

Youth and Young Adults With Cerebral Palsy: Their Use of Physician and Hospital Services

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Objectives: To examine patterns of health care utilization among youth and young adults who have cerebral palsy (CP) and to provide information to guide the development of health services for adults who have CP.

Design: This study analyzed health insurance data for outpatient physician visits and hospital admissions for a 4-year period.

Setting: Six children's treatment centers in Ontario, Canada.

Participants: The sample included 587 youth and 477 adults with CP identified from health records. Youths were 13 to 17 years of age, and adults were 23 to 32 years of age at the end of the data range.

Interventions: Not applicable.

Main Outcome Measures: We computed the annual rates of outpatient physician visits and hospitalizations per 1000 persons and compared these with rates for the general population.

Results: Annual rates of outpatient physician visits were 6052 for youth and 6404 for adults with CP, 2.2 times and 1.9 times higher, respectively, than rates for age-matched peers ($P < .01$). Specialists provided 28.4% of youth visits but only 18.8% of adult visits. Annual hospital admission rates were 180 for youth and 98 for adults with CP, 4.3 times and 10.6 times higher, respectively, than rates for age-matched peers ($P < .01$).

Conclusions: It appears that youth and adults with CP continue to have complex care needs and rely heavily on the health care system. Comprehensive services are essential to support their health as they move into youth and adulthood. However, there appear to be gaps in the adult health care system, such as limited access to specialist physicians.

Key Words: Cerebral palsy; Health services; Health transition; Rehabilitation.

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THERE IS LITTLE INFORMATION available regarding the use of health services by persons with complex and chronic physical disabilities of childhood.¹ Cerebral palsy (CP) is the most common form of complex and chronic physical disabilities of childhood.² Although there are many health care services available for children with CP, there are frequently different criteria for access and different services available to youth and adults with CP. For example, youth are eligible for pediatric services that are delivered by interdisciplinary teams, whereas adult services are often provided by independent providers. The change in access to health care that is associated with the transition to adulthood poses a significant clinical problem because most people with CP are now living beyond their youth into adulthood.³⁻⁷ As adults, they continue to have ongoing health issues from childhood,⁸ and many develop new issues unique to adulthood⁹⁻¹² (eg, hypertension and coronary artery disease¹²) and require extensive health care support. The goal of this article is to estimate rates of use of health services by youth and adults with CP. This information is not available elsewhere and is needed to guide the development of services for these groups and to educate clinicians regarding what to expect when a person with CP presents to their practice.

The health care system in Ontario, Canada, offers an excellent environment in which to study the impact of the transition from child-oriented to adult-oriented health services. In this province, health care for children with CP is funded by the government and delivered by 21 children's treatment centers (CTCs). Physician services for all Ontario residents are also funded by the government. Information on most physician services provided to persons with CP in Ontario is accessible in a series of provincial databases maintained at the Institute for Clinical Evaluative Sciences (ICES).

In 2000, we conducted a pilot study of a group of 349 adults with CP, spina bifida, and acquired brain injuries of childhood origin, from 1 CTC in Ontario by using health service analysis methods. That study reported high rates of utilization of outpatient physician services and hospitalization rates that were 9 times that of the population.¹ Similar research¹³ regarding hospital admissions, among children with CP in the United States, has recently been published. These results underscore the need for more detailed information regarding health care for adults with CP, spina bifida, and childhood-acquired brain injuries.

The purposes of the current article were (1) to examine patterns of outpatient health care utilization among youth and adults with CP for a 4-year period (1999–2002 inclusive), including the exploration of sex differences in rates, and (2) to examine patterns of hospital admissions in the same groups,

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including the exploration of differences in the reasons for hospital admissions.

