ORIGINAL PAPER

Receipt of Telepsychiatry and Emergency Department Visit Outcomes in New York State

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Abstract

Telepsychiatry has made psychiatric care more accessible to emergency department (ED) patients. To date, most telepsychiatry studies have focused on specific populations or small groups of EDs. This study sought to examine the potential role of telepsychiatry across a wider range of EDs by comparing visit dispositions for psychiatric visits in EDs that did (versus did not) receive telepsychiatry services. ED telepsychiatry service status was identified from the 2016 National ED Inventory-USA and then linked to psychiatric visits from the 2016 New York State Emergency Department Databases/State Inpatient Databases. Unadjusted analyses and multivariable logistic regression models were used to evaluate associations between an ED's telepsychiatry service status and two clinical outcomes: use of observation services and ED visit disposition. Across all psychiatric ED visits, 712,236 were in EDs without telepsychiatry while 101,025 were in EDs with telepsychiatry. Most (99.8%) visits were in urban EDs. In multivariable logistic regression models, psychiatric visits in EDs with telepsychiatry services had lower odds (adjusted odds ratio 0.30) of using observation services compared to visits in EDs without telepsychiatry. The receipt of ED telepsychiatry is associated with lower usage of observation services for psychiatric visits, likely reducing the amount of time spent in the ED and mitigating the ongoing problem of ED crowding. An overwhelming majority of visits in EDs with telepsychiatry services were in urban hospitals with existing psychiatric services. Factors affecting the delivery and effectiveness of telepsychiatry services to hospitals lacking in psychiatric resources merit further investigation.

Keywords Psychiatry · Telemedicine · Emergency department · Observation services · Visit disposition

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Introduction

The prevalence of mental illness has increased in the U.S. since the early 1990s [1]. In 2016, over 55 million adults were living with a mental illness or substance use disorder [2]. Emergency departments (EDs) are increasingly bearing the brunt of these patients, with the rate of ED visits related to mental illness or substance use disorder increasing by 44.1% between 2006 and 2014 [3]. With many EDs lacking in the ability to efficiently care for psychiatric patients [4], these visits are more likely than non-psychiatric visits to result in inpatient admission [2]. Yet, even with increased need for resources, the number of inpatient psychiatric beds has not kept up with demand, leaving psychiatric patients spending hours in the ED waiting for transfer to an open bed and creating crowding in the ED [5]. Previous efforts to solve ED crowding has focused on diverting psychiatric patients *out of* the ED. In recent years, many have argued instead for the creation of an effective environment *within* the ED for the emergency management and treatment of psychiatric patients, with an increasing interest in the ability of telepsychiatry to alleviate the rising demand [4].

Telepsychiatry, or the receipt of telehealth services for the evaluation of ED patients who require mental or behavioral health care [6], is one of the fastest growing segments of telehealth [7]. In 2016, 20% of US EDs received telepsychiatry services [6]. The use of telepsychiatry in EDs allows remote access to psychiatric providers with expertise in emergency psychiatry, helps improve patient care, facilitate patient discharge, and prevent ED crowding [4]. Preliminary studies suggest that, in comparison to traditional face-to-face delivery of mental health services, telepsychiatry is comparable in both effectiveness and patient satisfaction [8, 9]. Patients who did not receive ED telepsychiatry services appeared to spend more time waiting for treatment or an inpatient bed, were more likely to have their visit result in inpatient admission, and were less likely to attend outpatient follow-ups [10–12]. Despite the promise of telepsychiatry, much of the current research on ED telepsychiatry use focuses either on specific patient populations based on age [9, 12] or only includes hospital-based EDs enrolled into a specific telepsychiatry intervention program [10, 11]. We sought to investigate the role of telepsychiatry across a wider and more representative range of EDs. Thus, we examined all ED visits across New York State to investigate the difference between psychiatric visits in EDs that did not receive telepsychiatry services versus visits in EDs that did.

Because disposition of patients with psychiatric complaints in the ED continues to be an area of national focus, we focused our investigation on the use of observation services during the ED visit [13–15] and the final ED visit disposition [13, 14]. While many studies have observed the effect of telepsychiatry on ED length of stay and admission/transfer outcomes in psychiatric patients [10–12], we were also interested in the observation services variable. Observation services are used when patients require a period of treatment or monitoring before an admission or discharge decision can be made, with most cases of observation stays lasting between 8 to 48 hours [15]. While under observation, a psychiatric patient would not only still be taking up space in the ED, but also be subjected to chaotic ED environments, which have been shown to worsen symptoms in psychiatric patients [4]. Thus we hoped to explore the ability of telepsychiatry to reduce need for observation services and help facilitate more efficient discharges. We hypothesized that relative to visits in EDs with telepsychiatry services, visits in EDs that did not receive telepsychiatry services would be more likely to use observation services and have higher rates of admission.

