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Emergency department utilization and determinants of use by 0- to 6-year-old children with disabilities in Taipei

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ABSTRACT

Although many studies have explored emergency services for children, there are few published reports of the utilization of emergency services by children with disabilities. The present study attempts to provide data regarding the utilization of, and factors affecting, emergency department visits by disabled children in Taipei. A general census of 1006 children with disabilities, identified from the Taiwan National Disability Registry System in Taipei, was conducted. The overall response rate was 38%, yielding a sample of 340 disabled children. The results showed that 30.1% of children with disabilities had utilized emergency department services over the past 4 months with an average of 1.4 visits per child. The most common reasons for emergency visits were fever (34.7%), respiratory symptoms (24.2%), abdominal pain (15.8%), injury (7.4%), and epilepsy seizures (7.4%). This study also found, using a logistic regression model, that emergency department utilization may be associated with household economic status and the reported physical health of children with disabilities. The 'deficit' and 'balance' household economic status groups gave odds ratios of 3.902 (95% CI = 1.469–10.364) and 3.311 (95% CI = 1.249–8.779), relative to the 'surplus' group. The model also indicated that those children with disabilities who were reported as being in poor

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physical health had 11.359 times (95% CI = 2.968–43.469) the likelihood of using emergency care than those whose physical health was in excellent condition. The study suggests that in order to maximize the health of children with disabilities, medical care stakeholders should consider who are the most likely groups to use emergency department services and develop anticipatory guidance or preventive services for this vulnerable population.

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1. Introduction

The emergency department is a unique practice setting which delivers full medical services for acutely ill or injured patients, regardless of the nature of the presenting complaint. It is accessible for 24 h per day, 7 days per week, and provides health care to all who need it, irrespective of their ability to pay (Richardson & Hwang, 2001). The main reasons both males and females visit the emergency department include acute pharyngitis, illness defined by abdominal and respiratory symptoms, asthma, and upper respiratory infections. Injury and musculoskeletal symptoms were found to be the leading causes of emergency department visits made by adolescents (Ziv, Boulet, & Slap, 1998).

Approximately 20 million children (or almost one quarter of the pediatric population) in the United States seek health care in emergency departments annually (McCaig & Ly, 2001). Children represent a special challenge for emergency and trauma care providers, because their needs are quite different from adults (IOM, 2006). Therefore, Knapp (2007) acknowledged that the gaps in emergency care of children must be closed, children have different and special needs in medical care and those needs must be recognized and incorporated into planning, preparation, and care.

Although many studies have explored emergency services for youth, there are few published reports describing the characteristics of preschool children visiting emergency departments, particularly children with disabilities. Utilization of emergency departments was one of the most important health issues for people with disabilities (Lin et al., 2006, 2007a,b). Knowing the prevalence of emergency department use by children with disabilities and their characteristics may help to predict usage and help health care providers to improve their delivery of services, especially good quality emergency care for these vulnerable children. The present study took advantage of a census survey conducted in Taipei in 2002 to determine the rate of emergency department usage by disabled children, as identified by their main caregivers (guardians or parents), and to identify which children with disabilities are most likely to use emergency services.

2. Methods

2.1. Samples

This study used a cross-sectional survey; subjects were recruited from the Taiwan National Disability Registration System. The total population of this study was 1006 children, between 0 and 6 years of age and officially registered in Taipei in 2000 as having disabilities. We used a census method to recruit the children for this study in 2002. Data were collected via a questionnaire that was mailed to and completed by the main caregivers of children with disabilities. A total of 1006 questionnaires were mailed and 340 valid questionnaires were returned, giving a response rate of 33.8%.

2.2. Definition of disability

The definition of people with disabilities that was used in the present study was based on a Taiwanese National Law—the *Protection Law for People with Disabilities* (1997), which defines an individual with a disability as someone who is significantly limited in his or her daily life or social activities due to his or her physical or mental impairments.

2.3. Measures

We surveyed emergency department visits by children with disabilities during the previous 4 months (January 1, 2002 to April 30, 2002). The independent variables collected included the children's characteristics such as gender, age, residence, reported health status, disability condition, reason for emergency care and medical care difficulties and caregivers' characteristics such as gender, age, education and employment, household economic status and whether the child was from a one-parent or two-parent family.