METHODS

A secondary data analysis of health services utilization was completed for a sample of youth (born 1985 to 1989) and adults (born 1970 to 1979) who had CP. This study was 1 component of a larger cross-sectional project that used a mixed-methods design to analyze health services data in conjunction with the collection and analysis of health survey data and qualitative interview data regarding the health care experiences of persons with CP and their parents. The study focused on the transition to the adult health care sector for youth and adults with CP, spina bifida, and childhood-acquired brain injuries. The first article in the series¹⁴ was published in 2006 and provides an overview of all 3 components of the methods. This study focuses on the health services utilization analysis of those with CP with appropriate comparison to population controls.

The youth and adults with CP were recruited from 6 CTCs across Ontario. The sample was limited to those living in Ontario during the full period of 1999 to 2002. Health card numbers (HCNs) were abstracted from health records at these recruitment sites under institutional consent and with ethics approval from all sites. These HCNs were securely transferred to the ICES where all analyses were performed. Once at ICES, the HCNs were translated to ICES key numbers (IKNs) to ensure the anonymity of the records. These IKNs enabled us to link our groups to the Registered Persons Data Base (RPDB). To understand the meaning of patterns of physician care and admission rates, we also captured data from all persons with a valid HCN in the province of Ontario who were alive on December 31, 2002, and who were born between 1970 and 1979 or 1980 and 1985. These groups are referred to as the "general population" sample.

Databases

Three different datasets were used: the RPDB, the Ontario Health Insurance Plan (OHIP) data set, and the Canadian Institute for Health Information (CIHI) acute care hospital admission data set. The RPDB contained basic demographic information for all persons registered with OHIP. Through the use of the RPDB, we were able to verify the eligibility for all subjects (eg, confirm age, residency status).

OHIP is a provincial health insurance system that provides funding for all residents of Ontario. The OHIP database contained claims for eligible services. The vast majority of eligible services were services delivered by physicians. Most allied health services (eg, physical therapy, occupational therapy, psychology) are not funded by OHIP, and hence information on these services was not available for analysis. Therefore, the outpatient services analysis was limited to claims for outpatient physician services.

The third database was the CIHI database. This database contains information on acute care hospitalizations. The data originated from hospitals and were based on information provided by physicians in the discharge abstract of the hospital chart. The CIHI data contained information on the number of admissions (or "separations"), length of stay (LOS), and the reason for each admission using codes from the *International Classification of Diseases, Ninth Revision (ICD-9)* (<http://www.cdc.gov/nchs/icd9.htm>). This article focuses on the main reasons for admission, except when that reason was listed as CP, because this was already known. In such cases, the second reason for admission was used.

Information on the severity of disability was also sought to determine whether there were significant clinical differences

between the youth and adult CP groups. This information was not available from the RPDB, OHIP, or CIHI databases. However, it was available for a subset 187 persons who had participated in a mail-administered survey and whose CTC charts were reviewed in detail. Severity was assessed by using the Gross Motor Function Classification System (GMFCS)¹⁵ and classified as mild (GMFCS scores, 1 or 2), moderate (GMFCS score, 3), or severe (GMFCS scores, 4 or 5).

Data Preparation

The information acquired from the RPDB and CIHI databases was informative in its original format. However, some manipulation of the OHIP data was required. The OHIP data were initially screened, in conjunction with the CIHI data, to exclude all care provided on days that overlapped with hospital admissions. This was done to ensure that the OHIP data included in the analysis were limited to services delivered on an outpatient basis. In addition, we excluded all claims for diagnostic imaging and laboratory tests. Hence, the analyses were limited to physician visits.

Multiple claims on the same day were aggregated into a single entry, referred to as an outpatient physician visit, when the same physician was responsible. This enabled us to report the number of different visits to a physician rather than the number of fee codes claimed by 1 or more physicians. The former is more helpful in understanding patterns of care. The OHIP dataset also provided information on the type of visit, the site where the service was provided (eg, emergency department), and what the specialty was of the physician who provided the service. Both patient and physician identifiers were encrypted to protect their identities.

