

# A National Assessment of Children With Special Health Care Needs: Prevalence of Special Needs and Use of Health Care Services Among Children in the Military Health System

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**ABSTRACT.** *Objective.* Children are frequently perceived to be healthy, low-risk individuals with a majority of clinical services devoted to health maintenance and preventive clinical services. However, a subset of children have unique needs that require specialized care to achieve optimal health outcomes. The purpose of this research was to use survey tools that have been developed to identify children with special health care needs (CSHCN) to measure prevalence and resource needs of these children in the military health system (MHS).

*Methods.* The US Department of Defense manages the MHS, which is one of the largest integrated health care systems in the world and provides care to almost 2 000 000 children. We incorporated the CSHCN survey screener and assessment questions into the annual health care survey of beneficiaries who are eligible for benefits within the MHS. In addition, we used claims information available from inpatient and outpatient services. We used parent reports from the survey to estimate the prevalence of CSHCN. Incorporating claims data and restricting our analyses to those who were enrolled continuously in a military health maintenance organization (TRICARE Prime), we described utilization of different types of health care resources and compared CSHCN with their healthy counterparts. Finally, we examined alternative types of special needs and performed regression analyses to identify the major determinants of health needs and resource utilization to guide system management and policy development.

*Results.* CSHCN compose 23% of the TRICARE Prime enrollees who are younger than 18 years and whose parents responded to the survey. The needs of a majority of these children consist of prescription medications and services targeting medical, mental health, and educational needs. CSHCN experience 5 times as many admissions and 10 times as many days in hospitals compared with children without special needs. CSHCN are responsible for nearly half of outpatient visits for enrolled children and more than three quarters of inpatient days. Service utilization varies dramatically by type of special need and other demographic variables.

*Conclusion.* CSHCN represent a major challenge to organized systems of care and our society. Because they represent a group of children who are particularly at risk with potential for improved health outcomes, efforts to improve quality, coordinate care, and optimize efficiency should focus on this target population. *Pediatrics* 2004; 114:384–393; children with special health care needs, service use, CSHCN screener, military health system.

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ABBREVIATIONS. DoD, US Department of Defense; MHS, military health system; HCSDB, Health Care Survey of DoD Beneficiaries; DEERS, Defense Eligibility and Enrollment Reporting System; SIDR, standard inpatient data record; SADR, standard ambulatory data record; MEPRS, Medical Expense and Performance Reporting System; HCSR, health care service record; CHCS, Center for Health Care Strategies; NHIS, National Health Interview Survey.

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The US Department of Defense (DoD) manages the military health system (MHS), which is one of the largest integrated health care systems in the world. It offers health care to >8 million active duty and retired military personnel and their dependents, including nearly 2 million children under the age of 18. A comprehensive program of pediatric medicine has evolved in the MHS to care for this large, geographically and socially diverse population. Eligible children have several coverage options. More than 60% of eligible children are currently enrolled in TRICARE Prime, a point-of-service health plan that delivers care through clinics and hospitals operated by the MHS or its civilian contractors. Other eligible children may be covered by a preferred provider organization network of civilian providers contracted by the MHS, traditional indemnity insurance administered by the MHS, or by other civilian insurance such as through a parent's civilian job.

The MHS offers several programs to assist parents, including those with special health care needs.<sup>1</sup> The programs offer both financial assistance and assistance in coordinating medical and other community resources, particularly when personnel assume new duty stations. In conjunction with TRICARE Prime's comprehensive medical benefit, these programs help to promote continuity of care, interaction with community resources, and other features of a medical home, as prescribed by the American Academy of Pediatrics.<sup>2</sup>

As indicated by a recent collection of research

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devoted to the measurement of special and chronic health care needs of children, researchers have developed a number of alternative methods of identifying children with these needs, using categorical and noncategorical definitions of special needs and both administrative data and survey-based tools.<sup>3-7</sup> The tool used to identify CSHCN in this study, the CSHCN screener, was designed to identify children corresponding to the Maternal and Child Health Bureau's noncategorical definition and is the basis of much recent and currently ongoing research.<sup>8</sup> Prevalence estimates based on noncategorical definitions in different populations, including work using the Questionnaire for Identifying Children With Chronic Conditions (QuICCC) and Questionnaire for Identifying Children With Chronic Conditions—Revised (QuICCC-R) surveys, predecessors to the CSHCN screener, have ranged from 12% to 25%<sup>4,9-11</sup> with observed variation resulting from different identification strategies. Recent results from nationally representative samples using the CSHCN screener have produced more consistent estimates in the middle of this range, of 15%<sup>3</sup> and 16%.<sup>4</sup> These methods are now incorporated into federal efforts to address population needs and performance indicators to assess quality of care and have been shown to be accurate and reliable.

Concurrently, much research has investigated the relationship between chronic conditions and use of health care resources. A few studies have focused specifically on children.<sup>12-14</sup> These studies have found chronic conditions to be associated with large increases in cost, inpatient use, specialist use, and use of nonphysician inputs. Most of this work is based on lists of conditions taken from health insurance claims or other administrative data. It has measured use in systems of care defined by geographic areas (eg, states) or socioeconomic eligibility criteria (eg, Medicaid beneficiaries).