2.4. Statistical analysis

The returned data were analyzed using SPSS 10.0 for Windows including chi-square or *t*-tests to test the bivariate associations between emergency department utilization and characteristics of the caregivers or children in the study. We employed a multivariable logistical regression model to estimate the extent to which factors may be predictive of emergency department utilization by children with disabilities in Taipei.

3. Results

Our study found that a total of 30.1% of children with disabilities were reported to have utilized emergency care during the past 4-month period, with an average of 1.4 visits per child. The most common reasons for emergency care use by children with disabilities were fever (34.7%), respiratory symptoms (24.2%), abdominal pain (15.8%), injury (7.4%), and epilepsy seizures (7.4%) (Table 1). From analysis of the relationship between the utilization of emergency department and caregivers' characteristics, emergency visits by children with disabilities were found to be significantly related to household economic status ($p < 0.05$). Other factors such as the caregiver's gender, age, education, employment, family style (one-parent or two-parent family), and expenditure on children per month, also considered as a percentage of the household expenditure, were not statistically correlated to emergency department utilization by children with disabilities ($p > 0.05$) (Table 2).

As shown in Table 3, of the demographic factors of children with disabilities we found that the 'disability level' was statistically related to utilization of emergency services ($p < 0.05$). The other factors, including the child's age, gender, whether the child resided with their own families or in disability welfare institutions, and the onset and diagnosed age of disability did not statistically correlate with emergency department utilization by children with disabilities ($p > 0.05$).

With regards to reported health status, health care characteristics and emergency department utilization, children that were reported to be in poor or bad physical health were more likely to have used emergency department services than those who were reported to be in good or excellent health

Table 1
Emergency utilization and reasons of the children with disabilities.

Emergency utilization and reasons	Number	Percent
Emergency utilization ($n = 322$)		
Yes	97	30.1
Not	225	69.9
Medical reasons ($n = 95$) ^a		
Fever	33	34.7
Respiratory symptoms	23	24.2
Abdominal pain	15	15.8
Injury	7	7.4
Epilepsy seizure	7	7.4
Urological disease	1	1.1
Allergic disease	1	1.1
Other	8	8.4

^a Two missing data.

Table 2

Relation of caregivers' characteristics and emergency utilization of children with disabilities.

Caregiver characteristic	Emergency utilization		χ^2 - or <i>t</i> -test	<i>p</i> -Value
	No (<i>n</i> ; mean)	Yes (<i>n</i> ; mean)		
Gender (<i>n</i> = 308)				
Male	38	20	0.444	0.505
Female	175	75		
Age (<i>n</i> = 311)	36.05	36.65	-0.701	0.484
Education (<i>n</i> = 319)				
Elementary or less	4	5	5.406	0.368
Junior high	18	11		
Senior high	89	39		
College	60	24		
University	45	13		
Master or more	8	3		
Occupation (<i>n</i> = 319)				
Un-employment	18	10	6.418	0.698
Agriculture	1	0		
Labor	17	7		
Business	41	14		
Government or teaching	22	10		
Healthcare	7	1		
Personal employer	16	7		
Military/police	1	2		
Housewife/househusband	80	39		
Other	21	5		
Family style (<i>n</i> = 318)				
One-parent	20	7	0.220	0.639
Two-parent	203	88		
Household expenditure per month (NTD) (<i>n</i> = 288)	54862.5	54875.0	-0.004	0.997
Children expenditure per month (NTD) (<i>n</i> = 277)	16418.6	16872.2	-0.358	0.721
Percentage of children expenditure to the household (<i>n</i> = 235)	28.28	29.87	-0.677	0.499
Household economic status (<i>n</i> = 309)				
Balance	90	40	8.760	0.013
Surplus	43	6		
Deficit	85	45		

($p < 0.05$; Table 4). Other factors such as the child's reported mental health status, possession of a 'Major Illness Card' (which waives the copayment normally applicable for medical visits), medical cost affordability, medical care accessibility (traffic, physician or medical setting), the carer having time to accompany the child to hospital and the need for parents to take care of other siblings did not statistically correlate with emergency department utilization by children with disabilities ($p > 0.05$).

