Intellectual and Developmental Disabilities

Understanding characteristics and predictors of admission from the emergency department for patients with intellectual disability

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Corresponding Author:	Deepa Dongarwar Baylor College of Medicine Houston, UNITED STATES
First Author:	Elisha M Acosta
Order of Authors:	Elisha M Acosta
	Deepa Dongarwar
	Tara Everett
	Hamisu M Salihu
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Abstract:	The goal of this investigation is to compare rates of admission from the emergency department (ED) and the characteristics of patients with intellectual disability (ID) who get admitted from the ED. This was a retrospective study using data from the United States' Nationwide Emergency Data Sample (NEDS) to investigate the associations between the diagnosis of ID and admission to the hospital in patients ≥18 years during the years 2016-2017. Adults with ID were almost 4 times as likely to be admitted to the hospital from the ED as patients who were not identified as having ID. Identifying the major contributors to increased admission for patients with ID may help improve their care.

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Running Head: Predictors of admission from the emergency department for patients with intellectual disability

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Abstract-

The goal of this investigation is to compare rates of admission from the emergency department (ED) and the characteristics of patients with intellectual disability (ID) who get admitted from the ED. This was a retrospective study using data from the United States' Nationwide Emergency Data Sample (NEDS) to investigate the associations between the diagnosis of ID and admission to the hospital in patients ≥18 years during the years 2016-2017. Adults with ID were almost 4 times as likely to be admitted to the hospital from the ED as patients who were not identified as having ID. Identifying the major contributors to increased admission for patients with ID may help improve their care.

Key Words: Intellectual disability; Hospital admission; Emergency department

Understanding characteristics and predictors of admission from the emergency department for patients with intellectual disability

People with intellectual disability (ID) face worse health outcomes compared to the general population including increased prevalence and mortality rates of epilepsy, skin diseases, and upper respiratory infections (Straetmans et al., 2007). Additionally, studies have shown that about 30-40% of people with ID also suffer from psychiatric disorders that cooccur with their disabilities (Blaskowitz et al., 2019; Cooper et al., 2007; Einfeld et al., 2011; Morgan et al., 2008). Individuals with ID may receive lower quality of healthcare because many physicians feel they do not have the expertise to address their disabilities while also treating their underlying health conditions (Krahn et al., 2015).

Patients with ID present to the emergency department more frequently than their peers without ID (Kalb et al., 2020). Each year in the US about 20% of adults from the general population visit the emergency department, with 7% getting admitted as in-patients (Capp et al., 2014; Yamaki et al., 2019). Comparatively, 30-50% of adults with ID present to the emergency department each year while 16-18% of them get admitted (Blaskowitz et al., 2019; Janicki et al., 2003; Yamaki et al., 2019). Most studies attribute this difference in presentation and admission rates to lack of adequate preventative services in the primary care setting for patients with intellectual disability. Other studies also mention that due to the complex nature of their disabilities, these patients may need more comprehensive resources that are typically found in a hospital setting (Durbin et al., 2018; Yamaki et al., 2019). Researchers have noted that a proportion of services for hospitalized ID patients are likely avoidable as some conditions could

have been treated in a primary care setting; they attribute this finding to difficulties that patients with ID may face when trying to access community-based services (Yamaki et al., 2019).

Currently, there is a lack of research that examines the differences in hospital admission rates in the United States from the emergency department for patients with ID and their peers without ID. The existing studies have primarily focused on the admission rates from the emergency department (ED) for psychiatric concerns, but we want to expand our scope and include all reasons for admission, as well as, consider the impact of an aging population of individuals with ID. In comparison to other countries in which more robust data regarding hospital admission rates and diagnoses have been reported, the absence of a national health service that ensures coverage for all US citizens leads to particular barriers to the access of health care (Iacono et al, 2020; Skorpan el al, 2016). We hypothesize that individuals in the United States with ID are admitted to the hospital more frequently than their peers without ID regardless of admitting diagnosis. If the reasons for increased admissions from the ED can be identified, then healthcare providers and administrators can work to improve health outcomes for patients with ID while also decreasing healthcare costs.

