations required by age 6 months was found for 24% of the children with special health care needs. This percentage dropped to 11% for vaccinations required by age 18 months. Both complete immunization records used ACIP's Childhood Immunization Schedule for 2002, extended by 2 months, to check for timely receipt of the required vaccinations. A complete immunization record for age 6 months included: hepatitis B 1 & 2, diphtheria/tetanus/ pertussis 1, 2, &3, haemophilius influenza B 1, 2, & 3, and inactivated poliovirus 1 & 2. A complete immunization record for age 18 months included: hepatitis B 1, 2, & 3, diphtheria/tetanus/pertussis 1, 2, 3, & 4, haemophilius influenza B 1, 2, 3, & 4, inactivated poliovirus 1, 2, & 3, mumps/measles/rubella 1, and varicella 1.

- Immunization compliance for children with special health care needs was between 14%-34% for the most important vaccinations including hepatitis B, diphtheria/tetanus/pertussis, haemophilius influenza B, inactivated poliovirus, mumps/measles/rubella, and varicella, based on ACIP's recommendations. Two of the six vaccinations were documented as having been administered on time in about 15% of the charts, two were documented in about 25%, and the last two were documented in 31-34%

of the charts reviewed. With an extended schedule that added an additional month to each side of the vaccination window, immunization compliance increased to 30%-43% for the same immunizations.

- Significant differences in immunization administration were found by gender, race, system of care, and by age group. Using ACIP's recommended vaccination schedule, the tetanus/diphtheria vaccination varied significantly by gender, tetanus/diphtheria, mumps/measles/rubella and varicella vaccinations varied significantly by race; and hepatitis B, diphtheria/tetanus/pertussis, tetanus/diphtheria, inactivated poliovirus, mumps/measles/rubella and varicella vaccinations varied significantly by system of care. All eight vaccinations reviewed varied significantly by age group (hepatitis B, diphtheria/tetanus/pertussis, tetanus/diphtheria, haemophilius influenza B, inactivated poliovirus, mumps/measles/rubella, varicella, and pneumococcal conjugate). Using a vaccination schedule that extended the vaccination age ranges recommended by ACIP by one month before and after each vaccination window, haemophilius influenza B vaccinations also varied significantly by system of care.

2002 North Carolina data from the National Immunization Survey[6] showed immunization compliance for all vaccinations listed at a much higher level than what we found documented in the children with special health care needs' charts. Administration of hepatitis B (3 or more doses: 91%), diphtheria/tetanus/pertussis (3 or more doses: 96%), haemophilius influenza B (3 or more doses: 97%), inactivated poliovirus (3 or more doses: 94%), and mumps/measles/rubella (1 or more doses: 95%) reported in the National Immunization Survey were all at a level higher than 90%.

These differences could be due to differences in data collection (chart abstractions at one provider versus phone interview with family and vaccination providers), data abstraction guidelines (what to abstract as correct documentation for a vaccination), and age groups of children surveyed (age 18 and younger in our study of children with special health care needs versus ages 19 to 35 months for the National Immunization Survey). It is very likely that the age group of the children studied affected the results, given that all of the immunizations reviewed in the children with special health care needs study varied significantly by age. Younger children had a higher percentage of vaccinations in the recommended vaccination age ranges compared to older children.

For the children with special health care needs study, we used two categories to classify immunization administration: "administered as recommended", which represents a vaccination that was administered to the child within the recommended time frame, and that was also documented in the medical chart as required. Immunization administration was categorized as "not administered as recommended" if it was not administered in the recommended time frame, if it was not administered at all, or if there was no or not sufficient documentation in the medical chart regarding the administration of the vaccination. This means that children whose charts were categorized as "not administered as recommended" in the present study may still

have received the vaccination in question, but that the documentation was missing or insufficient in the medical chart at their current provider's office. This includes the scenario that immunization history for a child was not transferred to a new provider after a provider change, which may have particularly affected older children.

ANTICIPATORY GUIDANCE

- About 15% of children with special health care needs had all the recommended anticipatory guidance given and documented during their most recent Health Check visit. Fifty-three percent received some but not all of the recommended anticipatory guidance recommended for their age, which was abstracted as 'Partial' in this study.

- Significant differences in documenting anticipatory guidance were found by race, system of care, and age group. Significantly more charts of American Indian and African American children showed documentation of all the recommended anticipatory guidance than Caucasian/White children or children of other races. Similarly, significantly more children linked to CCNC/Carolina Access I than to CCNC/Carolina Access II or SouthCare showed documentation of all the recommended anticipatory guidance. Anticipatory guidance was given less frequently to older children than to younger children.

Differences in administration and documentation of anticipatory guidance may be influenced by provider perceptions: perceptions may differ in how much guidance families with different racial backgrounds need. Similarly, providers may have perceived families with younger children to be in more need of and to be more receptive of anticipatory guidance compared to families with teenage children. Administration and documentation of anticipatory guidance may also differ in relation to guidelines or standard procedures issued by the different systems of care.