Several new variables were generated from the OHIP data to enable the examination of primary care patterns because there has been a recent emphasis on primary care reform in Ontario. All patients are encouraged to find a consistent primary care provider as part of this primary care reform initiative. In much of the literature, this concept has been reflected by the term medical home.^{16,17} We used the OHIP claims data to identify persons who had a medical home. Our a priori definition was developed by clinician consensus based on their clinical expertise related to CP and is specific to this high needs population. They defined it as having received 2 annual physicals plus 1 other visit to the same physician over a 4-year period. We labeled this definition primary care provider (PCP). Two alternate definitions were developed for comparison. The second definition was drawn from the literature and tested in our previous pilot research. We have referred to it as dominant care provider (DCP). DCP is a binary variable that indicates whether subjects have received at least 50% of their physician care from 1 physician over the 4-year period of study.¹⁸ The third definition was termed annual physical and was defined as having 1 annual physical during the 4-year period. Because our clinical groups were composed of subjects with CP and were identified through a CTC, it follows that they had significant health care needs and hence receiving 1 physical in 4 years represented a minimum standard and one that was not clinically acceptable to many in this group. Note that all 3 definitions had to be fulfilled by physicians who played a primary care role. In Canada, these are limited to general practitioners (also referred to as family physicians or family practitioners) and also included pediatricians in the case of youth.

Analyses

The analyses focused on 2 different sites of care: outpatient physician visits, which were defined as unique episodes of care

Table 1: Sample Characteristics

Characteristics	CP Groups				General Population			
	Youth (n=587)		Adults (n=477)		Youth (n=897,762)		Adults (n=1,816,964)	
	Girls	Boys	Women	Men	Girls	Boys	Women	Men
n	256	331	202	275	423,557	446,205	915,781	901,183
Mean age (y)	15.3	15.5	26.4	26.3	15.0	15.0	27.7	27.7

NOTE. There was no significant differences related to sex (χ^2 test=.17, $P=.68$) between the youth (43.6% girls) and the adults (42.4% women). The general population of youth and young adults were similar to the CP groups with respect to age and sex distributions.

from a physician in an ambulatory care setting (eg, did not occur during a period of hospitalization), and inpatient hospital care.

We used the OHIP data to answer the following questions about outpatient physician services: (1) How often did youth and adults with CP visit a physician on an outpatient basis? (2) What types of services did they receive? (3) From whom did they receive these services? and (4) How many had a "medical home"?

Patterns of outpatient physician visits were compared between the age groups (youth vs adults), across the sexes, and with the general population by using the negative binomial distribution. We used the CIHI data to answer the following questions about hospital care: (1) How many youth and adults with CP were admitted to hospital? (2) How many times were they admitted to hospital? (3) How long did they stay in hospital? and (4) What were the main reasons for these admissions?

Comparisons between age groups, across sex, and between those with CP and general population were also made by using the CIHI data by using the negative binomial distribution.

RESULTS

We identified a potential sample of 1418 subjects from 6 CTCs in Ontario. Of these, 18.1% declined, 1.6% had not been in contact with the health care system during the period of study and were therefore ineligible, and 5.3% could not be matched to the RPDB. Thus, a sample of 1064 youth and adults with CP are included in this analysis. The sample characteristics for these individuals are presented in table 1.

Severity data were available for 18% of the sample. No significant differences were found between the severity of the youth (34% mild, 18% moderate, 48% severe) and adult (36% mild, 19% moderate, 45% severe) samples (Kruskal-Wallis test=.08, $P=.78$), suggesting these groups had similar clinical needs. Furthermore, the rates of outpatient physician visits and admissions for the subsample with GMFCS scores were comparable with those for the total sample, suggesting that the subsample was representative.

Outpatient Patterns of Care

Our analysis of the OHIP data provided a picture of the frequency of outpatient visits as well as information regarding the type of visits and to whom these visits were made. Because of the absence of information of this nature in the literature, we had no specific a priori predictions. We were particularly interested in whether they had a medical home, whether they continued to access specialist care, and whether admissions for pregnancy and delivery were beginning to appear in this adult cohort.