Method

Data Source

This was a retrospective study using the Nationwide Emergency Department Sample (NEDS) data for the years 2016-2017. NEDS, which was developed for the Healthcare Cost and Utilization Project (HCUP) and sponsored by the Agency for Healthcare Research and Quality (AHRQ), is the largest all-payer emergency department (ED) database in the United States, yielding national (only United States') estimates of hospital-owned ED visits ("NEDS Database

Documentation", 2021). Unweighted, it contains data from over 30 million ED visits each year; weighted, it estimates roughly 145 million ED visits. International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) were used to record all the diagnoses and procedures related a patients ED visit. The database provides discharge-level data with no patient identifiers; therefore, it was not possible to link different encounters for the same patient; therefore, analyses of the NEDS result in per-encounter (ED visit), as opposed to per-patient.

Study Sample

We restricted our analyses to adult patients who were ≥18 years of age. Patients with ID were diagnosed using ICD-10-CM codes F70-F79. The patient's socio demographic information was available in the dataset. Age was categorized as 18-39 years, 40-59 years, 60-79 years and ≥80 years. The discharge status was grouped as 'Discharged from ED', 'Admitted to hospital', Died, Discharged Against Medical Advice (DAMA) and other. The patients' income level was available in quartiles; primary payer was categorized as Medicare, Medicaid, private, self-pay and others. The patients' place of residence was grouped into metropolitan areas, micropolitan areas (non-metropolitan areas) and others (areas which were not metropolitan or micropolitan). Office of Management and Budget defines metropolitan statistical area to have at least one urbanized area of 50,000 or more inhabitants, and micropolitan statistical area to have at least one urban cluster of at least 10,000 but less than 50,000 population (Bureau, 2021). In United States, socio-demographic factors such as age, discharge status, income, primary payer and place of residence have been known to impact or be associated with the disease outcomes and therefore, these factors were considered in our study (Udoetuk et al., 2020; Masciale et al., 2021).

Statistical Analysis

We compared the patient demographics based on whether or not the patient had ID and calculated the prevalence of ID per 1,000 ED visits. Next we conducted bivariate analyses to assess the association between various patient characteristics and diagnosis of ID, stratified by age groups: 18-39 years, 40-59 years, 60-79 years and ≥80 years. Pearson's chi-squared test was utilized to conduct these bivariate associations. To compare the comorbidities among the patients with ID and their peers without ID, we looked at the frequencies of top 5 diagnoses among those with and without a diagnosis of ID. Finally, we conducted adjusted survey logistic regression to evaluate the association between diagnosis of ID and getting admitted to hospital after getting discharged from the ED. Statistical analyses were performed using R (version 3·6·1) and RStudio (Version 1·2·5001) and the Joinpoint Regression Program, version 4.7.0.0 ("Joinpoint Regression Program", 2021); we assumed a 5% type I error rate for all hypothesis tests (two-sided). This study was deemed exempt by the IRB of our organization as the study was performed on secondary, de-identified, publicly available data. Research funding support was provided by the U.S. Department of Health and Human Services and Health Resources and Services Administration for our institute's Center of Excellence in Health Equity, Training, and Research (Grant No: D34HP31024).

Results

Socio-demographic characteristics

This study examined 234,067,933 emergency department (ED) visits among adults during the study period 2016-2017, out of which 510,753 (0.2%) of the visits recorded an ICD-10 code indicating intellectual disability (ICD 70-70.9). Of all the ED visits studied, 19.0% (N=44,389,599) of visits for patients without ID resulted in admission to the hospital while

50.2% (N=256,563) of visits for patients with ID were admitted(X^2= 32454.7, p=<0.01). For admitted patients of all ages, there were 5.75 patients per 1000 ED visits with ID. For those without ID, a higher proportion of visits were by women (57.2%) compared to men (42.8%). For those with ID, this finding was reversed; 56.6% of visits for ID patients identified as male and 43.4% as female (X^2= 39187.8, p=<0.01). Medicare was listed as the primary method of payment for 64.2% of patients with ID compared to 29.0% of patients without ID. The second most common primary payment method for patients without ID was private insurance (28.4%) while it was Medicaid (27.5%) for patients with ID (X^2= 37916.5, p=<0.01) (Table 1).