Methods

Study Design

This observational study was based on data gathered from an institutional-level survey of U.S. EDs, which was then linked to a state database with patient outcomes. New York was chosen due to the fact that the state had rural and urban EDs as well as teaching hospitals and Critical Access Hospitals (CAH). The study was approved by the Human Research Committee of Partners Healthcare.

National Emergency Department Inventory

Using the National Emergency Department Inventory (NEDI)-USA database [16], we identified 194 New York EDs open in 2016. EDs were included in NEDI-USA if they were open 24 hours per day, 7 days per week, year-round and were available for use by the general public. This included freestanding EDs (EDs that are not physically connected to a hospital) [17]. We mailed a one-page survey to all ED directors up to three times and then contacted nonresponding EDs to complete the survey through telephone interview. The 2016 NEDI-USA survey asked ED directors to report basic characteristics of their ED, including annual visit volumes and telemedicine use (see Online Supplement).

Exposure Measurement

Receipt of ED telepsychiatry was assessed with the question: "Does your ED receive telemedicine for patient evaluation?" [18]. Those who responded yes were then asked to report the clinical applications for which they used telemedicine. EDs whose directors reported use of telemedicine for psychiatry or wrote-in that they used telemedicine for "behavioral health" or "mental health" were classified as receiving telepsychiatry. We also collected: rural location, defined as ED location outside of a core-based statistical area (CBSA) [19]; CAH [20] designation; and Council of Teaching Hospitals (COTH) [21] designation.

Outcome Variables

EDs identified in the 2016 NEDI-USA database were linked to the 2016 American Hospital Association (AHA) database [22] using methods previously described [23]. Using AHA ID numbers, the NEDI-USA EDs were then linked to the New York 2016 State Emergency Department Databases (SEDD) and New York 2016 State Inpatient Database (SID). Visits in EDs that did not respond to the 2016 NEDI-USA survey or to EDs unable to be linked to the 2016 AHA database were excluded. We first compiled an overview of psychiatric services available to New York hospitals in 2016, comparing hospitals with EDs that did not report receipt of telepsychiatry services versus hospitals with EDs that did. Through the use of SEDD/SID ICD-10-CM diagnosis codes [24], we then identified visits that received a psychiatric-related primary, secondary, or tertiary diagnosis in SEDD and psychiatric visits with subsequent admissions by admitting diagnosis in SID. We obtained patient characteristics, including age, sex, race/ethnicity,

insurance status, and median household income (based on patient's ZIP code) [13, 14]. We then identified the use of observation services during the visit and the final disposition of the ED visit. The visit dispositions of interest were transfer to a short-term hospital, transfer to another type of facility (including psychiatric hospitals), or admission through the ED.

Statistical Analysis

Descriptive statistics are presented as both frequencies and percentages. We used chi-square test to evaluate bivariate associations between an ED's telepsychiatry service status and other characteristics at visit and hospital levels. A two-sided $P < 0.05$ was considered statistically significant. We then used both unadjusted and multivariable logistic regression models to examine the associations between telepsychiatry status and two outcomes: use of observation services and final ED visit disposition, with a random intercept for hospital to account for variation in dependent variables across hospitals. In the disposition model, outcome was defined as visits admitted through ED or transferred to a short-term hospital or other type of facility. Non-case was defined as visits with routine discharge. Other types of facility include a skilled nursing facility, intermediate care facility (ICF), and a psychiatric hospital or psychiatric unit. All multivariable models were adjusted for several visit and hospital characteristics. In sensitivity analyses, we re-ran our multivariable models in subpopulations restricted to adults only and patients with a primary diagnosis in SEDD. Patient data from SID had to be excluded from the primary diagnosis population, as it was not possible to tell whether the psychiatric diagnosis in the ED was primary or secondary. Results are reported as odds ratios (ORs) with 95% confidence intervals (95% CIs). All analyses were performed with SAS software, version 9.4 (SAS; Cary, NC).

Results

In 2016, there were 194 EDs open in New York State. The data from these EDs were consolidated into 160 observations [23] (each observation representing between 1 and 3 New York EDs) linked across the NEDI-USA, AHA, and SEDD/SID databases, with 18 (11%) of those being EDs that received telepsychiatry. After excluding visits in EDs that did not respond to the 2016 NEDI-USA survey, visits in the remaining 133 EDs then formed our analytic sample (Fig. 1).