The objectives of our study were to estimate the prevalence of special health care needs among children who receive their care through the MHS and to estimate resource use of these children using the linked administrative data of the MHS. To identify CSHCN, we use responses from the Health Care Survey of DoD Beneficiaries (HCSDB), a survey administered to beneficiaries worldwide since 1995. We match these survey responses to administrative records of medical services to measure resource use. As a result, we are able to provide the first estimates of prevalence of special health care needs among children of the MHS. We also perform the first estimates from administrative data of resource use for CSHCN who have been identified by a large-scale population-based survey.

Our study is based on a large, national, socially diverse, and unique sample. Our study is the first to look at variations in resource use among children identified by the CSHCN screener. We tested the hypothesis that CSHCN in this enrolled military population use significantly more MHS health care resources than do non-CSHCN. We also tested the hypothesis that the resources used vary with special

needs identified by the screener and with other characteristics of the beneficiary.

The results of this study will be useful to clinicians who manage the treatment of children in their care, administrators who want to identify and plan for the health care needs of both healthy children and CSHCN, and policy makers in the design and implementation of strategies to deliver quality care. We describe the relationship between the needs that parents identify in their survey responses and the medical services that their children use. In the future, survey-based assessment strategies will play an increasing role in planning for CSHCN as part of ongoing medical practice and social policy. Quality improvement efforts will stress recognizing the service needs and limitations of children rather than specific diagnosed chronic conditions as the way to address patient needs and overcome barriers to care.

## METHODS

We collected data from adult sponsors regarding the health and health care needs of child dependents who were currently enrolled in TRICARE Prime. Eligibility of these children for health care during the study period was verified, and encounter records were extracted. The CSHCN screener questions were used to categorize survey respondents. Survey data were scored and tabulated using established methods<sup>8</sup> to identify CSHCN and for each specific type of need. Comparisons of health resource utilization, reported experiences, and ratings of health plan and physician were compared for CSHCN and their healthy counterparts.

### Study Population

The Defense Eligibility and Enrollment Reporting System (DEERS), which contains a description of each person who is eligible to receive benefits through the MHS, was used to identify the study population. The study population consists of 1.7 million dependents of active duty and retired members of the armed forces under age 18 as of January 31, 2001, and resident in the continental United States, Alaska, or Hawaii. Approximately 51% are male, and 64% were enrolled in TRICARE Prime as of January 31. Thirty percent were younger than 6 years at that time.

### Study Sample

The HCSDB is a survey of a representative random sample of beneficiaries who are eligible for care in the MHS. The survey was mandated by Congress to measure the access and satisfaction of beneficiaries worldwide and has been administered periodically since 1995. Separate questionnaires have been fielded to gather information about the care of adults and of children. Data for this analysis were taken from the 2000 Child HCSDB, which was fielded beginning in July 2001. The survey questionnaire contained questions from the Consumer Assessment of Health Plans Surveys, questions from the CSHCN screener, and a number of supplemental questions developed to address issues specifically relevant to the MHS. The nationwide survey sample of 35 000 was drawn from DEERS and was stratified according to geographic region, child age, and enrollment in TRICARE Prime.

Survey fielding began July 13 and was closed September 17, 2001. Survey responses for the 2000 survey were collected by mail from a total of 10 869 sponsors of sampled children. Duplicate and partially completed surveys were excluded, resulting in 10 734 complete surveys. On the basis of their survey responses, 7483 beneficiaries were identified as users of TRICARE Prime, meaning children who, according to their parents, received most of their care over the previous 12 months through TRICARE Prime. Our analysis of the prevalence and characteristics of CSHCN was performed using the group of TRICARE Prime users.

Within the group of 7483 TRICARE Prime users, DEERS was used to identify 6180 children who were eligible for MHS coverage for the period October 1, 1999, and March 31, 2001. For ensuring more accurate estimates of resource use, the analyses of inpatient and outpatient use were restricted to these 6180 children.

Our analysis was restricted to TRICARE Prime users for 2 reasons. First, these children are the primary responsibility of MHS providers. Second, restricting the sample to children who use TRICARE Prime increases the likelihood that complete records of all of their service use will be contained in TRICARE's administrative data.

### Identifying CSHCN

CSHCN were identified using the CSHCN screener. The CSHCN screener, shown in the Appendix, contains 5 groups of questions identifying children who need prescription drugs, need medical services, are limited in their activities, and need special therapies or counseling. Each group of questions consists of a question asking about a special need or limitation and 2 follow-up questions, one about whether a service was needed because of a medical condition and another about whether the condition has lasted or is expected to last 12 months. The respondent must answer yes to each of the questions in at least 1 group for their child to be considered subject to a special need.<sup>8</sup>

### Administrative Data Match

Administrative data used for this research consist of records of inpatient and outpatient health care encounters from both military and civilian providers of care. Inpatient stays at military facilities were obtained from standard inpatient data records (SIDRs). The SIDRs contain patient, diagnostic, and procedural information and are collected from the electronic patient records at all bedded military hospitals and are generally completed within 90 days of the date of care. Ambulatory care received from military facilities is recorded in standard ambulatory data records (SADRs). The SADRs were taken from scannable paper forms filled out at the time of service. They contain patient, diagnostic, procedural, and specialty information. SADRs were augmented by use of Medical Expense and Performance Reporting System (MEPRS), which records complete monthly visit rates by cost center at all military facilities.

