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# Research in Developmental Disabilities



## Healthcare utilization and expenditure analysis between individuals with intellectual disabilities and the general population in Taiwan: A population-based nationwide child and adolescent study



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### ARTICLE INFO

#### Article history:

Received 23 November 2012

Received in revised form 8 May 2013

Accepted 13 May 2013

Available online 7 June 2013

#### Keywords:

Children and adolescents

Intellectual disability

Ambulatory

Outpatient

### ABSTRACT

This study examines differences in outpatient-visit frequency and medical expenditures between (1) children and adolescents in Taiwan with intellectual disabilities and (2) children and adolescents in Taiwan's general population. A cross-sectional study was conducted to analyze data from 2007 provided by Taiwan's National Health Insurance program. A total of 236,045 beneficiaries younger than 19 years made use of outpatient services; among them, 35,802 had a principal diagnosis of mental retardation (intellectual disability). The average number of ambulatory visits was  $14.9 \pm 12.4$ , which is much higher than in the United States and other developed countries. The mean number of annual visits of the individuals with intellectual disabilities was significantly higher than that of the general population in Taiwan ( $20.1 \pm 20.0$  vs.  $14.0 \pm 12.2$ ); age, gender, urbanization level of residential area, and copayment status affected outpatient visit frequency. The mean annual outpatient costs were  $\text{NTD}6371.3 \pm \text{NTD}11989.1$  for the general population and  $\text{NTD}19724.9 \pm \text{NTD}40469.9$  for those with intellectual disabilities (US \$1 equals approximately NTD30). Age, gender, urbanization level of residential area, and copayment status were the determinants that accounted for this difference in cost. Children and adolescents with intellectual disabilities had higher use rates of rehabilitative and psychiatric services than the general population. We conclude that individuals with intellectual disabilities had higher demands than the general population for healthcare services, especially for rehabilitative and psychiatric services.

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## 1. Introduction

It is well known that individuals with intellectual disabilities (ID) are more prone than the general population to particular health problems, such as psychiatric disorders, seizure disorders, dental problems, gastrointestinal disorders, and

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osteoporosis (Center, Beange, & McEjduff, 1998; Evenhuis, Henderson, Beange, Lennox, & Chicoine, 2001; Lennox & Kerr, 1997; Lin, Yen, & Wu, 2005; Sutherland, Couch, & Iacono, 2002; US Department of Health et al., 2002). Our previous studies found that people with ID in Taiwan had a higher risk of ill health, poorer health status, and a greater prevalence of multiple physical diseases than those in Taiwan's general population (Hsu, Lin, Chiang, Chang, & Tung, 2012; Lai et al., 2011; Lin & Lin, 2011; Lin et al., 2007, 2009; Lin, Lin, Hsieh, & Lin, 2010; Lin, Lin, Lin, Hsu, et al., 2010; Lin, Lin, Lin, Lai, et al., 2011; Yen, Lin, Loh, Shi, & Hsu, 2009). Consequently, they also have higher rates of utilizing medical care services (Hsu, Chang, Lin, & Lin, 2012; Hsu et al., 2009; Lin et al., 2005) and higher levels of medical costs for these services (Hsu et al., 2012b; Lai, Hung, Lin, Chien, & Lin, 2011; Lin, Lee, et al., 2011).