Socio-demographics by age stratification

When patients with ID were stratified by age group, Medicaid was the primary payer for patients ages 18 to 39 (52.3%), and Medicare was the primary payer for patients ages 40+. In both cohorts the majority of ED visits occurred in Metro areas and in zip codes comprising the lowest income quartile. For patients with ID, the percentage of ED visits that resulted in admission within each age group appears to be directly proportional to age; with increasing age, the likelihood of admission became greater (p-value <0.0001). Within the ID 18 to 39-year age range, the percentage of visits that resulted in admission was 43.2% compared to 49.7% for 40 to 59-year-old patients, 58.5% for ages 60 to 79, and 68.7% for 80+ years (Table 2).

Comorbidities

For patients with ID aged ≥18, the most common reasons for hospital admission from the ED were septicemia (6.5%), epilepsy (3.1%), pneumonitis (2.5%), urinary tract infection (2.4%), and pneumonia (2.2%) [Table 3]. For the patients without ID group aged ≥18, the most common comorbid diagnoses included other chest pain (2.1%), unspecified chest pain (2.1%), urinary

tract infection (1.9%), headache (1.5%), and unspecified abdominal pain (1.4%). Regardless of age, septicemia was the most common diagnosis. Epilepsy (3.6%) was the second most common diagnosis for ID patients aged 18 to 59 while urinary tract infection (3.9%) was the second most common diagnosis for ID patients aged ≥60. Only in the 18 to 39-year age range in patients with ID did the psychiatric diagnoses of bipolar disorder (3.0%), unspecified schizoaffective disorder (2.8%), and bipolar type schizoaffective disorder (2.7%) appear at greater frequencies in visits leading to admission from the ED. The most common diagnoses for individuals without ID in that same 18 to 39-year age range included headache (1.9%), urinary tract infection (1.9%), abdominal pain (1.8%), and other chest pain (1.6%). A mental health disorder was not listed as one of the top five diagnoses in any age range for those without ID who were admitted to the hospital (Table 3).

Association models

Overall, patients with ID were nearly four times as likely (OR 3.94, 3.63-4.28) to be admitted to the hospital (R^2 =0.72, F=0.26, degrees of freedom (df)=1548, p<0.0001) compared to patients without ID (Table 4). Though visits of patients with ID lead to admission more commonly at every age group, the adjusted odds ratio became less pronounced as age increased. For the age group 18-39, the likelihood that a patient presenting at the ED with a diagnosis of ID would be admitted increased by about six-fold when compared to peers without ID (R^2 =0.68, F=0.36, df=1548, p<0.0001). In the 40 to 59-year age range, individuals with ID were more than three times as likely to be admitted to the hospital from the ED (R^2 =0.58, F=0.12, df=1548, p<0.0001). Meanwhile, individuals with ID ages 60 to 79 years old were 2.72 as likely to be admitted (R^2 =0.37, F=0.15, df=1548, p<0.0001), and individuals with ID ages 80+ were 2.54

times as likely to get admitted (R^2 =0.67, F=0.14, df=1548, p<0.0001) compared to their peers without ID. (Table 4)

Discussion

Summary

Our study supports the previous reports of patients with intellectual disability being admitted from the emergency department at higher rates than individuals without intellectual disability (Hosking et al., 2017; Iacono et al., 2020). By breaking down the population by age brackets, we were able to learn additional information on how age impacts this occurrence. Additionally, looking at the most common diagnoses by age range also demonstrated that psychiatric illnesses, which are commonly discussed as reasons for ED evaluation and admission for patient with intellectual disability, are only common for younger adult patients (less than age 40) presenting to the ED.

Comparisons with literature

Ailey et al reported the most frequent diagnoses for admitted adults with ID included psychoses, seizure disorders, and septicemia (Ailey et al., 2014). This study, using data broken down by age, indicated that psychoses is only a common diagnosis for patients younger than age 40. This could have important implications for how mental health resources should be targeted in the intellectual disability community. In contrast, the analysis in this study supports the prevalence of septicemia and seizure disorder as common admission diagnoses unrelated to age of patient for patients with intellectual disability. The presence of these medical diagnoses as prominent contributors to hospital admission may reflect on the idea, reported in previous studies, that better access to ambulatory care could decrease hospital admissions in patients with

ID (Durbin el al, 2018; McDermott et al, 2018). Effective primary care and specialty care (i.e. Neurology) could allow, in some cases, for earlier identification and treatment of infectious illnesses prior to their progression to sepsis or better control of seizure disorders.