Psychiatric Services in New York State

The EDs within our analytic sample were first examined for hospital psychiatric services based on data from the AHA database (Table 1). Eighteen hospitals reported having no psychiatric services. Of the 18 EDs that reported receiving telepsychiatry services in 2016, 8 (44%) also had psychiatric beds within their hospital, 13 (72%) had psychiatric emergency services, and 8 (44%) had psychiatric outpatient services. Only 1 was a CAH, with 3 others identified as teaching hospitals. EDs without telepsychiatry saw a median of 37,000 annual total ED visits, with an interquartile range of 16,000 – 75,000 visits. ED's with
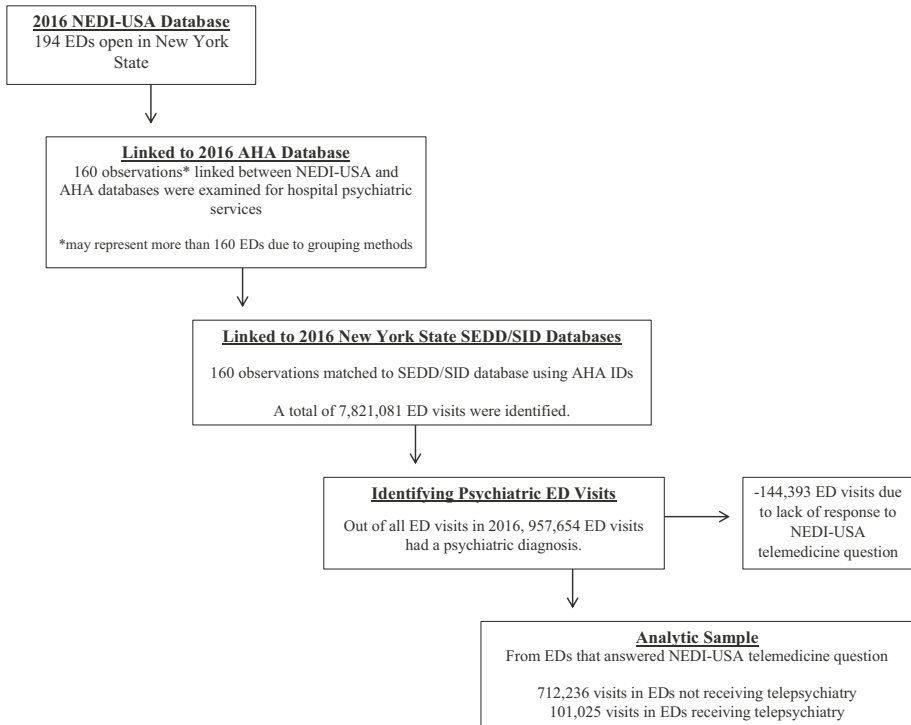
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┌─────────────────────────────────┐
│     2016 NEDI-USA Database      │
│  194 EDs open in New York       │
│           State                 │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────────────┐
│     Linked to 2016 AHA Database          │
│  160 observations* linked between         │
│  NEDI-USA and AHA databases were          │
│  examined for hospital psychiatric        │
│              services                     │
│                                           │
│  *may represent more than 160 EDs due     │
│         to grouping methods               │
└─────────────────────────────────────────┘
                 │
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┌─────────────────────────────────────────────────┐
│  Linked to 2016 New York State SEDD/SID Databases │
│                                                   │
│  160 observations matched to SEDD/SID database    │
│            using AHA IDs                           │
│                                                   │
│  A total of 7,821,081 ED visits were identified.  │
└─────────────────────────────────────────────────┘
                 │
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┌─────────────────────────────────────┐      ┌──────────────────────┐
│   Identifying Psychiatric ED Visits  │      │ -144,393 ED visits due│
│                                      │─────▶│ to lack of response to│
│  Out of all ED visits in 2016,       │      │      NEDI-USA         │
│  957,654 ED visits had a psychiatric │      │ telemedicine question │
│            diagnosis.                │      └──────────────────────┘
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                 │
                 ▼
┌──────────────────────────────────────────────┐
│              Analytic Sample                  │
│  From EDs that answered NEDI-USA telemedicine │
│                  question                     │
│                                               │
│  712,236 visits in EDs not receiving          │
│              telepsychiatry                   │
│  101,025 visits in EDs receiving              │
│              telepsychiatry                   │
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Fig. 1 Inclusion flow diagram. Abbreviations: NEDI, National Emergency Department Inventory; ED, Emergency Department; AHA, American Hospital Association; SEDD, State Emergency Department Databases; SID, State Inpatient Database

telepsychiatry services saw a median of 50,000 total ED visits per year, with an interquartile range of 34,500-87,500 visits.