HEALTH AND DEVELOPMENTAL SCREENING:

HEALTH CHECK VISITS

Of the 1,736 children with special health care needs included in the study, 51% had a Health Check visit documented in 2002. Providers are required to assess and document all Health Check visit components in the medical chart during a Health Check visit.

- Among those children with special health care needs who had a Health Check visit in 2002, health components assessed and documented varied greatly. Assessments of weight, height, heart, lungs, nose/mouth and abdomen were documented in more than 90% of the charts reviewed whereas documentation of the vital signs such as temperature, pulse, and respirations were only found in a quarter to half of the charts reviewed. Written developmental assessments were documented in about 25% of the charts reviewed. Risk assessments such as tobacco, and alcohol use or exposure,

substance abuse or exposure, and sexuality issues were even less likely to be documented.

- Health Check visit component documentation varied significantly by gender (risk assessments), race (vital signs, abdomen, subjective ear/hearing, gastrointestinal status, risk assessments, and written developmental assessments) system of care (vital signs, height, nutrition/appetite, subjective and objective ear/hearing, skin, hips, neurological status/tone, gastrointestinal and genitourinary status, tobacco use and exposure, sexuality issues, past medical history, and written developmental assessments) and age group (Health Check visit by same provider, pulse, respirations, blood pressure, height, weight, nutrition/appetite, objective eye/vision screening, objective ear/hearing, nose/mouth, heart, lungs, abdomen, risk assessments, past medical history, and written developmental assessments).

Differences in administration and documentation of Health Check visit components in the children with special health care needs study may have been influenced by provider perceptions regarding who needed assessments for the specific items the most, or who would benefit the most of specific assessments (for instance, girls, older children, and Caucasian/Whites were significantly more likely to have risk assessments documented, and Native Americans were significantly more likely to have vital signs documented). Administration and documentation may also have differed due to different guidelines or standard procedures issued by the different systems of care.

LAB TESTS

- Generally, documentation for administration of lab tests was very low (8%-21% of charts). This was true even for mandated tests such as sickle cell testing and lead screening (the latter is a mandatory test for children enrolled in Medicaid).

- Significant differences in lab tests documented were found by gender (hemoglobin/hematocrit), by race (hemoglobin/hematocrit, urinalysis, and sickle cell testing), by system of care (hemoglobin/hematocrit, urinalysis, and sickle cell testing) and by age group (hemoglobin/hematocrit, urinalysis, lead screening, and sickle cell testing). These results were based on the lab test schedule outlined for Health Check visits. For a schedule where each test window was extended by a month on each side, there were significant differences by race (sickle cell testing), by system of care (hemoglobin/hematocrit, urinalysis, and sickle cell testing), and by age group (hemoglobin/hematocrit, urinalysis, lead screening, and sickle cell testing).

Data published by the Children's Environmental Health Branch of the North Carolina Department of Environment and Natural Resources[7] showed 36% of North Carolina children ages 1 and 2 screened for lead poisoning in 2002, and 55% of children ages 1 and 2 who were

enrolled in Medicaid -- which is much higher than the 9% of children with special health care needs with a documentation of lead screening in their medical charts.

Differences in the percent of children with special health care needs screened in comparison to the lead screening data published by the Children's Environmental Health Branch might be due to missing medical history (medical history as far back as for ages 1-2 years is needed for lead screening results), differences in age groups studied (18 years and younger versus 9-35 months), and documentation issues. For the children with special health care needs study, lab tests were only abstracted as documented as required if there was a date listed for the administration of the test, and included in the study as compliant if the date fell into the time range recommended for Health Check visits. As was the case with immunizations, lab test administration was categorized as "not administered as recommended" if it was not administered in the recommended time frame, if it was not administered at all, or if there was no or not sufficient documentation in the medical chart regarding the administration of the lab test. This means that children whose charts were categorized as "not administered as recommended" may still have had the lab test in question, but that the documentation was missing or insufficient in the medical chart at their current provider's office. This includes the scenario that lab test history for a child was not transferred to a new provider after a provider change.

TREATMENT PLANNING:

- Formalized treatment plans were found in a very small number of medical charts reviewed (7%). Formalized treatment plans include patient and parent/guardian and emergency contact information in addition to diagnosis, plan for treatment or action plan, and evaluation of planned actions (also found in non-formalized treatment plans).

- Two thirds of the medical charts reviewed included a non-formalized treatment plan.

- Significant differences were found by race, system of care, and by age group. American Indians were significantly more likely than children of White/Caucasian, African American or other race to have a treatment plan in their charts whereas children with special health care needs of all other races were more likely than American Indian children to have a formalized treatment plan. Children enrolled with SouthCare were most likely to have a non-formalized treatment plan, and children enrolled with CCNC/Carolina Access were most likely to have a formalized treatment plan included in their medical charts. Children age 9 years and younger were most likely to have a formalized treatment plan.

COORDINATED CARE:

- Thirty-four percent of the medical charts reviewed had a minimum of one referral and follow-up documented.

- Significant differences were found by race (American Indian children were most likely and children of other races were least likely to have a referral and follow-up documented), by system of care (children enrolled with SouthCare were most likely to have a referral and follow-up documented), and by age group (the youngest children had the highest percentage of referrals and follow-up documented).