We found that the prevalence of ID and resulting hospital admissions likelihood were higher in males than in females. This finding is in alignment with literature regarding other developmental disorders which reports that autism, attention deficit hyperactivity disorder (ADHD), learning disability, and Tourette's syndrome occur more commonly among boys (Thompson et al., 2003). Sex differences in dopamine neurons may, for example, explain some of the gender differences in ADHD; although further research in this area is warranted for ID.

In a systematic review published in 2017, only 7 articles were found in the English language that reported on the reason for inpatient hospital admissions for patients with ID with a comparison group of individuals without ID (Dunn et al., 2017). Of those, only 5 included data for adults with ID. Our study will contribute to this paucity of data and expand upon characteristics of those admitted using US population level data. Importantly, we start to clearly identify the differences in primary payer for those presenting to the ED with or without ID across age. The relative predominance of government funded coverage (Medicaid or Medicare) for individuals with ID allow for the consideration of how government programing could be better utilized to improve healthcare access, utilization, and delivery to decrease cost of ER and inpatient care in this population.

Strengths and Limitations

Inherent to using a large national database are some limitations. First, the data is reported as emergency department encounters without patient identifiers so a patient may have multiple ED encounters and cannot be followed over time. Second, the type of data available is limited, for example, racial/ethnic data is not available in this dataset. Additionally, the number of diagnoses reported are limited so there is the possibility that not all patients with ID are represented. Despite shortcomings, the HCUP NEDS data set has notable strengths including the sheer volume of data available and the representation of the data as hospitals from across various demographic regions are included. Importantly, as per our knowledge, this is the first study to detail the differences in admission likelihood and reason for admission by age. Having additional information by age could change the way primary care is approached based on the age of a patient with intellectual disability.

Conclusions and future direction

We believe our study adds to the sparse data available regarding the admission of patients with intellectual disability from the emergency department, particularly highlighting nuances of how age affects care for this population. Future studies could utilize these findings to examine racial/ethnic differences among different age groups of patients with ID presenting to the ED.

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Table 1

Socio-demographic characteristics of patients with and without ID presenting in the ED

	ID				
	No		Yes		Prevalence of ID per 1000 ED visits[a]
Age	**n**	**%**	**n**	**%**	
18-39 years	92373541	39.6%	172242	33.7%	1.86
40-59 years	69750862	29.9%	195182	38.2%	2.79
60-79 years	50657130	21.7%	131128	25.7%	2.58
80+ years	20775647	8.9%	12201	2.4%	0.59
Discharge Status					
Discharged	183852712	78.7%	249442	48.8%	1.35
Admitted	44389599	19.0%	256563	50.2%	5.75
Died	386253	0.2%	724	0.1%	1.87
DAMA	3874727	1.7%	1347	0.3%	0.35
Other	1053887	0.5%	2677	0.5%	2.53
Zip Income quartile					
Lowest quartile	79571490	34.1%	152822	29.9%	1.92
2nd quartile	62524544	26.8%	135777	26.6%	2.17
3rd quartile	48995266	21.0%	110636	21.7%	2.25
Highest quartile	38108886	16.3%	102816	20.1%	2.69
Missing	4356992	1.9%	8702	1.7%	1.99
Primary Payer					
Medicare	67640439	29.0%	327910	64.2%	4.82
Medicaid	57889514	24.8%	140609	27.5%	2.42
Private Insurance	66408567	28.4%	30284	5.9%	0.46
Self-Pay	41153919	17.6%	11563	2.3%	0.28
Other/Missing	464740	0.2%	387	0.1%	0.83
Sex					
Male	100030848	42.8%	288838	56.6%	2.88
Female	133500660	57.2%	221886	43.4%	1.66
Missing	25671	0.0%	29	0.0%	1.13
Place of residence					
Metro areas	191471338	82.0%	412775	80.8%	2.15
Micropolitan areas	24366557	10.4%	65799	12.9%	2.69
Others	16391935	7.0%	30859	6.0%	1.88
Missing	1327349	0.6%	1319	0.3%	0.99

Note. ID- intellectual disability, ED- emergency department, DAMA- discharged against medical advice

Bivariate associations between each socio-demographic characteristics and ID status were tested using Pearson's Chi-squared test and the all the results were statistically significant with $p<0.01$[a]
Prevalence is the rate of ID diagnosis among each patient socio-demographic characteristics