Records of care received from civilian providers were gathered from medical claims and collected in electronic records called health care service records (HCSRs). Institutional HCSRs are from claims submitted by hospitals. Noninstitutional HCSRs are from claims submitted by physicians. These data are obtained when claims are processed. Because filing is required to receive payment and because of mandated time limits on claims handling, the records are believed to be 95% complete within 90 days. A file that contained administrative records for continuously eligible respondents was created from all data sources. All records of services between October 1, 1999, and March 31, 2001, were matched to survey responses using individual identifiers.

### Measures of Inpatient and Outpatient Service Use

Inpatient use is measured from SIDRs and institutional HCSRs. Only records with nonzero length of stay were included. Outpatient records were taken from SADR and noninstitutional HCSR, when the place of treatment was not an inpatient hospital. SADR visits were counted by MEPRS billing code, which identifies the cost center responsible for the code. Each visit from a cost center for a particular month was multiplied by an adjustment factor that is the ratio of MEPRS visits to SADR visits for that facility, cost center, and month.<sup>15</sup> The adjustment factor compensated for the incompleteness of SADR records for that month. Encounters solely for laboratory tests, diagnostic radiology, or immunizations were excluded.

Outpatient records were classified into mutually exclusive groups according to the specialty code of the provider of the health care or service. Providers were classified as primary care physicians when they were listed as general practitioners, family practice, internists without a subspecialty, obstetrician gynecologists, gynecologists, or pediatricians without a subspecialty. Other physicians were classified as specialists. Psychiatrists and psychologists were classified together and distinguished from other specialists as psychiatric specialists.

### Statistical Analysis

Observations in our survey sample are weighted to account for the survey design. An observation's weight is the inverse of its probability of selection, adjusted for nonresponse. Each propor-

tion or rate was calculated using these weights. Standard errors of these statistics were adjusted for the effects of sample design using the Taylor series approximation method.

To test the hypotheses that health care needs specified by the screener are associated with increased resource use and that use varies according to different needs identified in the screener, we used the continuously eligible sample to perform a multivariate regression analysis of the relation of special needs and selected demographic factors to the use of medical services. Because inpatient admissions are a rare event and multiple admissions are possible, we used Poisson regression to estimate a model for admissions. We used ordinary least squares to estimate models of outpatient visits and specialist visits. We estimated an ordinary least squares model of inpatient days using only the children with inpatient admissions. Standard errors for all coefficient estimates were adjusted for survey design using the Taylor series approximation.

Because our focus is intensity of resource use, we chose to perform our analysis on the basis of counts of visits. Although the level of use could be dichotomized and analyzed using logistic regression and contingency tables, we propose no criteria for classifying levels of health care use (eg, high vs low, appropriate vs inappropriate). The continuous variable provides information about intensity of use not available in a dichotomized variable.

## RESULTS

Table 1 compares demographic characteristics of TRICARE Prime enrollees and continuously eligible TRICARE Prime enrollees with characteristics of all survey respondents, using sampling weights adjusted for nonresponse. TRICARE Prime users are more likely nonwhite and younger but less likely to have Medicaid coverage or graduate-educated parents than the total respondent sample. The continuously eligible group is more similar in age and education to the total sample than is the TRICARE Prime users group but differs more in race and Medicaid coverage.

Among users of TRICARE Prime, CSHCN were identified by the CSHCN screener. Screener results are shown for children who were classified as CSHCN and non-CSHCN and each of the 5 question groups that comprise the CSHCN screener. These groups identify children who need prescription drugs; need medical, mental health, or educational services; are functionally limited; need therapy; and need emotional, developmental, or behavioral treatment. Results are shown for 2 other groups defined by combinations of these questions: children who need services, meaning medical services, therapy, or behavioral or developmental treatment, and children who need only drugs. We expect CSHCN who need prescription drugs but who need no special medical services to be similar in many respects to non-

**TABLE 1.** Demographic Characteristics of TRICARE Prime Users

	Survey Respondents	TRICARE Prime Users	Users Eligible Since 10/1/99
N	10 734	7483	6180
Mean age, y	9.28	8.44	9.52
% Male	51.86	51.80	51.67
% Nonwhite	23.64	24.64	25.25
% Graduate-educated parent	17.98	16.33	18.23
% With Medicaid coverage	1.91	0.67	0.56



CSHCN, and we compared them with both non-CSHCN and children with service needs.

Results shown in Table 2 indicate the prevalence of children with reported special medical needs lasting or expected to last >12 months. Approximately 23% of parents reported that their child had some sort of special need. The 23% include 9% who need only prescription medications and 14% who need services, meaning some sort of medical, mental health, or educational services; special therapies; or treatment or counseling. Parents report that 11% of enrolled children have a special need for medical, mental health, or educational services. The proportion who reported functional limitations was 5.5%.

As shown in Table 3, which compares demographic characteristics of CSHCN and non-CSHCN among TRICARE Prime users, children with a special need identified by any of the screener components are more likely to be older, male, and white and to have graduate-educated parents than children who are not identified as having a special need. CSHCN are 6 times as likely to be covered by Medicaid as are non-CSHCN, although parents report their usual source of care as the MHS.