Psychiatric ED Visits and Telepsychiatry

Across all EDs consolidated into our analytic sample, there were 7,821,081 total ED visits. Among those visits, 957,654 (12%) received a psychiatric diagnosis. Among these visits, 712,236 (74%) were in an ED without telepsychiatry and 101,025 (11%) were in an ED with telepsychiatry; 144,393 (15%) visits were excluded due to their unknown telepsychiatry status. The receipt of telepsychiatry services was associated with several patient and hospital characteristics (Table 2). In bivariate comparisons, visits in EDs with telepsychiatry services were more likely to occur in an urban ED (99.8% vs 98%), EDs with >40,000 annual visits (83% vs 77%) , and among patients with public (63% vs 62%) or private insurance (24% vs 21%).

Telepsychiatry Receipt Status and Visit Disposition

Observation services were used in 2.3% of visits presenting to EDs with telepsychiatry, versus 2.7% of patients presenting to EDs without. We found that visits in EDs without

Table 1 Facility characteristics of New York State Emergency Departments without and with telepsychiatry services, 2016

Hospital Characteristics	EDs answered tel-emedicine question	EDs without telepsychiatry services	EDs with telepsychiatry services
	(n = 133)	(n=115)	(n=18)
Psychiatric Services, n(%)			
Psychiatric care beds	60 (45)	52 (45)	8 (44)
Alcoholism-chemical dependency care services	33 (25)	30 (26)	3 (17)
Psychiatric education services	51 (38)	41 (36)	10 (56)
Psychiatric emergency services	69 (52)	56 (49)	13 (72)
Psychiatric outpatient services	59 (44)	51 (44)	8 (44)
Psychiatric partial hospitalization services	21 (16)	18 (16)	3 (17)
Psychiatric residential treatment	7 (5.2)	6 (5.2)	1 (5.6)
None	18 (14)	15 (13)	3 (17)
Annual total ED visits, n(%)			
< 10,000	14 (11)	13 (11)	1 (5.6)
10,000-19,999	20 (15)	19 (17)	1 (5.6)
20,000-39,999	32 (24)	27 (23)	5 (28)
≥40,000	67 (50)	56 (49)	11 (61)
Teaching Hospital, n(%)	13 (10)	10 (8.7)	3 (17)
Critical Access Hospital, n(%)	16 (12)	15 (13)	1 (5.6)
Location of Hospital (CBSA code), n(%)			
Urban	122 (92)	105 (91)	17 (94)
Rural	11 (8.3)	10 (8.7)	1 (5.6)

Abbreviations: *ED* emergency department, *CBSA* core-based statistical area

telepsychiatry were less likely to result in admission or transfer than visits in EDs with telepsychiatry. When comparing psychiatric visits in EDs without telepsychiatry versus those with telepsychiatry, 12% versus 14% resulted in admission or transfer to a short-term hospital, 83% versus 78% resulted in routine discharge, and 2% versus 5% resulted in transfer to another type of facility.

In multivariable analyses (Table 3), psychiatric visits in EDs with telepsychiatry were three times less likely to use observation services (P = 0.03), after adjusting for patient demographic characteristics and hospital characteristics. In a separate multivariable analysis for final ED visit disposition (Table 4), psychiatric visits in EDs without telepsychiatry had similar odds of admission through the ED, transfer to a short-term hospital, or transfer to another type of facility, compared to psychiatric visits in EDs with telepsychiatry. In a sensitivity analysis restricting our analytical population to those with documentation of a primary psychiatric diagnosis in SEDD, visits in EDs with telepsychiatry remained less likely to have used observation services (adjusted OR 0.35, 95%CI 0.12-0.99, P = 0.048), and ED telepsychiatry status remained unassociated with ED disposition. In another sensitivity analysis restricting our analytical population to adults only, observation service also occurred less often in visits in EDs with telepsychiatry service (adjusted OR 0.30, 95% CI 0.10-0.85, P = 0.02). Adult patients had similar ED dispositions regardless of ED telepsychiatry status.