Table 2

Socio-demographic characteristics of patients with and without ID presenting in the ED stratified by different age-groups

	18-39 years			40-59 years			60-79 years			80+ years		
	Total=9254 5783	**ID=172 243**	**Prevalence of ID per 1000 ED visits**	**Total=6994 6044**	**ID=195 182**	**Prevalence of ID per 1000 ED visits**	**Total=5078 8257**	**ID=131 127**	**Prevalence of ID per 1000 ED visits**	**Total=2078 7848**	**ID=12 201**	**Prevalence of ID per 1000 ED visits**
Discharge Status												
Discharged	89.3%	55.9%	1.16	81.2%	49.3%	1.69	66.4%	40.5%	1.57	52.8%	30.5%	0.34
Admitted	8.4%	43.2%	9.43	16.4%	49.7%	8.39	31.6%	58.5%	4.76	44.9%	68.7%	0.90
Died	0.0%	0.1%	2.92	0.1%	0.1%	3.14	0.3%	0.2%	1.90	0.5%	0.2%	0.26
DAMA	2.0%	0.4%	0.42	1.9%	0.2%	0.33	1.2%	0.1%	0.23	0.6%	0.0%	0.03
Other	0.3%	0.4%	2.69	0.3%	0.6%	4.69	0.6%	0.7%	2.78	1.3%	0.5%	0.25
Zip Income quartile												
Lowest quartile	36.9%	33.5%	1.69	35.2%	29.4%	2.32	30.9%	26.6%	2.22	25.2%	24.2%	0.56
2nd quartile	27.3%	27.1%	1.84	26.3%	26.0%	2.76	26.6%	26.6%	2.58	26.4%	28.1%	0.62
3rd quartile	20.2%	20.6%	1.90	20.4%	21.8%	2.98	22.1%	22.7%	2.65	23.9%	23.0%	0.57
Highest quartile	13.9%	17.2%	2.30	15.9%	21.0%	3.67	18.4%	22.4%	3.12	23.2%	22.9%	0.58
Missing	1.6%	1.5%	1.76	2.3%	1.8%	2.23	2.0%	1.8%	2.28	1.3%	1.7%	0.76
Primary Payer												
Medicare	4.0%	32.3%	14.91	15.8%	73.7%	12.88	67.0%	89.2%	3.42	92.5%	94.5%	0.60
Medicaid	37.6%	52.3%	2.58	27.5%	20.9%	2.11	7.5%	7.3%	2.52	0.9%	2.0%	1.23
Private Insurance	32.1%	11.8%	0.68	37.1%	3.6%	0.27	19.2%	2.1%	0.29	4.8%	1.8%	0.23
Self Pay	26.1%	3.6%	0.26	19.4%	1.8%	0.26	6.1%	1.3%	0.54	1.6%	1.7%	0.60
Other/Missing	0.2%	0.1%	0.60	0.2%	0.1%	1.04	0.2%	0.1%	1.42	0.1%	0.0%	0.00
Sex												
Male	39.5%	56.7%	2.66	46.1%	57.5%	3.47	46.4%	55.8%	3.10	38.2%	47.4%	0.73

Female	60.5%	43.3%	1.33	53.9%	42.5%	2.20	53.6%	44.2%	2.12	61.8%	52.5%	0.50
Missing	0.0%	0.0%	2.11	0.0%	0.0%	0.51	0.0%	0.0%	0.79	0.0%	0.0%	1.36
Place of residence												
Metro areas	83.1%	84.2%	1.88	82.1%	80.9%	2.74	80.1%	77.0%	2.48	81.1%	73.3%	0.53
Micropolitan areas	10.2%	10.1%	1.85	10.2%	13.1%	3.57	11.1%	15.7%	3.63	10.7%	17.7%	0.97
Others	6.2%	5.3%	1.60	6.9%	5.8%	2.34	8.3%	7.1%	2.21	8.1%	8.8%	0.64
Missing	0.6%	0.4%	1.18	0.8%	0.2%	0.90	0.5%	0.2%	0.87	0.2%	0.2%	0.53

Note. ID- intellectual disability, ED- emergency department, DAMA- discharged against medical advice

Bivariate associations between each socio-demographic characteristics and ID status were tested using Pearson's Chi-squared test and the all the results were statistically significant with $p<0.01$

[a] Prevalence is the rate of ID diagnosis among each patient socio-demographic characteristics