ADDITIONAL ANALYSES:

Medical Record Documentation Standards and Baseline Data

- Medical record documentation standards such as the dating of entries in the medical chart, identification of the author of entries, and patient identifiers on each page or electronic file were followed by providers of more than 90% of all children with special health care needs whose charts had been reviewed.

- Baseline data such as the problem list, allergy information, and a medication list were present in 84 to 93 percent of charts reviewed.

Comparison to the Health Check and Immunization Study

Data for a subgroup of the children with special health care needs ages 6-24 months were compared with data on children the same age included in the 2002 Health Check and Immunization Study. Generally, the chart review for the children with special health care needs showed higher levels of

- medical record component documentation
- documentation of Health Check visit components
- compliance with a composite of required immunizations, and
- compliance with individual vaccination requirements.

Children with special health care needs ages 6-24 months were almost twice as likely as children included in the Health Check & Immunization Study to have written developmental assessments administered during Health Check visits (31% versus 17%).

CONSTRAINTS AND LIMITATIONS OF THE CHILDREN WITH SPECIAL HEALTH CARE NEEDS STUDY

There are several constraints and limitations of this study that should be noted:

- Lab tests, immunizations, developmental assessments, referrals and referral follow-up components documented were treated as administered as required in the children with special health care needs study if they had a date for the administration of the procedure or action listed in the chart, and, for lab tests and immunizations, if the date was within the recommended time periods for the specific procedure. A note of *up-to-date* or *current* was not accepted instead of a date. (For the comparison with the Health Check & Immunization Study, however, immunizations and lab tests were included if there was any date listed.)

- If a specific lab test, immunization, developmental assessment, referral and referral follow-up was not documented as required in the medical chart, it was treated as "not administered as required". In the case where a lab test, immunization, developmental assessment, referral and referral follow-up was considered "not administered as required", however, it can not be concluded that it was not administered -- it was simply not known to us from the chart and/or chart abstraction if it was administered or not. Missing medical history after a provider change, gaps in documentation of administered lab tests or immunizations, inappropriate documentation of procedures or actions administered, or missed appointments for immunizations and Health Check visits by the children and their families emerge as possible reasons for missing information in our children with special health care needs data.

For similar studies in the future, the information gained through chart reviews could be supplemented with Medicaid claims analyses to obtain a more comprehensive picture of procedures administered. Use of the North Carolina Immunization Registry could also be considered to supplement the information collected by chart abstractions.

CONCLUSION

In comparing children with special health care needs to children included in the Health Check and Immunization Study, which included a cross section of children ages 6-24 months enrolled in Medicaid with no particular health problems, the status of care for children with special health care needs in terms of preventive care and health and developmental screenings was found to be better. This is desirable for children that are at an increased risk for chronic physical, developmental, behavioral, or emotional conditions. Treatment planning and coordination of care were not studied in the Health Check and Immunization Study or in any other recent study by the NC Division of Medical Assistance, so no comparisons could be made. The data obtained in this study are intended to serve as baseline measures of preventive care, health and

developmental screenings, treatment planning, and coordination of care for the group of children with special health care needs. This information could be used to develop future initiatives using "medical home" concepts to improve accessibility, family-centeredness, continuity, comprehensiveness, coordination, compassion, and cultural effectiveness of care provided to children with special health care needs.

REFERENCES

[1] North Carolina Medical Home Initiative: *North Carolina Statewide Medical Home Implementation Plan, Promise to the State*. Available at http://www.medicalhomeinfo.org/resources/state/Downloads/NCpromise.doc

[2] National Committee for Quality Assurance (NCQA): *HEDIS 2002*, Volume 2, Technical Specifications. Washington, DC: National Committee for Quality Assurance, 2001.

[3] *MMWR Weekly*: Notice to Readers: Recommended Childhood Immunization Schedule -- United States, 2002. Vol. 51, January 18, 2002, p. 31-33.

[4] The North Carolina Division of Medical Assistance: *Health Check Billing Guide 2002.* Special Bulletin III, July 2002. Available at http://www.dhhs.state.nc.us/dma/bulletin/pdfbulletin/0702spec.pdf

[5] State Center for Health Statistics: *Health Check and Immunization Compliance: A Medical Record Study Among North Carolina Medicaid Children 6 through 24 Months of Age.* October 3, 2002. Available at http://www.dhhs.state.nc.us/dma/ca/hcimstudy.pdf

[6] 2002 North Carolina data from the National Immunization Survey, extracted from the table: *Estimated vaccination coverage with individual vaccines and selected vaccination series among children 19-35 months of age by state, US, National Immunization Survey, Q1/2002-Q4/2002.* Available at the National Immunization Program's website at the Center for Disease Control and Prevention at http://www.cdc.gov/nip/coverage/NIS/02/tab3_antigen_state.xls

[7] 2002 North Carolina lead screening data, extracted from the table: *2002 North Carolina childhood lead screening data by county*. Available at the Children's Environmental Health Branch's website at the North Carolina Department of Environment and Natural Resources at http://www.deh.enr.state.nc.us/ehs/Children_Health/datatable2.pdf.