How often did youth and adults visit a physician on an outpatient basis? There were 14,211 outpatient physician visits made over the 4-year period by the 587 youth with CP.

This equates to an annual outpatient physician visit rate per 1000 of 6052. This compares with a total of 12,218 visits by 477 adults with CP or an annual outpatient physician visit rate per 1000 of 6404 outpatient physician visits. The annual outpatient physician visit rates per 1000 persons in the general population were 2746 for youth and 3431 for the adults. Thus, adults with CP had 5.8% more visits than youth with CP and 86.7% more visits than adults in the general population. Youth with CP had 120.4% more visits than youth in the general population.

What types of outpatient physician visits did they receive? We found that youth with CP received 50.0% of their outpatient care from primary care physicians in their offices (30.5% from general practitioners plus 19.5% from pediatricians*). A similar pattern was observed among adults, with 52.8% of outpatient care being provided by primary care physicians in their offices (51.4% from general practitioners plus 1.4% from pediatricians). Differences were noted in the proportion of visits to specialist physicians. Specialists provided 28.4% of youth visits but only 18.8% of adult visits. The reverse trend was observed in emergency department outpatient physician visits. Youth received 5.6% of their outpatient physician visits in emergency departments, whereas adults received 6.4% of their outpatient physician visits there. Further details on the rate of the various types of visits are shown in table 2.

Although the main focus of this study was to describe patterns of care, we were also interested in exploring differences between youth and adult patterns of care. Therefore, we compared the frequency of outpatient physician visits between youth and adults. The total rate of physician visits was not significantly different between the youth and adults with CP ($P=.22$, based on the negative binomial distribution). However, adults with CP had a significantly higher rate of both general practitioner visits and annual physicals when compared with youth ($P<.01$) and a lower rate of specialist and pediatrician visits ($P<.01$). We also completed an exploratory analysis to look for variations in patterns associated with sex. We found that females received significantly more care than males overall ($P<.01$). This was because of significantly more visits by females to pediatricians and psychiatrists ($P<.01$).

Data on the rates of all types of outpatient physician visits for the general population were also computed by sex. The annual outpatient physician visit rates per 1000 were 2827 for girls, 2670 for boys, 5507 for women, and 2393 for men. The rates of annual physicals per 1000 persons in the general population were 171 for girls, 163 for boys, 332 for women, and 129 for men. Because we did not expect those with CP to

*It has been our experience that pediatricians often provide primary care to children with CP. Thus we have included pediatricians within the primary care group, but have shown them separate from general practitioners.

Table 2: Annual Outpatient Physician Visit Rates for CP Groups Per 1000

Type of Outpatient Physician Visit	CP Groups			
	Girls (n=256)	Boys (n=331)	Women (n=202)	Men (n=275)
General practitioner office visits* (except annual physicals and pregnancy care)	1896	1807	3865	2869
Annual physicals*	162	188	324	282
Pediatrician office visits*†	1394	1020	114	72
Psychiatry office visits†	590	314	545	466
Pregnancy care office visits	—	—	53	—
Other specialists physician office visits*	1825	1643	1278	1159
Chronic care visits (eg, nursing home visits)	332	355	894	340
Emergency department visits	333	354	428	409
Total outpatient physician visits	6532	5681	7501	5597
General population sample	2827	2670	5507	2393
Total outpatient physician visits				

NOTE. The Total Outpatient Physician Visit values differ slightly from the youth rate of 6052 and adult rate of 6404 given in the text because the table provides sex-specific rates, and there were an unequal number of females and males in our samples.

*A statistically significant difference at $P < .01$ between youth and adult rates based on negative binomial distribution.

†A statistically significant difference at $P < .01$ between male and female rates based on negative binomial distribution.

be similar to the general population with respect to the other types of visits (eg, specialist physician visits), these were not computed for the general population.

