Characteristics of Younger and Older Adults with Hospital-Acquired Delirium: a Claims Data Study Spanning 14 years

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INTRODUCTION

Delirium is an acute change in mental status with a fluctuating course, and has been associated with high morbidity and mortality.¹ While delirium may affect patients of any age, most delirium prevention initiatives in the hospital focus on older adults as they are more vulnerable to developing delirium.² Little is known about delirium in younger adults. In this study, we compare the characteristics of younger (18–64 years) and older (≥ 65 years) adults with hospital-acquired delirium using claims data from 2003 to 2017.

METHODS

Data for this study were obtained from Optum Clinformatics™ Datamart. This database comprises administrative health claims from a national managed care company affiliated with Optum and Medicare Advantage Part D members. It includes 15–18 million annual covered lives and contains de-identified clinical information abstracted from medical records, pharmacy, and medical claims.

We included 14,775,245 adult patients who were discharged from a hospital between December 31, 2003, and December 31, 2017. Delirium was identified using International Classification of Disease (ICD) codes. We excluded 497,720 patients who had a diagnosis of delirium present on admission. Our Institutional Review Board exempted this study from review.

Bivariate analysis was conducted to assess differences in the characteristics between younger (18–64 years) and older (≥ 65 years) adults with delirium. For each characteristic, standardized mean difference (SMD) for each variable was calculated using the method implemented in the “tableone” package in R. SMD is defined as the mean difference between the two groups over the pooled standard deviation. SMD of 0 implies no difference was observed between the two groups for that

variable. The higher the SMD, the greater the magnitude of difference between the variables. Analysis was done using R, version 3.6.1.

RESULTS

A total of 3,233,358 patients with hospital-acquired delirium were identified. Of these, 27.5% were younger adults (Table 1). The rate of delirium was 10.8% (890,957 of 8,230,662) in younger adults and 35.8% (2,342,401 of 6,544,583) in older adults (SMD = 0.61). Compared to older adults with delirium, younger adults with delirium received more opiates (18.6% versus 10.0%) and antipsychotics (4.2% versus 1.1%), had lower mean Charlson comorbidity score (1.5 versus 2.0), and lower rates of heart failure (13.6% versus 28.3%), renal disease (11.5% versus 20.9%), and dementia (0.8% versus 8.3%).

Compared to older adults with delirium, younger adults with delirium were more often discharged home (86.5% versus 67.0%) and less often discharged to a rehabilitation facility (5.5% versus 23.7%). Thirty-day mortality was lower among younger adults (4.2% versus 8.3%) but no significant difference in the length of stay or hospitalization cost was noted between younger and older adults with delirium.

DISCUSSION

To our knowledge, this is the largest study assessing the differences between younger and older adults who were diagnosed with delirium during their hospital stay. Our study shows high rates of hospital-acquired delirium in younger (10.8%) and older adults (35.8%). Approximately 1 in 4 cases of delirium occurred in a younger adult (18–64 years old). LOS and cost were similar in younger and older adults with delirium.

This study has a few limitations. First, the population is restricted to those in the Optum Clinformatics™ Datamart comprised of commercial health plan and Medicare Advantage members, thus excluding uninsured younger adults and those with an alternate insurance (e.g., Medicaid) and older adults without Medicare part D coverage. However, since this is a large database with over 65 million covered lives from a geographically diverse area, the results are likely generalizable. Second, we used ICD codes for identifying patients with delirium. Bedside assessment for delirium would yield more

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Table 1 Characteristics of Patients with Delirium