When we investigate for patterns of need among children, those who have an indicated need of any sort are older, are more likely white, and have more educated parents than do non-CSHCN. Among the CSHCN, there are notable variations in children's characteristics depending on the specific nature of indicated special health care needs. Children who

require special therapy are younger, whereas children who need treatment or counseling are significantly older than other CSHCN. Although a majority of CSHCN are male (57%), nearly 2 of 3 who require treatment or counseling are male. Children who are indicated as needing treatment or counseling are more likely to be white (83%) and have the most educated parents among all children studied. CSHCN who require medications are 2 times more likely to have Medicaid coverage than are non-CSHCN, whereas those who need medical, mental health, or educational services are 10 times more likely, those who are limited in function are 15 times more likely, and those who need special therapies are 20 times more likely to have Medicaid coverage than are non-CSHCN.

To examine resource utilization for CSHCN and their healthy counterparts, we restricted the eligible population to TRICARE Prime users with 2 years of eligibility before survey fielding. The prevalence of special needs and demographic characteristics of this group is similar to those described above, although children in the continuously eligible group are older as a result of the eligibility requirement. The prevalence of special needs (25%) is also slightly higher in this group.

Inpatient use is strikingly higher for CSHCN of all types compared with children without any identified special need (Table 4). CSHCN have more inpatient admissions and a longer average length of stay in the hospital. CSHCN have 5 times as many admissions and spend 10 times as many total days in the hospital as children without special needs.

The heaviest users of inpatient services are those who have functional limitations, who require therapy, or who require developmental or behavioral treatment. Each of these groups averages >10 admissions per 100 beneficiary years compared with 1 admission per 100 beneficiary years for non-CSHCN. Children who need only prescription medications use substantially more inpatient care than do children without special needs but significantly less than other CSHCN.

The use of outpatient services differs significantly between CSHCN and non-CSHCN. As shown in Table 5, CSHCN, broadly defined, have >2 times as many outpatient visits as do children with no identified special need. CSHCN use more of all categories of outpatient visits. The greatest proportional differences are in the categories of nonphysician visits, such as visits with therapists or nurse practitioners, specialist visits, and psychiatric or psychological visits.

As is the case with inpatient care, children who need only medications use the smallest number of outpatient services among CSHCN but still use substantially more than non-CSHCN. They use significantly more of all types of outpatient care than children with no indicated special need, including a higher proportion of specialist visits. CSHCN who require only medications make ~60% of their outpatient visits to primary care physicians. Primary care makes up a much lower proportion of outpatient

**TABLE 2.** Prevalence of CSHCN: 2000 HCSDDB TRICARE Prime Enrollees (N = 7483)

	% of Enrolled Children	SE
Any special need	23.15	0.54
No special need	76.85	0.54
For a condition lasting or expected to last >12 mo:		
1. Does your child currently need or use medicine prescribed by a doctor (other than vitamins)?	18.28	0.49
2. Does your child need or use more medical, mental health, or educational services than is usual for most children the same age?	11.02	0.40
3. Is your child limited or prevented in any way in his or her ability to do the things that most children of the same age can do?	5.45	0.29
4. Does your child need special therapy, such as physical, occupational, or speech therapy?	4.20	0.26
5. Does your child have any kind of emotional, developmental, or behavioral problem for which he or she needs or gets treatment or counseling?	5.96	0.30
Needs extra services*	13.67	0.44
Needs only medications†	8.72	0.36

\* Include children who were identified on the basis of positive answers to item sets 2, 4, or 5 (alone or in combination with positive answers to other item sets).

† Include children who were identified by positive answers to item set 1 only and not by any other item set.

**TABLE 3.** Characteristics of CSHCN: 2000 HCSDb TRICARE Prime Enrollees

	N	% of Enrolled Children	Mean Age, Years (SE)	% Male (SE)	% Nonwhite (SE)	% Graduate-Educated Parent (SE)	% with Medicaid Coverage (SE)
Any special need	1778	23.15	9.61 (0.12)	57.70 (1.32)	21.19 (1.09)	18.09 (1.03)	1.89 (0.36)
No special need	5705	76.85	8.08 (0.04)	50.03 (0.74)	25.67 (0.64)	15.80 (0.54)	0.31 (0.07)
1. Does your child currently need or use medicine prescribed by a doctor (other than vitamins)?	1416	18.28	9.93 (0.13)	57.62 (1.48)	20.66 (1.21)	18.14 (1.16)	1.60 (0.35)
2. Does your child need or use more medical, mental health, or educational services than is usual for most children the same age?	834	11.02	9.06 (0.18)	60.53 (1.89)	19.51 (1.54)	15.30 (1.41)	3.38 (0.68)
3. Is your child limited or prevented in any way in his or her ability to do the things that most children of the same age can do?	415	5.45	9.50 (0.26)	60.52 (2.69)	23.64 (2.34)	16.33 (2.05)	4.57 (1.12)
4. Does your child need special therapy, such as physical, occupational, or speech therapy?	315	4.20	8.12 (0.29)	61.34 (3.07)	20.64 (2.56)	16.92 (2.40)	6.60 (1.53)
5. Does your child have any kind of emotional, developmental, or behavioral problem for which he or she needs or gets treatment or counseling?	466	5.96	10.04 (0.22)	66.36 (2.47)	17.86 (2.03)	21.82 (2.20)	4.53 (1.07)
Needs services	1046	13.67	9.34 (0.16)	60.79 (1.69)	19.31 (1.37)	17.90 (1.35)	2.76 (0.55)
Needs only medications	672	8.72	9.87 (0.21)	53.93 (2.17)	23.60 (1.86)	18.90 (1.70)	0.69 (0.37)

Questions 1–5: for a condition lasting or expected to last at least 12 months.