Table 2 Visit characteristics among psychiatric visits in Emergency Department without and with telepsychiatry services, 2016

Visit Characteristics	Total psychiatric ED visits (n=813,261) N (%)	Psychiatric visits in EDs without telepsychiatry services (n=712,236) N (%)	Psychiatric visits in EDs with telepsychiatry services (n=101,025) N (%)	P-value
Age Group				<0.001
<1 year	177 (0.02)	129 (0.02)	48 (0.05)	
1-17 years	58,404 (7)	49,786 (7)	8,618 (9)	
18-44 years	452,988 (56)	400,801 (56)	52,187 (52)	
45-64 years	233,953 (29)	204,150 (29)	29,803 (30)	
65+ years	67,739 (8)	57,370 (8)	10,369 (10)	
Sex				0.73
Male	446,704 (55)	391,264 (55)	55,440 (55)	
Female	366,557 (45)	320,972 (45)	45,585 (45)	
Race/Ethnicity				<0.001
Non-Hispanic White	406,466 (50)	363,669 (51)	42,797 (42)	
Non-Hispanic Black	189,969 (23)	167,124 (23)	22,845 (23)	
Hispanic	107,724 (13)	85,801 (12)	21,923 (22)	
Asian, Pacific Islander or Native American	17,937 (2)	15,730 (2)	2,207 (2)	
Other	91,165 (11)	79,912 (11)	11,253 (11)	
Insurance Status				<0.001
Private	171,741 (21)	147,998 (21)	23,743 (24)	
Public	508,367 (63)	444,325 (62)	64,042 (63)	
Self-pay	99,854 (12)	88,773 (12)	11,081 (11)	
Other	33,299 (4)	31,140 (4)	2,159 (2)	

Disposition of Patient

Table 2 (continued)

Visit Characteristics	Total psychiatric ED visits (n=813,261) N (%)	Psychiatric visits in EDs without telepsychiatry services (n=712,236) N (%)	Psychiatric visits in EDs with tel-epsychiatry services (n=101,025) N (%)	P-value
Admission through ED/Transfer to short-term hospital	99,477 (12)	85,094 (12)	14,383 (14)	<0.001
Routine discharge	672,380 (83)	593,182 (83)	79,198 (78)	
Transfer to another type of facility	22,270 (3)	17,241 (2)	5,029 (5)	
Home health care	715 (0.1)	644 (0.1)	71 (0.1)	
Left against medical advice	17,671 (2)	15,375 (2)	2,296 (2)	
Died	493 (0.1)	445 (0.1)	48 (0)	
Discharge alive, destination unknown, or Missing disposition	255 (0.03)	255 (0.04)	*	
Presence of Observation Stay				
Yes	21,398 (3)	19,066 (3)	2,332 (2)	<0.001
No	791,863 (97)	693,170 (97)	98,693 (98)	
Location of Hospital (CBSA code)				
Urban	799,122 (98)	698,277 (98)	100,845 (99.8%)	<0.001
Rural	14,139 (2)	13,959 (2)	180 (0)	
Annual total ED visits				
< 10,000	9,648 (1)	9,468 (1)	180 (0)	<0.001
10,000-19,999	39,349 (5)	36,392 (5)	2,957 (3)	
20,000-39,999	132,989 (16)	118,740 (17)	14,249 (14)	
≥40,000	631,275 (78)	547,636 (77)	83,639 (83)	
Teaching Hospital	155,008 (19)	129,646 (18)	25,362 (25)	<0.001
Critical Access Hospital	16,077 (2)	15,897 (2)	180 (0)	<0.001

Table 2 (continued)

Visit Characteristics	Total psychiatric ED visits (n=813,261) N (%)	Psychiatric visits in EDs without telepsychiatry services (n=712,236) N (%)	Psychiatric visits in EDs with tel-epsychiatry services (n=101,025) N (%)	P-value
Median household income based on patient's zipcode				
1-42,999	270,703 (33)	244,850 (34)	25,853 (26)	<0.001
43,000-53,999	215,533 (27)	204,635 (29)	10,898 (11)	
54,000-70,999	152,680 (19)	133,591 (19)	19,089 (19)	
≥71,000	161,324 (20)	117,867 (17)	43,457 (43)	
Missing	13,021 (2)	11,293 (2)	1,728 (2)	

Visits in public insurance group are paid with Medicare or Medicaid. "Other" includes visits paid with other type of insurance type (i.e., Worker's Compensation), without any charge, or missing insurance information

Abbreviations: ED emergency department, *CBSA* core-based statistical area

*Cell represents less than 10 patients

Table 3 Logistic regression of using observation services by Emergency Department telepsychiatry service status, 2016