Multivariate logistic regression analysis was conducted to assess the significance of variation in emergency department utilization across different predisposed groups and to measure the degree to which utilization was associated with the health characteristics of children with disabilities (Table 5). The model included possible predicting variables and included those factors which were found to be statistically related to emergency department utilization from the bivariate association tests shown in Tables 2–4. Those factors include their household economic status, disability level, and the reported physical health status of children with disabilities. Two-tailed *t*-tests were employed to measure statistical significance using a 95% confidence interval (CI). The results show that two factors, household economic status and reported physical health status of children with disabilities, were significantly related to emergency department use ($p < 0.05$). For the factor of 'household economic status' within the multivariate logistic regression model, the odds ratios for the 'deficit' and 'balance' groups were 3.902 (95% CI = 1.469–10.364) and 3.311 (95% CI = 1.249–8.779), respectively, compared to the 'surplus household economic status' group. This means that disabled children from families

Table 3

Relation of children characteristics and emergency utilization of children with disabilities.

Characteristics	Emergency utilization		χ^2 - or <i>t</i> -test	<i>p</i> -Value
	No (<i>n</i> ; mean)	Yes (<i>n</i> ; mean)		
Gender (<i>n</i> = 320)				
Male	143	60	0.052	0.820
Female	81	36		
Age (<i>n</i> = 316)	3.37	3.21	1.055	0.292
Residence (<i>n</i> = 313)				
Family	208	90	0.066	0.797
Welfare institution	10	5		
Onset age of disability (month) (<i>n</i> = 314)	10.83	9.44	0.951	0.342
Disability diagnosed age (month) (<i>n</i> = 312)	14.48	12.30	1.281	0.201
Disability level (<i>n</i> = 319)				
Mild	44	13	8.762	0.033
Moderate	77	23		
Severe	67	37		
Profound	34	24		

with poor household economic status were more likely to have used an emergency department than those children from families with 'surplus' household economic status. The model also indicated that those children with disabilities that were reported to be in poor physical health were 11.359 times (95% CI = 2.968–43.469) more likely to have sought emergency care than those who were thought by their caregivers to be in excellent physical health.

4. Discussion

The results of this study present a general profile of emergency department utilization, and the determinants of its use, by 340 individuals with disabilities in Taipei. The data suggest that nearly one-third of the subjects (30.1%) used emergency department services during the past 4 months. There is little in the literature regarding emergency department utilization by preschool children with disabilities so we cannot compare the results of this study with others from Taiwan or elsewhere. However, there are studies showing high emergency department usage by children. One of our previous studies (Lin et al., 2006) focused on people with intellectual disabilities, and we found that 18.4% were reported to have utilized emergency care in the past 7 months, with an average of 2.29 visits per person. The National Center for Health Statistics in the United States (2005) showed that approximately 20% of children (under the age of 19) make one or more visits to an emergency department each year and 7% make two or more visits. Jee, Antonucci, Aida, Szilagyi, and Szilagyi (2005) examined emergency department utilization by children (aged 1–14 years) in foster care using nationally representative data in the United States. They found that 31% of foster children had visited the emergency department or urgent care center during the past 12 months. In this study, the most important reasons for emergency department utilization by children with disabilities were fever (34.7%), respiratory symptoms (24.2%), abdominal pain (15.8%), injury (7.4%), and epilepsy seizures (7.4%). A Medical Expenditure Panel Survey in the U.S. found that injury was the leading cause of emergency department visits among children aged 0–17 years (43%). The next most common reasons were 'other' respiratory infections (13%), otitis media (8%), asthma (5%), and intestinal infections (3%) (Carolyn, Dougherty, & Walker, 2002). However, most visits to the emergency departments by children or adolescents were not urgent and might have been better treated through nonemergency or primary care sites (Ziv et al., 1998). Chande, Krug, and Warm (1996) also found that parents seemed to overestimate the severity of their child's illness and suggested that parents need to have better education about the management of common pediatric illnesses so that they will be more comfortable to care for their child at home. In addition, when children utilize emergency care they may be too young to effectively communicate with health professionals about what is wrong with them or how

Table 4

Relation of health status, health care characteristics and emergency utilization of the children with disabilities.