**TABLE 4.** Inpatient Health Care Use by CSHCN: 2000 HCSDb TRICARE Prime Enrollees

	N	% of Enrolled Children	No. of Admits* (SE)	Inpatient Days* (SE)	Average Length of Stay (SE)
Any special need	1544	24.54	6.61 (1.07)	36.89 (8.45)	5.58 (0.88)
No special need	4636	75.46	1.17 (0.16)	3.75 (0.84)	3.21 (0.43)
1. Does your child currently need or use medicine prescribed by a doctor (other than vitamins)?	1235	19.52	6.65 (1.29)	41.37 (10.55)	6.22 (1.09)
2. Does your child need or use more medical, mental health, or educational services than is usual for most children the same age?	718	11.61	9.96 (1.91)	59.67 (16.38)	5.99 (1.17)
3. Is your child limited or prevented in any way in his or her ability to do the things that most children of the same age can do?	361	5.74	10.56 (1.91)	83.67 (29.51)	7.92 (2.10)
4. Does your child need special therapy, such as physical, occupational, or speech therapy?	265	4.30	10.08 (2.25)	76.07 (35.11)	7.55 (2.45)
5. Does your child have any kind of emotional, developmental, or behavioral problem for which he or she needs or gets treatment or counseling?	406	6.27	11.85 (3.36)	93.66 (30.19)	7.90 (1.78)
Needs services	903	14.42	8.55 (1.57)	49.22 (13.24)	5.75 (1.10)
Needs only medications	588	9.29	3.56 (1.39)	16.89 (8.07)	4.75 (1.28)

\* Per 100 children per year. During the period October 1, 1999, to March 31, 2001.

Questions 1–5: for a condition lasting or expected to last at least 12 months.

visits for the functionally limited or service-using group than for other CSHCN.

Children with a reported need for special therapies

have the highest outpatient visit rate, >19 visits per year. Their higher rate is attributable largely to their rate of nonphysician visits, 8.5 per year, which com-

**TABLE 5.** Outpatient Health Care Use by CSHCN: 2000 HCSDDB TRICARE Prime Enrollees

	N	% of Enrolled Children	Outpatient Visits (SE)	Nonphysician Visits (SE)	Primary Physician Visits (SE)	Specialist Visits* (SE)	Psychiatric Visits (SE)	ED Visits (SE)
Any special need	1544	24.54	11.00 (0.52)	3.12 (0.42)	5.12 (0.14)	1.67 (0.10)	0.82 (0.08)	0.54 (0.03)
No special need	4636	75.46	4.48 (0.09)	1.15 (0.05)	2.69 (0.05)	0.49 (0.02)	0.07 (0.01)	0.37 (0.02)
1. Does your child currently need or use medicine prescribed by a doctor (other than vitamins)?	1235	19.52	10.73 (0.57)	2.76 (0.47)	5.24 (0.16)	1.62 (0.11)	0.85 (0.09)	0.56 (0.03)
2. Does your child need or use more medical, mental health, or educational services than is usual for most children the same age?	718	11.61	14.65 (1.03)	4.51 (0.88)	6.17 (0.24)	2.28 (0.19)	1.32 (0.14)	0.59 (0.04)
3. Is your child limited or prevented in any way in his or her ability to do the things that most children of the same age can do?	361	5.74	15.03 (1.26)	4.98 (1.04)	6.03 (0.35)	2.38 (0.25)	1.39 (0.23)	0.61 (0.06)
4. Does your child need special therapy, such as physical, occupational, or speech therapy?	265	4.30	19.10 (2.54)	8.48 (2.32)	5.97 (0.39)	2.71 (0.34)	1.65 (0.27)	0.53 (0.07)
5. Does your child have any kind of emotional, developmental, or behavioral problem for which he or she needs or gets treatment or counseling?	406	6.27	14.54 (1.05)	4.37 (0.77)	5.62 (0.31)	1.60 (0.19)	2.56 (0.26)	0.52 (0.05)
Needs services	903	14.42	13.51 (0.84)	4.06 (0.71)	5.73 (0.21)	2.07 (0.16)	1.31 (0.13)	0.55 (0.04)
Needs only medications	588	9.29	7.28 (0.29)	1.67 (0.12)	4.34 (0.18)	1.02 (0.10)	0.12 (0.04)	0.53 (0.05)

\* Nonpsychiatric.

ED indicates emergency department.

During the period October 1, 1999, to March 31, 2001. Rates are annualized. Questions 1–5: for a condition lasting or expected to last at least 12 months.

poses almost half of their total visits and is much higher than that of any other group of children identified here.