The comparison of the CP sample to the general population suggests that those with CP received annual physicals at a rate similar to that of the general population, except for men with CP who received annual physicals at a rate 2.2 times that of their age-matched peers. However, overall the CP group received far more outpatient care than the general population, particularly in their youth.

From whom did they receive outpatient physician services?

We identified 5318 different physicians who provided 26,429 outpatient physician visits to our sample of 587 youth and 477 young adults with CP. We determined the proportion of physicians who provided care to both youth and adults because the opportunity to provide care to children with CP, in consultation with pediatricians, is suggested as a mechanism through which adult providers can gain experience in dealing with CP in Canada. Details on the proportion of physicians providing care to youth, adults, or a combination of youth and adults is shown in table 3. The numbers providing care exclusively to youth and adults are similar. There were only 36.5% of physicians (primarily general practitioners) who provided care across the age spectrum.

We also looked within our youth and adult groups to see what proportion of our subjects were receiving care from various types of physicians by subdividing physicians into 6 specialty categories. This information is provided in table 4. This table shows over 90% of youth and adults who have CP have access to a general practitioner in some context (perhaps via a walk-in clinic), and 5% of adults continue to see pediatricians.

How many had a “medical home”? It was important to determine what proportion of youth and adults with CP had a “medical home” because this has been identified as a marker of coordinated care in the literature^{16,17} and because coordinated care is particularly critical for those with chronic diseases. We used 3 definitions of medical home: the proportion who received 2 annual physicals and 1 other office visit to a single physician over the 4-year period thus had a PCP, the proportion who had an annual physical over the 4-year period (annual physical), and the proportion for whom 50% of their care was provided by a single physician over the 4-year period and

appeared to have a DCP. The proportion of youth and adults who fulfilled each of these definitions is shown in table 5.

Table 5 shows that very few of the members of our CP groups received comprehensive care according to the PCP definition. This was set a priori as our clinical standard. Furthermore, adults were more likely to receive a pattern of care more consistent with the clinical standard than were youth. Alternate definitions supported these findings, although the proportions were higher as a consequence of the definitions being less stringent.

Normative data were only collected for the annual physical criteria. During the 4-year period, 40.2% of girls, 39.0% of boys, 61.8% of women, and 33.9% of men in the general population had at least 1 annual physical. Thus, the proportion of those with CP who received annual physical examinations was similar to that observed in the general population, with the exception of men with CP, who were more likely to have had at least 1 annual examination over the period compared with their age-matched peers.

Admissions Results

CIHI data were used to answer questions regarding: What proportions of the CP groups were admitted? How many times were they admitted? What was the average LOS? and What were the reasons for admissions? This information is presented in table 6. Note that because pregnancy-related hospitalizations were extremely rare among girls and women with CP, we excluded pregnancy related admissions from all data.* However, our results show a large difference in the general population adult admission rates between women and men. This suggests that there may be some pregnancy-related admissions (eg, related to pre-eclampsia) that may not have been successfully excluded from the general population data. Hence, the admission rates among the general population of women may be inflated and may not provide the most accurate comparison group.

Our data on hospital admissions were based on the analysis of 1064 persons with CP of whom 281 (26.4%) were admitted.

*We considered all ICD-9 codes between 630 and 649 to indicate pregnancy-related admissions and all codes between 650 and 669 to indicate admissions for delivery.

Table 3: Distribution of Community Physicians Providing Care for the CP Groups by Area of Specialty

OHIP Data	Physicians			Row Total (%)
	Physicians Caring for Youth Only (%)	Physicians Caring for Both Youth and Adults (%)	Physicians Caring for Adults Only (%)	
General practitioners	18.1	26.5	17.8	62.4
Pediatricians	6.9	1.5	0.5	9.0
Surgeons	3.7	4.4	5.0	13.1
Internal medicine specialists	2.4	3.1	6.3	11.8
Psychiatrists	0.7	0.1	1.1	1.9
Other*	0.2	0.8	0.8	1.9
Column total	32.0	36.5	31.4	100.0 (5318 physicians)

*This category includes emergentologists and radiologists, plus other types of physicians who provide exclusively diagnostic services.