Characteristics	Emergency utilization		χ^2 -test	p-Value
	No (n; mean)	Yes (n; mean)		
Reported physical health status (n = 321)				
Excellent	26	3	25.252	0.000
Good	80	25		
Fair	86	34		
Poor	22	29		
Bad	10	6		
Reported mental health status (n = 318)				
Excellent	19	7	1.176	0.882
Good	49	25		
Fair	86	34		
Poor	47	20		
Bad	20	11		
Major illness card holder (n = 313)				
Yes	140	68	1.607	0.205
No	78	27		
Medical care difficulty: traffic (n = 319)				
Yes	80	36	0.137	0.711
No	144	59		
Medical care difficulty: medical cost (n = 319)				
Yes	83	44	2.388	0.122
No	141	51		
Medical care difficulty: parent's time (n = 318)				
Yes	107	52	1.510	0.219
No	117	42		
Medical care difficulty: other siblings (n = 318)				
Yes	85	43	1.674	0.196
No	139	51		
Medical care difficulty: physician (n = 319)				
Yes	25	6	1.785	0.182
No	199	89		
Medical care difficulty: medical setting (n = 315)				
Yes	31	10	0.669	0.413
No	190	84		

Table 5Multivariate logistic regression of utilized emergency care of children with disabilities (n = 306)^a.

Variable	β	S.E.	p-Value	O.R.	95% CI for O.R.
Constant	-3.242	0.759	<0.001	0.039	
Family economic status			0.024		
Surplus (ref.)				1	
Balance	1.197	0.497	0.016	3.311	1.249–8.779
Deficit	1.361	0.498	0.006	3.902	1.469–10.364
Physical health status			<0.001		
Excellent (ref.)				1	
Good	0.990	0.659	0.133	2.692	0.740–9.796
Fair	1.099	0.651	0.091	3.000	0.838–10.744
Poor	2.430	0.685	<0.001	11.359	2.968–43.469
Bad	1.421	0.806	0.078	4.140	0.853–20.099

^a The model analysis includes the following variables: household economic status, disability level, and reported physical health status.

they are injured, making triage more difficult. Therefore, when caring for young children many emergency providers may feel considerable stress and anxiety (IOM, 2006).

In this study, we found that emergency department visits by children with disabilities were likely to be associated with their household economic status and reported physical health status. Simpson et al. (2005) conducted national health data analyses in the United States and found that children from low-income families were more likely than children from middle- to high-income families to have made trips to the emergency department. Jee et al. (2005) conducted a multivariate logistic regression analysis which revealed that of children in foster care, children who had a chronic condition, young children, and children with young foster caregivers were more likely to use the emergency department services. Other studies, such as that by Halfon, Newacheck, Wood, and St Peter (1996), found that significant demographic risk factors for an emergency department being a usual source of sick care included race, single-parent versus two-parent families, mother's education, household poverty, and living setting.

Although this is the first study to address emergency department use by children with disabilities in Taiwan, we recognize the limitations of using caregivers' reports to measure the use of the emergency department is not necessarily reflective of the actual need for urgent services in this population. Second, the local level of this study may limit us from describing the full picture for all Taiwanese children with disabilities. Finally, this study is also limited in its assessment of the appropriateness of emergency department visits by children with disabilities. However, our study provides a profile of emergency department visits by children with disabilities in Taiwan. It indicates that emergency department utilization may be associated with household economic status and the reported physical health status of children with disabilities. Identification of the children with disabilities who are most likely to use the emergency department may provide main caregivers, medical providers and governments with the opportunity to consider what anticipatory guidance or preventive services may be of maximum benefit. The ways in which frequency and appropriateness of emergency department visits may vary based upon the different types of disabilities should be explored further. In summary, emergency services are not cheap and the emergency department is a frequent source of entry to inpatient care. We suggest the health authorities scrutinize the accessibility, availability and appropriateness of emergency care for children with disabilities to improve the quality of medical care.

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