Results from previous studies show that health care utilization has been influenced by several determinants. Compared with males, females had higher rates of medical care services utilization (Dempsey & Freed, 2010; Turk, Kerry, Corney, Rowlands, & Khattran, 2010; US Congress et al., 1991; Vingilis, Wade, & Seeley, 2007; Yu, Bellamy, Schwalberg, & Drum, 2001). The relationship between age of adolescent and health care utilization, however, is inconclusive. Several investigations have found that medical utilization was higher among older adolescents (Brownell et al., 2002; US Congress et al., 1991; Vingilis et al., 2007; Yu, Huang, & Singh, 2010), whereas other studies found no age-specific differences in physician visits (Ford, Bearman, & Moody, 1999; Giannakopoulos, Tzavara, Dimitrakaki, Ravens-Sieberer, & Tountas, 2010). In the United States, researchers found that children in families with low socio-economic status were less likely to use health care (Ford et al., 1999; Weller, Minkovitz, & Anderson, 2003; Yu et al., 2001). On the contrary, in Canada, children from low socio-economic status families had higher health care utilization (Brownell et al., 2002). Kozyrskyj and Hildes-Ripstein (2002) found that chronic health problems and disabilities increased Canadian's adolescent health care utilization. In the United States, the results of the National Health Interview Survey on Disability showed a similar trend (Weller et al., 2003).

Children and adolescents' health needs are significantly different from those of adults, unmet health needs remain prevalent among these populations and it is important for them to have access to health care appropriately and timely (Newacheck, Hughes, Hung, Wong, & Stoddard, 2000). If health needs are not identified and treated, they can affect a child's physical and mental development in the future. Therefore, it is important to examine the healthcare utilization profile for this population to identify their healthcare expressed needs and the determinants. Our study is aimed at producing a profile of ambulatory utilization for children and adolescents with ID in Taiwan and exploring the factors that affect this utilization. We hope the findings may provide evidence for social and health service policymaking for children and adolescents with ID.

## 2. Methods

The present study analyzed ambulatory utilization and influencing factors by the children and adolescents in Taiwan by means of a cross-sectional analysis of National Health Insurance (NHI) outpatient claimed dataset. Taiwan launched its NHI in 1995 (Bureau of National Health Insurance, 2011a). This compulsory social insurance program covered 99.48% of Taiwan's population at the end of 2008, and in 2010, 92% of the medical institutions in Taiwan were affiliated with the BNHI (Bureau of National Health Insurance, 2011a,b). The structure of claimed data sets and precautions for information safety are described in detail on the National Health Research Institutes Web site (National Health Research Institutes, 2011a,b), and were depicted in a previous study (Hsu, Chang, et al., 2012). The study dataset included 236,045 random national health insurance beneficiaries, aged below 19 years who claimed outpatient services in the year 2007. Among them, 35,802 claimants had a principal diagnosis of intellectual disability (ICD-9-CM Diagnosis Code 317–318), and the rest of them were general population. All study subjects were divided into four age groups: the preschool (0–5 years old), elementary school (6–12 years old), junior high school (13–15 years old), and senior high school (16–18 years old).

Four variables, age group, gender, urbanization and copayment status, were included in the analysis to identify demographic characteristics and to compare ambulatory utilization. Urbanization of the residential area was stratified into seven levels based on the 2005 National Health Interview Survey (NHIS) of Taiwan (Liu et al., 2006). This urbanization classification was based on the following factors: the population density (people/km<sup>2</sup>), the proportion of residents with at least a college education, the proportion of people older than 65 years, the proportion of agricultural workers, and the number of physicians per 100,000 residents (Hsu, Lin, et al., 2012). We also calculated the frequency distribution of principal diagnoses at all visits by ICD-9-CM chapter.

Statistical analysis was performed with SAS 9.2 for Windows (SAS Institute Inc., Cary, NC, USA). A Chi-square test was used to compare the difference in frequencies of six variables (i.e. age group, gender, urbanization and copayment status) between the general population and people with ID; multiple logistic regression analysis was used to associate these variables with outpatient utilization. Cumulative logistic regression analysis was used to examine the usage of medical care facilities. An ANOVA was applied to compare these variables to ambulatory annual visit frequencies and annual treatment expenses. The general estimating equation (GEE) was used to verify the differences in average per visit expenses among age group, gender, urbanization and copayment status.

## 3. Results

The demographic characteristics of two groups are presented in Table 1. After Chi-square test the distribution of four variables, age group, gender, urbanization and copayment status were different between intellectual disability (ID) and

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