Characteristics	Unadjusted OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Psychiatric Visits to EDs with Telepsychiatry Services	0.38	(0.13, 1.15)	0.09	0.30	(0.10,0.88)	0.03
Age Group						
18-44 years	1.00	Ref		1.00	Ref	
<1 year	2.08	(0.84, 5.19)	0.12	2.12	(0.85,5.31)	0.11
1-17 years	0.87	(0.81, 0.94)	<0.001	0.82	(0.76,0.88)	<0.001
45-64 years	2.08	(2.02, 2.15)	<0.001	2.07	(2.01,2.14)	<0.001
65+ years	4.45	(4.29, 4.63)	<0.001	4.45	(4.28,4.64)	<0.001
Sex						
Male	1.00	Ref		1.00	Ref	
Female	1.16	(1.13, 1.19)	<0.001	1.08	(1.05,1.11)	<0.001
Race/Ethnicity						
Non-Hispanic White	1.00	Ref		1.00	Ref	
Non-Hispanic Black	0.73	(0.71, 0.76)	<0.001	0.94	(0.90,0.98)	0.01
Hispanic	0.71	(0.67, 0.75)	<0.001	0.95	(0.90,1.01)	0.10
Asian or Pacific Islander or Native American	0.85	(0.77, 0.94)	0.002	1.08	(0.97,1.20)	0.17
Other	0.73	(0.69, 0.78)	<0.001	0.93	(0.87,0.99)	0.03
Insurance Status						
Private	1.00	Ref		1.00	Ref	
Public (Medicare vs. Medicaid)	0.95	(0.92, 0.98)	0.001	0.77	(0.74,0.79)	<0.001
None (Self-pay)	0.60	(0.56, 0.64)	<0.001	0.63	(0.59,0.67)	<0.001
Other (No Charge, Other and Missing)	0.75	(0.68, 0.82)	<0.001	0.71	(0.64,0.78)	<0.001
Location of Hospital (CBSA code)						
Urban	1.00	Ref		1.00	Ref	
Rural	1.70	(0.44, 6.62)	0.45	1.02	(0.22,4.80)	0.98
Annual total ED visits per thousand	0.99	(0.98, 0.996)	0.001	0.99	(0.98,0.99)	0.001
Teaching Hospital	0.68	(0.19, 2.37)	0.54	2.83	(0.69,11.63)	0.15
Critical Access Hospital	1.66	(0.52, 5.29)	0.39	0.74	(0.19,2.85)	0.66

Table 3 (continued)

Characteristics	Unadjusted OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Median Household Income						
1-42,999	1.00	Ref		1.00	Ref	
43,000-53,999	1.24	(1.19, 1.29)	<0.001	1.16	(1.10,1.21)	<0.001
54,000-70,999	1.38	(1.32, 1.43)	<0.001	1.20	(1.15,1.26)	<0.001
≥71,000	1.56	(1.49, 1.64)	<0.001	1.27	(1.20,1.34)	<0.001

Abbreviations: ED emergency department, *OR* odds ratio, *CI* confidence interval, *CBSA* core-based statistical area

Table 4 Logistic regression of transfer or admission through ED by Emergency Department telepsychiatry service status, 2016

Characteristics	Unadjusted OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Psychiatric Visits to ED's with Telepsychiatry Services	0.99	(0.62, 1.58)	0.98	0.91	(0.57, 1.45)	0.70
Age Group						
18-44 years	1.00	Ref		1.00	Ref	
<1 year	0.59	(0.36, 0.96)	0.034	0.54	(0.33, 0.88)	0.01
1-17 years	1.03	(1.004, 1.06)	0.02	0.99	(0.97, 1.02)	0.57
45-64 years	1.26	(1.24, 1.28)	<.001	1.18	(1.16, 1.20)	<.001
65+ years	1.62	(1.59, 1.66)	<.001	1.38	(1.35, 1.42)	<.001
Sex						
Male	1.00	Ref		1.00	Ref	
Female	0.92	(0.90, 0.93)	<.001	0.86	(0.85, 0.88)	<.001
Race/Ethnicity						
Non-Hispanic White	1.00	Ref		1.00	Ref	
Non-Hispanic Black	0.79	(0.78, 0.81)	<.001	0.82	(0.80, 0.83)	<.001
Hispanic	0.78	(0.76, 0.80)	<.001	0.82	(0.80, 0.84)	<.001
Asian or Pacific Islander or Native American	0.94	(0.90, 0.98)	0.008	0.99	(0.95, 1.03)	0.64
Other	0.81	(0.79, 0.83)	<.001	0.90	(0.87, 0.92)	<.001
Insurance Status						
Private (Private insurance)	1.00	Ref		1.00	Ref	
Public (Medicare vs. Medicaid)	1.36	(1.33, 1.38)	<.001	1.34	(1.32, 1.37)	<.001
None (Self-pay)	0.40	(0.39, 0.41)	<.001	0.42	(0.40, 0.43)	<.001
Other (No Charge, Other and Missing)	0.76	(0.72, 0.79)	<.001	0.76	(0.73, 0.80)	<.001
Location of Hospital (CBSA code)						
Urban	1.00	Ref		1.00	Ref	
Rural	0.82	(0.46, 1.47)	0.51	1.30	(0.64, 2.61)	0.47
Annual total ED visits per thousand	1.00	(0.999, 1.004)	0.34	1.00	(0.998, 1.01)	0.28
Teaching Hospital	0.95	(0.56, 1.62)	0.85	0.76	(0.40, 1.43)	0.39
Critical Access Hospital	0.57	(0.35, 0.93)	0.02	0.51	(0.28, 0.93)	0.03