The patterns that emerged suggest that, after adjusting for slight age and sex differences, the group with CP were admitted 7.0 times more often than those in the general population and required 9.5 times as many days of inpatient hospitalization as their age-matched peers. The youth with CP were the most likely to be admitted regardless of sex and had a mean LOS of 6.4 days, whereas women with CP had the longest LOS, with a mean of 7.88 days.

Examination of the reasons for the admissions used the ICD-9 codes assigned to the admission record. The most common reasons for admissions among the youth and adults are presented in table 7. We excluded ICD-9 codes related to childbirth. Although the "other" category contains a large number of admissions, these cannot be broken down into more detail due to small cell sizes in either the youth or adult cells and, therefore, must be grouped together to protect the anonymity of the subjects involved. However, it is important to note that 49% of the youth admissions in the "other" category were because of nervous system disorders, whereas the rate of such conditions among adults is below the level of suppression. There was also a far lower rate of admissions for musculoskeletal reasons among the adults.

DISCUSSION

This study presents the health care utilization patterns for youth and young adults with a range of severity of CP. When we compared this group with the characteristics of the CTC population from which they were drawn, they appear to be

Table 4: Types of Physicians Providing Care to the CP Groups

OHIP Data	Number of Physicians	Percentage of 587 Youth Who Received This Service (%)	Percentage of 477 Adults Who Received This Service (%)
General practitioners	3318	92.2	95.0
Pediatricians	476	58.8	5.0
Surgeons	699	48.9	39.2
Internal medicine specialists	627	31.7	46.1
Psychiatrists	99	6.0	8.8
Other	99	2.6	10.5

Table 5: Proportion of Persons With CP Who Have a Medical Home

Primary Care Definitions	Girls (%)	Boys (%)	Women (%)	Men (%)
Primary care provider	10.5	16.0	30.7	26.5
Annual physical	38.3	41.1	62.4	52.7
Dominant care provider	21.1	24.2	41.6	42.2

representative.¹⁴ Hence, we believe that the results of this study are generalizable across the province. Similar LOS findings have recently been reported for American children with CP based on admissions data from 1997¹³ that found the top 5 reasons for admissions among children with CP to be respiratory (26%), nervous system (24%), musculoskeletal (18%), digestive (11%), and nutrition/endocrine/metabolic (5%). Despite age group and coding differences between the study published by Murphy et al¹³ and our research, there are strong similarities that suggest our results may also be relevant to Americans with CP.

Our analysis of administrative data from provincial sources has shown that persons with CP clearly need and receive more care than those in the general population. However, these rates reflect current practice and are not necessarily indicative of the correct rates. These rates may be lower than adequate because of limitations in access to certain types of care, such as specialist physicians.

The literature is replete with discussion of how expert care exists in the pediatric health care system but may be more fragmented in the adult care system. The outpatient care data presented here confirm that there is clearly a different model of care that is provided to adults when compared with youth. The key differences we identified included a higher use of outpatient physician services by adults when compared with youth. Adults also had far fewer visits to pediatricians, suggesting that, for the most part, scope of practice is being preserved. The observation of lower rates of other specialist physician visits in conjunction with higher rates of emergency department visits among adults was not statically significant but is of clinical relevance. One possible interpretation is that limited access to essential specialist expertise may result in more emergency department visits.

On a more positive note, adults are more likely to have a "medical home" than youth, at least according to the 3 definitions used in this study. Thus, the 28.6% of adults who met the definition of having a primary care provider may be receiving comprehensive care.

Our hospitalization results show that the adults with CP had fewer admissions than youth with CP. The much lower rate of admissions for musculoskeletal and connective tissue reasons may be indicative of a lower number of surgical admissions than are necessary during growth and development and may partially explain the lower number of admissions in adults. Much higher rates of endocrine/nutritional/metabolic, mental disorders, and genitourinary system reasons among adults should be considered by physicians as conditions to watch for when providing care to adults with CP. We also observed that the adults were generally admitted for longer periods of time than were the youth. Longer admissions may indicate more complex clinical presentation, higher acuity of illness at admission, or difficulties in discharge. All of these are reasons for concern.