This pattern of health care use suggests that, in the MHS, a disproportionate amount of health care is provided to enrolled CSHCN. The proportion of MHS resources provided to CSHCN is shown in Fig 1. CSHCN, representing approximately one quarter of children in TRICARE Prime, are responsible for nearly half of the outpatient visits and more than three quarters of inpatient days among all enrolled children. They are also seen in more than half of specialist visits and more than three quarters of psychiatric visits.

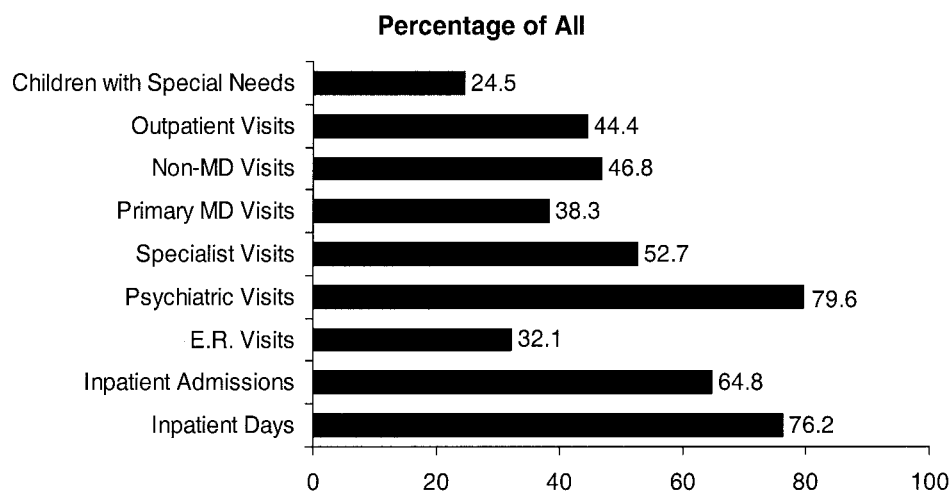
Multivariate results shown in Table 6 indicate that children who need medications and children who need additional services use significantly more inpatient and outpatient care, controlling for other needs and demographic factors, than do children without those needs. Children who need medications have approximately twice as many admissions, 4.6 more outpatient visits, and 0.8 additional specialist visits in an 18-month period than do children with no special needs. Children who need additional medical, mental health, or educational services have ~170% more admissions, 8 more outpatient visits, and 1.8 more specialist visits than do non-CSHCN. Children who have inpatient admissions and need

medications also spend significantly more days in the hospital, controlling for these other factors.

Although the first 2 types of special needs in the CSHCN screener capture an overall increase in both inpatient and outpatient use, other special needs described by the screener are associated with increases in specific types of service utilization. Children who need therapy have significantly more outpatient visits (10.8 total visits and 1.0 visits to specialists per 18 months) but not inpatient stays, whereas children who need behavioral counseling have longer inpatient stays and fewer (nonpsychiatric) specialist visits. Children who are described as being limited in function do not have higher use beyond that described by other special needs questions. Regression results also show that white children, controlling for age and special needs, use significantly more outpatient care but not more inpatient care, whereas children with more highly educated parents have more specialist visits.

## DISCUSSION

Our estimates indicate that the prevalence of special health care needs among children enrolled in TRICARE Prime is ~23%. Although that number is within the range of prevalence estimates found in previous studies, it is above the estimates found using the CSHCN screener in nationally representa-



SOURCE: Tabulation of 2000 Child HCSDDB Results.

**Fig 1.** Among children who were surveyed and enrolled in TRICARE Prime with 18 months of continuous eligibility, percentage of all service use as a result of CSHCN.

**TABLE 6.** Models of Service Use: Impact of Special Needs and Demographic Factors

Independent Variable	Inpatient Admissions (N = 6180; IRR)	Inpatient Days (N = 177; Coefficient)	Outpatient/ED Visits (N = 6180; Coefficient)	Specialist Visits (N = 6180; Coefficient)
Intercept	0.02†	4.67*	6.09†	0.91†
Age ≤5 y	1.32	-5.71*	5.77†	-0.01
Age 6-10 y	0.58	-5.30*	-0.20	-0.28
Age 11-15 y	1.11	1.32	-0.58	-0.22
Parent graduate educated	1.12	1.03	0.56	0.23*
Nonwhite	0.98	3.79	-1.06†	-0.37†
1. Does your child currently need or use medicine prescribed by a doctor (other than vitamins)?	2.10*	4.12*	4.59†	0.77†
2. Does your child need or use more medical, mental health, or educational services than is usual for most children the same age?	2.69†	-3.61	7.98†	1.80†
3. Is your child limited or prevented in any way in his or her ability to do the things that most children of the same age can do?	1.31	0.95	1.07	0.49
4. Does your child need special therapy, such as physical, occupational, or speech therapy?	1.15	4.43	12.31†	1.95†
5. Does your child have any kind of emotional, developmental, or behavioral problem for which he or she needs or gets treatment or counseling?	2.05	9.25†	2.37	-1.07†

\*  $P < 05$ .

†  $P < 01$ .