Table 3

Top 10 comorbid diagnoses among overall population visiting the ED and among those with ID, stratified by age groups

Overall		18-39 years		40-59 years		60-79 years		80+ years	
Diagnoses	**N**	**Diagnoses**	**N**	**Diagnoses**	**N**	**Diagnoses**	**N**	**Diagnoses**	**N**
ID patients									
Septicemia, unspecified	33158	Septicemia, unspecified	7025	Septicemia, unspecified	13193	Septicemia, unspecified	11752	Septicemia, unspecified	1188
Epilepsy, unspecified, not intractable - without status epilepticus	15914	Epilepsy, unspecified, not intractable - without status epilepticus	6147	Epilepsy, unspecified, not intractable - without status epilepticus	6913	Urinary tract infection, site not specified	5079	Urinary tract infection, site not specified	638
Pneumonitis due to inhalation of food and vomit	12816	Bipolar disorder, unspecified	3392	Pneumonitis due to inhalation of food and vomit	4865	Pneumonitis due to inhalation of food and vomit	5062	Pneumonitis due to inhalation of food and vomit	599
Urinary tract infection, site not specified	12389	Schizoaffective disorder, unspecified	3223	Urinary tract infection, site not specified	4457	Pneumonia, unspecified organism	4081	Pneumonia, unspecified organism	535
Pneumonia, unspecified organism	11103	Schizoaffective disorder, bipolar type	3052	Pneumonia, unspecified organism	4225	Epilepsy, unspecified, not intractable - without status epilepticus	2715	Acute kidney failure, unspecified	313
Injury of blood vessels of head, not elsewhere classified - initial encounter	6276	Unspecified intellectual disabilities	2962	Injury of blood vessels of head, not elsewhere classified - initial encounter	2602	Acute kidney failure, unspecified	1887	Chronic obstructive pulmonary disease with (acute) exacerbation	168
Unspecified convulsions	6258	Schizophrenia, unspecified	2956	Unspecified convulsions	2458	Injury of blood vessels of head, not elsewhere	1876	Injury of blood vessels of head, not elsewhere	145

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						classified - initial encounter		classified - initial encounter	
Schizoaffective disorder, unspecified	5342	Major depressive disorder, single episode, unspecified	2718	Other chest pain	2422	Syncope and collapse	1402	Altered mental status, unspecified	141
Schizoaffective disorder, bipolar type	5286	Unspecified convulsions	2627	Chest pain, unspecified	2326	Encounter for attention to gastrostomy	1391	Epilepsy, unspecified, not intractable - without status epilepticus	140
Unspecified intellectual disabilities	5140	Pneumonitis due to inhalation of food and vomit	2290	Schizoaffective disorder, bipolar type	1895	Altered mental status, unspecified	1345	Weakness	129
Overall									
Other chest pain	5019257	Headache	1746595	Chest pain, unspecified	2099520	Chest pain, unspecified	1249861	Urinary tract infection, site not specified	771099
Chest pain, unspecified	4999482	Urinary tract infection, site not specified	1722924	Other chest pain	2004525	Other chest pain	1202061	Sepsis, unspecified organism	714389
Urinary tract infection, site not specified	4465000	Unspecified abdominal pain	1631340	Headache	1217978	Sepsis, unspecified organism	1174349	Pneumonia, unspecified organism	409026
Headache	3551271	Other chest pain	1501335	Low back pain	1180556	Chronic obstructive pulmonary disease with (acute) exacerbation	1052535	Syncope and collapse	389985
Unspecified abdominal pain	3368117	Chest pain, unspecified	1330692	Unspecified abdominal pain	1117344	Urinary tract infection, site not specified	1043393	Chest pain, unspecified	319409

Low back pain	3031628	Acute upper respiratory infection, unspecified	1267105	Urinary tract infection, site not specified	927584	Syncope and collapse	700627	Other chest pain	311336
Sepsis, unspecified organism	2830069	Acute pharyngitis, unspecified	1237099	Essential (primary) hypertension	702147	Dizziness and giddiness	684580	Acute kidney failure, unspecified	294391
Syncope and collapse	2326508	Low back pain	1208026	Dizziness and giddiness	670506	Pneumonia, unspecified organism	665199	Chronic obstructive pulmonary disease with (acute) exacerbation	279302
Acute upper respiratory infection, unspecified	2251559	Nausea with vomiting, unspecified	1082404	Sepsis, unspecified organism	647670	Essential (primary) hypertension	644324	Injury of blood vessels of head, not elsewhere classified - initial encounter	275173
Dizziness and giddiness	2130314	Non-infective gastroenteritis and colitis, unspecified	884752	Acute upper respiratory infection, unspecified	630600	Low back pain	506209	Weakness	270980