	Younger adults (age 18–64 years) (n = 890,957)	Older adults (Age ≥ 65 years) (n = 2,342,401)	Standardized mean difference
Age at admission, mean (SD), years	50.1 (12.1)	77.0 (6.8)	2.75
Female, no. (%) ^b	471,065 (52.9)	1,312,834 (56.1)	0.06
Non-elective admission, no. (%)	550,666 (61.8)	1,609,145 (68.7)	0.14
Charlson comorbidity score, mean (SD)	1.5 (2.0)	2.0 (2.0)	0.25
Charlson comorbidity score, no. (%) ^b			0.36
0	418,580 (47.0)	717,890 (30.6)	
1–2	275,748 (30.9)	864,218 (36.9)	
3–4	121,576 (13.6)	529,976 (22.6)	
5+	75,042 (8.4)	230,306 (9.8)	
Comorbidities present on admission, no. (%)			
Diabetes mellitus	242,251 (27.2)	746,618 (31.9)	0.10
Lung disease	197,084 (22.1)	683,632 (29.2)	0.16
Heart failure	121,415 (13.6)	662,502 (28.3)	0.37
Stroke/paralysis	142,999 (16.1)	473,288 (20.2)	0.11
Renal disease	102,278 (11.5)	489,924 (20.9)	0.26
Malignancy	88,988 (10.0)	303,787 (13.0)	0.09
Dementia	6,934 (0.8)	193,306 (8.3)	0.37
Liver disease	76,893 (8.6)	104,517 (4.5)	0.17
Alcohol/drug use, no. (%)	4,069 (0.5)	2,088 (0.1)	0.07
Medications administered, no. (%)			
Opiates	165,901 (18.6)	234,620 (10.0)	0.25
Benzodiazepines	36,580 (4.1)	27,806 (1.2)	0.18
Anticholinergics	6,014 (0.7)	4,816 (0.2)	0.07
Antipsychotics	37,720 (4.2)	24,825 (1.1)	0.19
Discharge destination, no. (%) ^b			0.55
Home	723,802 (86.5)	1,492,464 (67.0)	
Rehabilitation facility	46,341 (5.5)	527,952 (23.7)	
30-day mortality, no. (%)	37,339 (4.2)	194,577 (8.3)	0.17
Length of stay, median (IQR), <i>d</i>	4.0 (2.0, 7.0)	4.0 (2.0, 6.0)	0.07
Standardized cost, median (IQR), US dollars ^c	\$10,272 (\$6,047, \$20,340)	\$11,086 (\$6,300, \$21,134)	0.02
Charge, median (IQR), US dollars ^c	\$25,349 (\$12,440, \$56,364)	\$30,885 (\$15,615, \$62,310)	0.03

SD, standard deviation; IQR, interquartile range

^aThe following International Classification of Disease (ICD) codes were used to identify patients with delirium: ICD-9-Clinical modification codes included 293.0, 780.79, 780.1, 780.97, 307.9, 348.3, 348.30, 348.39, 349.82, 348.31, 298.9, 294.11, 294.21, 294.9, 298, 297, 293.1, 780.02, 292.81, 290.41, 799.23, 799.51, 293.82, 293.81, 293.89, 293.9, 290.3, 290.20, 290.11, 290.12. The ICD-10 codes included F05, F05.0, F05.1, F05.8, F05.9, R41.0, F06.0, F06.2, F06.8, F09, F11.121, F11.122, F11.150, F11.151, F11.159, F11.221, F11.222, F11.129, F11.229, F11.23, F11.250, F11.251, F11.259, F11.920, F11.921, F11.922, F11.950, F11.951, F11.959, F11.929, F11.93, F13.239, F13.230, F13.121, F13.150, F13.151, F13.159, F13.231, F13.232, F13.250, F13.251, F13.259, F13.921, F13.931, F13.932, F13.950, F13.951, F13.959, F13.939, F13.930, F13.929, F13.920, F13.129, F13.120, F29, F22, F23, F24, R40.0, R41.0, R41.82, R41.89, R41.9, G93.4, G93.40, G93.49, G93.41, R40.4, R44, R44.0, R44.1, R44.2, R44.3, R44.8, R44.9, R45.1, R45.6, R45.87, R41.840

^bMissing values for sex: 151 in the 18–64 years group and 244 in the ≥ 65 years group; missing values for Charlson comorbidity score: 11 in the 18–64 years group and 11 in the ≥ 65 years group; missing values for discharge destination: 53,965 in the 18–64 years group and 115,570 in the ≥ 65 years group

^cDefinitions used in the Optum Clinformatics database: Standardized cost was defined as an estimate of the allowed amount for the facility charges related to that admission. Charge was defined as the amount the facility requested to be reimbursed for the service(s) provided

accurate diagnoses but is not possible in large claims data-based studies. Third, the data on alcohol and drug use is likely under-documented but we surmise that affected both groups equally. Fourth, we could only report the variables included in the database.

There is paucity of literature on delirium in younger adults. Few small studies that reported delirium in younger adults were restricted to oncology or palliative care patients and post-hematopoietic stem cell transplant recipients.^{3–5} In our study, delirium among patients 18–64 years of age was relatively common (10.8%) and was associated with similar LOS and cost as in older adults with delirium. Delirium prevention initiatives in the hospital should include high-risk younger adults along with older adults.

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Compliance with Ethical Standards:

Conflict of Interest: The authors declare that they have no conflict of interest.

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