Inpatient days, outpatient visits, and specialty visits are estimated by ordinary least squares. Admissions are estimated by poisson regression. For the poisson regression, the incidence rate ratio (IRR) is the ratio of the number of admissions when the factor is present to the number of admissions when it is absent.

tive samples. National estimates, using the CSHCN screener, suggest prevalence on the order of 15%<sup>3</sup> to 17%.<sup>4</sup> Estimates from populations that are not nationally representative, such as health plans, health centers, or Medicaid, have indicated higher prevalence rates. Overall, studies that used the Questionnaire for Identifying Children With Chronic Conditions, Questionnaire for Identifying Children With Chronic Conditions—Revised, or other noncategorical methods to identify CSHCN from national samples have estimated prevalence rates from 12% to 25%.<sup>4,5,9-11</sup>

Although it lies at the upper end of the range of noncategorical prevalence estimates, our number is smaller than the numbers estimated in some studies using categorical definitions. For example, the Center

for Health Care Strategies (CHCS)<sup>14</sup> estimated a prevalence of 31% in a 4-state population, and Gay et al<sup>13</sup> found 23% of Washington state's Medicaid-enrolled children to have chronic conditions. Because disability is an eligibility criterion for Medicaid, high numbers of CSHCN will be found in Medicaid populations. A national study based on the 1988 National Health Interview Survey (NHIS)<sup>15</sup> used a broad array of chronic conditions to arrive at a prevalence of 31%. The proportion of children who were found to be limited in our study population (5.5%) is slightly lower than the rate identified by Newacheck and Halfon<sup>16</sup> (6.5%) through the NHIS but higher than the limited proportion identified by Bethell et al<sup>4</sup> (3.8%) with the CSHCN screener.

On the basis of comparison with other noncat-



egorical results, the prevalence of CSHCN in the TRICARE Prime users group seems to be somewhat higher than the national norm. The number of limited children in our study is lower than the number identified through the NHIS. However, other CSHCN screener results show a still lower number of limited children than does our study, suggesting that the NHIS classifies more children as limited than does the CSHCN screener, perhaps as a result of the nested follow-up questions of the screener. The high proportion of CSHCN identified in our population may be attributable to entry or retention in the military of people with CSHCN or to programs, such as those described earlier, that promote recognition and treatment of special health care needs. It may also be attributable to higher survey response rates among parents of CSHCN.

Demographic results from our study are consistent with previous studies that have found CSHCN more likely to be male and older than non-CSHCN. Our results differ in finding parents of CSHCN to be better educated.<sup>9–11</sup> These findings suggest that there might be some difference in access or use of services in TRICARE Prime that results in greater recognition and treatment of special needs as education increases.

Much of the previous work describing costs of CSHCN is based on Medicaid populations and identifies children with diagnoses from lists of chronic conditions. Ireys et al<sup>12</sup> calculated expenditures for children who had selected conditions and were enrolled in Washington State's Medicaid program any time in fiscal year 1993. A second study by Gay et al<sup>13</sup> used the Classification of Congenital and Chronic Health Conditions system to identify and measure expenditures of children with chronic conditions from Washington Medicaid data from fiscal 1992 and 1993. Using a modified version of the Chronic Disease Payment System<sup>17</sup> to identify CSHCN, the CHCS<sup>14</sup> measured average monthly Medicaid expenditures in California, Georgia, Michigan, and Tennessee. However, Newacheck and Halfon<sup>16</sup> compared service use of CSHCN, defined as children with functional limitations, and non-CSHCN among respondents to the NHIS.

Resource use in our study is measured using services received rather than dollars expended. Our results can be compared with those of Newacheck and Halfon<sup>16</sup> and the CHCS,<sup>14</sup> which also provide service use rates. We found large variations in inpatient use, similar in magnitude to variations in studies by Newacheck and Halfon and by the CHCS, although the overall rate in our sample is ~50% to 100% lower. For example, the CHCS found ~138 admissions per 1000 patient years among CSHCN in a Medicaid population, whereas CSHCN in our sample had approximately half of that number of admissions. Newacheck and Halfon found ~1310 inpatient days per 1000 among children with limitations, whereas children with limitations in our sample recorded ~834 days per 1000.

The difference in use of services by CSHCN relative to non-CSHCN in our sample corresponds approximately to these other studies. For example, the

limited group was responsible for ~40% of inpatient days in our sample and 35% in Newacheck and Halfon's. Similarly, the ratio of admissions for CSHCN to admissions for non-CSHCN was ~6 to 1 in both the CHCS study and our current study.

We found outpatient use, whether measured by physician contacts or by outpatient visits, to be closer than inpatient use to levels observed in the Newacheck and Halfon or CHCS studies. For example, special needs children in the CHCS study experienced ~15 visits per year, whereas our count is ~11. Newacheck and Halfon recorded ~9 physician contacts per year for the limited population, similar to the level experienced by limited children in our sample. Once again, the relative use of outpatient services among CSHCN and non-CSHCN in our study is similar to other work. For example, the CHCS found that CSHCN have ~3 times the outpatient visit rate of non-CSHCN, whereas we find a ratio of ~2.5. The similarity between categorical methods and the CSHCN screener in the number of children identified and in the relative use of inpatient and outpatient services suggests that both methods are identifying children with similar service needs relative to other children even if all children are not classified accurately.