Table 6: Rates of Admissions to Acute Care Hospitals

CIHI Data	CP Groups				General Population			
	Girls	Boys	Women	Men	Girls	Boys	Women	Men
Annual admission rate per 1000	181	179	99	97	17	17	26	20
Mean LOS (d)	6.2	5.4	7.9	5.8	4.7	3.9	4.5	5.7
Proportion admitted 1999 to 2002 (%)	30.5	33.5	16.3	21.5	4.8	5.1	7.2	5.5
Days of hospitalization per 1000 persons	1124	958	780	567	81	68	99	114

Study Limitations

One of the key limitations of this study is that it was based on administrative data. It lacks the richness of either survey data or qualitative data. This has 2 consequences: (1) detailed severity data based on the GMFCS were only available for a subsample and (2) we were restricted to using patterns of outpatient physician visits to classify those who had the right combination of services delivered by a physician as having a primary care provider. However, in both cases, additional analyses supported the validity of the results. For example, we generated 1 definition based on clinical consensus, derived another from the literature,¹⁸ and created a third based on using only the best quality data and simplest rules (ie, the annual physical definition). Because of the concordance of findings from all 3 definitions, we believe these results are robust. Furthermore, our study is ongoing, and the 2 additional components of the study will include self-reported data and qualitative data, which will provide richer detail.

CONCLUSIONS

This study documents high rates of utilization and clearly shows that there is a need for intensive health care support, not only for youth but also for adults who have CP. In Canada, there are few adult-oriented health services available to support this population, and the same appears true in

most countries around the world based on discussion articles in the literature.^{19,20} One of the key areas in which there were lower visit rates for the adults, compared with the youth, was in specialist physician visits. This appears to be partially offset by increased rates of general practitioner visits and emergency department visits. The rates of hospitalization are also extremely high for both CP groups, far higher than those for the general population.

Although we agree that general practitioners are the keystone of primary care and can be extremely successful in caring for persons with CP across the lifespan, but they also need resources. Access to specialist consultation is an important component of the primary care model that appears to be lacking. It is our recommendation that more services be delivered by teams of physicians. This type of approach is particularly rare among adult-oriented health care providers but is important if they are to fully support the complex health care needs of adults with CP.

In the future, it will become important to explore whether increasing outpatient services, particularly specialist care, and enhancing the education of primary care physicians regarding common reasons for admission and preventive care specific to CP will lead to reductions in emergency department visits as well as reductions in hospitalization rates and LOSs. Further long-term study of adults with CP is necessary to answer this and other questions and to guide the development of enhanced clinical services for youth and adults with CP.

Table 7: Reasons for Hospital Admissions Within CP Groups

Reasons	Youth Admissions (%)	Adult Admissions (%)
Respiratory system	20.1	19.3
Digestive system	11.4	18.7
Symptoms, signs and ill-defined conditions	14.5	12.3
Musculoskeletal system and connective tissue	20.9	3.7
Injury and poisoning	7.3	13.9
Endocrine, nutritional, and metabolic diseases	1.9	9.1
Mental disorders	2.8	6.4
Genitourinary system	1.7	5.3
Other reasons*	19.4 [†]	11.2
Total	100.0	100.0

*Other reasons include infectious and parasitic diseases; neoplasms; diseases of the blood and blood forming organs; diseases of the skin and subcutaneous tissue; congenital anomalies; certain conditions originating in the perinatal period; diseases of circulatory system; complications of pregnancy, childbirth, and the puerperium; and diseases of the nervous system and sense organs.

[†]Forty-nine percent of the "other reasons" for youth were nervous system disorders, whereas this was not true among adults.

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