Table 4 (continued)

Characteristics	Unadjusted OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Median Household Income						
1-42,999	1.00	Ref		1.00	Ref	
43,000-53,999	1.12	(1.10, 1.14)	<.001	1.11	(1.09, 1.14)	<.001
54,000-70,999	1.21	(1.18, 1.24)	<.001	1.21	(1.18, 1.24)	<.001
≥71,000	1.18	(1.16, 1.21)	<.001	1.18	(1.15, 1.21)	<.001

Abbreviations: *ED* emergency department, *OR* odds ratio, *CI* confidence interval, *CBSA* core-based statistical area

Discussion

Through linkage of multiple 2016 datasets, we were able to compare visit- and hospital-level characteristics across 813,261 visits in New York EDs, with an analytic focus on the ED's receipt of telepsychiatry services. We examined the association of telepsychiatry in the ED with two specific outcomes of an ED visit; the use of observation services and final ED visit disposition. Psychiatric visits in EDs without telepsychiatry, compared to those with, were three times more likely to have used observation services, but still had similar odds of being admitted or transferred as their final ED disposition.

To our knowledge, this study is the first to investigate the role of telepsychiatry across an entire state's EDs, with a focus on patient disposition. Prior studies on the potential of telepsychiatry for use within ED settings were conducted within very specific settings, with some only focusing on pediatric populations or only among certain hospital systems [9–12]. While one prior study investigated the impact of telepsychiatry across South Carolina, only visits in hospitals enrolled in the state telepsychiatry program were eligible to be matched to visits in hospitals without telepsychiatry, limiting the generalizability to hospitals not receiving telepsychiatry through this dedicated state program [10]. By examining all EDs across New York State, we found that visits in EDs with telepsychiatry had lower odds of observation unit use while maintaining similar admission and transfer outcomes as visits in EDs without. Though we conducted a separate analysis excluding children from the population, we did not find that it materially affected results. This finding is consistent with previous research, in which, telepsychiatry has been suggested as a potential solution for patients in EDs without in-house psychiatric services, with evidence suggesting that telepsychiatry is comparable on several measures [8–12].

With many ED's lacking the ability to care for psychiatric patients, these patients are often left in the ED waiting for transfer to an inpatient bed, exacerbating the problem of crowding in EDs [4]. Research suggests that the use of specialized observation services can reduce inpatient admission rates for psychiatric patients. However, it must be noted that this requires investment into the specialized resources that would allow psychiatric patients under observation to receive efficient and safe care [25], something most EDs lack [4]. Even with an efficient environment, the use of observation services, by definition, increases the amount of time spent in the ED [15] and does not resolve the problem of crowding in the ED, especially when other ED patients may require observation. In our findings, visits in EDs with telepsychiatry were less likely to use observation services while maintaining similar disposition outcomes. Though a low percentage of all psychiatric ED visits used observation services (Table 2), it is possible that what is considered use of observation services in one ED may be considered part of ED length of stay in another ED with no official observation unit [15]. Our findings still lend support to telepsychiatry's ability to reduce overall time spent in EDs [11], whether the visit involves official use of observation services or non-classified time spent waiting for treatment.

With the increase in psychiatric-related visits in the ED in recent years, rural EDs have struggled to accommodate these patients as an increase in urban migration has led to decreased access to specialists and consultants in rural areas [26]. In New York, 40 out of its 62 counties were designated as Mental Health Shortage areas in 2014 [27]. Telepsychiatry has been touted before as a solution for rural EDs to access necessary mental health resources [28]. Despite this, we found that among our analytic sample, 98% of visits were in EDs in urban hospitals, with 99.8% of visits in EDs with telepsychiatry services occurring in urban hospitals. Only one hospital with telepsychiatry services reported having a

CAH designation. These findings differ from results of a nationally representative sample, where EDs in rural areas or carrying CAH designations made up a higher proportion of EDs that received telepsychiatry [6]. It is unclear why a state with a documented need for mental health resources in its rural counties [29] sees the highest rate of telepsychiatry use in its urban hospitals or in hospitals with in-house psychiatric services. However, based on recent research on barriers to use of telemedicine by rural hospitals [26], we can hypothesize that cost and technologic concerns have played a role in the lack of telepsychiatry services in rural EDs despite research supporting its use.