Our data permit us to classify encounters according to physician specialty. We found that although special needs were associated with an increase in the proportion of care received from specialists, CSHCN still had many more encounters with generalists. This finding is consistent with that of Kuhlthau et al,<sup>18</sup> who compared use of specialist and generalist physicians in Medicaid-enrolled patients from 4 states with specified chronic conditions. They found that among children who were not on Supplemental Security Income, who make up the majority of Medicaid CSHCN, generalist visit rates were ~3 times as high as specialist rates, which is similar to the ratio that we observed. We found that all types of outpatient use, including emergency department use, increased with special needs but that emergency department use differed less with special needs than did other forms of use. That finding may indicate that CSHCN conditions were successfully managed in the MHS, preventing acute events and providing access in the appropriate settings.

Our regression results demonstrate the role of individual screener questions in identifying CSHCN. Almost all children who are identified by the screener are identified by the first 2 questions, which ask whether children are heavy users of medications and medical services. Those 2 questions identify children who are heavier users of all types of care. Other questions identify children with specific additional needs. For example, questions about needs for therapy or counseling are associated in our regression models with variations in specialty care and length of stay. Future research could use the relationship between individual questions and resource needs to establish a measure of the severity of special needs from questions and selected demographic variables.

These results highlight the importance of understanding and managing the needs of these children



for effective and efficient pediatric care in the MHS. As indicated by Fig 1, much of the workload of pediatricians and pediatric subspecialists in the MHS is attributable to CSHCN. Our results also contribute to predicting the impact of proposed changes in military health benefits. For example, recent changes in health benefits have eliminated copayments of active duty dependents for civilian care covered by TRICARE Prime. By leading CSHCN families to use TRICARE Prime, this benefit change may increase the number of children in TRICARE Prime who require more intense medical management. By directing CSHCN families to the civilian network, the change may also increase the need for specialists, nonphysicians, and mental health professionals in the supporting network of care.

Our findings regarding service use have limitations associated with all claims data. The information is primarily a billing and payment mechanism, and deficits in claims submission and accuracy could have a negative impact on the accuracy of our findings. We restricted our study population to enrolled users of care to ensure that beneficiaries received the great majority of their medical services through the MHS, but it is possible that some services were obtained outside and are unrecorded in the databases used for this study.

Our results may also be affected by sorting among MHS benefit options. If parents of children with the most severe disabilities choose a different form of coverage, then TRICARE Prime's style of management could lead to fewer children with severe disabilities in the TRICARE Prime population than in the Medicaid or general civilian population. However, the large and comparable proportion of parents who reported CSHCN does not support this concern.

Our data do not permit us to investigate time involved in treatment of CSHCN outside of direct patient care. The additional laboratory and referral reports, treatment plans, and family education entailed by care of these children consume resources not captured in most administrative data sources. Studies with richer provider-level data are needed to establish the additional tasks and the amount of time required in the treatment of CSHCN.

Despite these limitations, our study clearly indicates the magnitude of systemic efforts required to measure, plan for, and meet the health care needs of families with CSHCN. The MHS will require a coordinated effort across the medical departments of all 3 armed services to bring together the staff and resources to ensure that these children get the care that they require when and where they need it. The MHS can use the information in this study to measure more accurately the costs of establishing adequate networks of providers and determine how the CSHCN population can be woven into existing programs of quality assurance, utilization, and case management.

These results also suggest additional research that can be conducted using this and other data sources. By incorporating parents' reports of their experiences in seeking and receiving care and of their

encounters with their health plans' administrative requirements, service and survey data can be used to investigate the extent to which care provided through the health system meets the special needs of its children. Our data can also be used to investigate how parents of CSHCN choose health benefits for their children when they have the option of selecting among several alternatives. Understanding these issues can help both public and private care providers and policy makers to care better for this vulnerable population. This study suggests that CSHCN represent a major opportunity to target improvements in efficiency and enhancement of the quality of health care delivered to children in the United States.

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## APPENDIX. THE CSHCN SCREENER

A *health condition* could be physical, mental, or behavioral. *Health conditions* can affect a child's development, daily function, or need for services. Keep this in mind as you answer the following questions.

1. Does your child currently need or use *medicine prescribed by a doctor* (other than vitamins)?

Yes No

If yes

Is this because of a medical, behavioral, or other health condition?

Yes No

If yes

Is this because of a health condition that has lasted or is expected to last for *at least 12 months*?

Yes No

2. Does your child need or use more *medical, mental health, or educational services* than is usual for most children the same age?

Yes No

If yes

Is this because of a medical, behavioral, or other health condition?

Yes No

If yes

Is this because of a health condition that has lasted or is expected to last for *at least 12 months*?

Yes No

3. Is your child *limited or prevented* in any way in

his or her ability to do the things that most children of the same age can do?

Yes No

If yes

Is this because of a medical, behavioral, or other health condition?

Yes No

If yes

Is this because of a health condition that has lasted or is expected to last for *at least 12 months*?

Yes No

4. Does your child need *special therapy*, such as physical, occupational, or speech therapy?

Yes No

If yes

Is this because of a medical, behavioral, or other health condition?

Yes No

If yes

Is this because of a health condition that has lasted or is expected to last for *at least 12 months*?

Yes No

5. Does your child have any kind of emotional, developmental, or behavioral problem for which he or she needs or gets *treatment or counseling*?

Yes No

If yes

Is this because of a health condition that has lasted or is expected to last for *at least 12 months*?

Yes No