Note. ID- intellectual disability, ED- emergency department

Table 4

Adjusted survey logistic regression model to show the association between diagnosis of ID in the ED and getting admitted to hospital – overall and by age groups

	Overall		**18-39 years**		**40-59 years**		**60-79 years**		**80+ years**	
	OR(95%CI)	p-value	OR(95%CI)	p-value	OR(95%CI)	p-value	OR(95%CI)	p-value	OR(95%CI)	p-value
ID										
No	reference		reference		reference		reference		reference	
Yes	3.94(3.63-4.28)	<0.01	5.83(5.25-6.47)	<0.01	3.39(3.07-3.74)	<0.01	2.72(2.43-3.05)	<0.01	2.54(1.94-3.32)	<0.01
Age										
80+ years	reference									
18-39 years	0.18(0.17-0.19)	<0.01	—	—	—	—	—	—	—	—
40-59 years	0.35(0.34-0.36)	<0.01	—	—	—	—	—	—	—	—
60-79 years	0.63(0.62-0.64)	<0.01	—	—	—	—	—	—	—	—
Zip Income quartile										
Highest quartile	reference		reference		reference		reference		reference	
Lowest quartile	0.92(0.88-0.96)	0.05	0.8(0.74-0.85)	<0.01	0.93(0.88-0.97)	0.04	0.98(0.94-1.03)	0.87	0.94(0.89-0.99)	0.05
2nd quartile	0.92(0.88-0.96)	0.01	0.81(0.77-0.86)	<0.01	0.94(0.89-0.98)	0.05	0.98(0.94-1.02)	0.72	0.92(0.87-0.97)	<0.01
3rd quartile	0.96(0.93-1)	0.04	0.88(0.84-0.92)	<0.01	0.98(0.95-1.02)	0.35	1.00(0.97-1.04)	0.72	0.95(0.91-1.00)	0.12
Primary Payer										
Medicare	reference		reference		reference		reference		reference	
Medicaid	0.67(0.65-0.69)	<0.01	0.51(0.48-0.53)	<0.01	0.62(0.61-0.64)	<0.01	0.71(0.69-0.74)	<0.01	1.14(1.04-1.26)	<0.01
Private Insurance	0.59(0.58-0.6)	<0.01	0.45(0.43-0.48)	<0.01	0.53(0.52-0.54)	<0.01	0.62(0.6-0.63)	<0.01	0.72(0.68-0.76)	<0.01

Self-Pay	0.44(0.43-0.46)	<0.01	0.31(0.3-0.33)	<0.01	0.41(0.4-0.43)	<0.01	0.53(0.5-0.56)	<0.01	0.74(0.68-0.81)	<0.01
Other/Missing	0.6(0.46-0.78)	<0.01	0.39(0.28-0.54)	<0.01	0.52(0.39-0.69)	<0.01	0.72(0.59-0.88)	<0.01	0.88(0.63-1.23)	<0.01
Sex										
Female	reference		reference		reference		reference		reference	
Male	1.32(1.30-1.33)	<0.01	1.3(1.26-1.34)	<0.01	1.46(1.44-1.48)	<0.01	1.30(1.29-1.32)	<0.01	1.10(1.09-1.12)	<0.01
Place of residence										
Metro areas	reference		reference		reference		reference		reference	
Micropolitan areas	1.17(1.12-1.23)	<0.01	1.29(1.21-1.39)	<0.01	1.15(1.09-1.21)	<0.01	1.13(1.08-1.19)	<0.01	1.17(1.10-1.24)	<0.01
Others	0.92(0.87-0.96)	<0.01	0.93(0.87-0.99)	<0.01	0.95(0.89-1.01)	<0.01	0.91(0.87-0.96)	<0.01	0.85(0.81-0.9)	<0.01

Note: ID- intellectual disability, ED- emergency department, DAMA- discharged against medical advice