The financial sustainability of telepsychiatry programs is not a new concern, as many programs are grant-funded and risk dissolution upon the disappearance of the grant [30]. In regards to technology, hospitals often use different electronic medical records systems, making it difficult to transfer information gathered by the ED provider to the off-site clinician [31]. To address these concerns, we encourage more research into alternative telepsychiatry delivery methods that help to reduce cost and technological difficulties. For example, a recent study examined the effect of psychiatric assessment officers in rural New York EDs [32]. A group of officers, including licensed social workers, mental health counselors, and psychiatric nurses, were integrated into EDs for 8 hours daily to help perform psychiatric evaluations and coordinate further care via telepsychiatry. This method cut costs by reducing the amount of time a licensed psychiatrist was needed and making use of lower-cost behavioral health providers.

In addition to the cost of telepsychiatry itself, hospitals must also obtain reimbursement for these patients through their insurance companies, an issue that telehealth experts have identified as a major barrier for incorporating telemedicine into everyday healthcare practice [33]. Within the US, Medicare covers telepsychiatry services only under certain specifications (e.g., historically for patients living in rural areas) [34, 35]. However, while it was found that there was an increase in rural Medicare beneficiaries who were able to access telepsychiatry services from 2004 to 2014, an overwhelming amount were using telepsychiatry to supplement in-person psychiatric care. Only 15% of beneficiaries used telepsychiatry as their sole source of mental health care [36]. Within the psychiatric ED visits that we examined, most (63%) were paid for by public insurance (including Medicare) and 98% occurred within urban settings. These findings parallel those found by Mehrotra et al. [36] and further support the benefit of Medicare coverage pivoting from its historic targeted population of rural beneficiaries. By adding the ability to cover telepsychiatry use in urban EDs, this could ensure the program is truly helping to increase access to care for those who do not have other sources of emergency psychiatric care. Currently, due to the COVID-19 pandemic, restrictions have been relaxed to allow Medicare coverage for use of telehealth in urban areas [37]. An extension of the current waiver could help motivate hospitals previously unwilling to invest in telepsychiatry services due to their location in a non-rural area.

Limitations

Our study has potential limitations. First, our decision to focus on one state limits the study's statistical power as compared to analyzing a national sample. However, we chose New York not only due to its many Mental Health Shortage areas [27] but also because New York has both rural and urban EDs (Table 1), in addition to teaching hospitals and CAHs [19, 20]. The state had 7.8 million ED visits in 2016, which gave us a relatively large sample to analyze. Additionally, psychiatric patients also often struggle with physical

health issues, which can complicate care and cause situations where their psychiatric illness is not the primary diagnosis for their ED visit but is still an underlying issue that requires treatment [38]. These could have excluded them from being in our visit population, however, we mitigated this issue by including visits where the secondary and tertiary diagnosis in SEDD were also psychiatric related. Our sensitivity analysis also showed the same difference in observation service usage and similar patient's disposition among primarily diagnosed visits in EDs with and without telepsychiatry. In addition, the data we used was primarily administrative data for billing purposes and does not offer the in-depth detail of individual chart reviews. However, the SEDD/SID databases are often used to study patient-level data and outcomes across an entire state [39, 40]. Lastly, our study identified telepsychiatry service status as an ED-level variable rather than a visit-level variable, thus it is unknown which individual patients received telepsychiatry services versus in-person exams. Given that this is the first study to examine ED telepsychiatry state wide, review of service status at the facility level is appropriate. Given our finding that visits in EDs with telepsychiatry are less likely to use observation services, we encourage future studies to look into the possibility of identifying telepsychiatry use on a visit-level.

Conclusion

We investigated the association of ED-based telepsychiatry and ED visit outcomes across all psychiatric-related ED visits in New York State during 2016. Compared to EDs without telepsychiatry, the presence of telepsychiatry was associated with decreased odds of an observation stay, with similar final ED disposition. Factors affecting the delivery and effectiveness of telepsychiatry services to ED patients merit further investigation, especially in EDs with few resources or with a lack of any emergency psychiatric services whatsoever.

Data Availability The authors confirm that the data supporting the findings of this study are available within the article.

Code Availability Not applicable.

Declarations

Ethics Approval This article does not contain any studies with human participants or animals performed by any of the authors.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

Conflict of Interest None of the authors have any potential conflicts of interest that affected the reporting of this work.

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