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ED utilization of medical clearance testing for psychiatric admission: National Hospital Ambulatory Medical Care Survey analysis

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Abstract

Introduction—Routine medical clearance testing of emergency department (ED) patients with acute psychiatric illnesses in the absence of a medical indication has minimal proven utility. Little is known about the variations in clinical practice of ordering medical clearance tests.

Methods—This study was an analysis of data from the annual United States National Hospital Ambulatory Medical Care Survey from 2010 to 2014. The study population was defined as ED visits by patients 18 years old admitted to a psychiatric facility. We sought to determine the percentage of these ED visits in which at least one medical clearance test was ordered. Using a multivariate logistic regression model, we also evaluated whether patient visit factors or regional variation was associated with use of medical clearance tests.

Result—A medical clearance test was ordered in 80.4% of ED visits ending with a psychiatric admission. Multivariate logistic regression demonstrated a statistically significant increased odds ratio (OR) of medical clearance testing based on age (OR 1.02, 95%CI 1.01, 1.03), among visits involving an injury or poisoning (OR 2.38, 95%CI 1.54, 3.68), and in the Midwest region as compared to the Northeast region (OR 2.2, 95% confidence interval [CI] 1.09, 4.46), after adjusting for other predictors.

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Declaration of interests

The authors (BY, AS, BW, CW, AR) report no conflicts of interest.

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Discussion—Our study demonstrated that, on a national level, 4 out of 5 ED visits resulting in a psychiatric facility admission had a medical clearance test ordered. Future research is needed to investigate the reasons underlying the discrepancies in ordering patterns across the U.S., including the effect of local psychiatric admission policies.

Keywords

Psychiatry; Psychiatric emergency services; Routine diagnostic tests

1. Introduction

In 2017, the American College of Emergency Physicians (ACEP) updated their earlier 2006 clinical policy “Critical Issues in the Diagnosis and Management of the Adult Psychiatric Patient in the Emergency Department” [1]. The update reaffirmed the recommendation of the 2006 ACEP clinical policy: “Do not routinely order laboratory testing on patients with acute psychiatric symptoms. Use medical history, previous psychiatric diagnoses, and physician examination to guide testing” [1]. This recommendation was consistent with previous work showing limited utility for routine medical clearance testing for patients presenting to the emergency department (ED) with acute psychiatric illness [2,3].

Many psychiatric hospitals require screening diagnostic studies for medical clearance prior to psychiatric admission [4–6]. A better understanding of the variation in medical clearance testing for psychiatric admissions is needed to inform clinicians and policymakers about potential targets for interventions to reduce unnecessary testing and decrease healthcare costs.

While previous work has attempted to ascertain the utility of routine medical clearance tests for psychiatric admissions [3,5,7–12], little is known about the overall adherence to the ACEP guidelines and variations in clinical practice of ordering medical clearance tests. We aimed to address this knowledge gap by determining the percentage of ED visits ending with an admission to a psychiatric facility that had a medical clearance test ordered, and whether geographic region or other variables are associated with use of such tests.

2. Material and methods

2.1. Study design

This descriptive study was a secondary analysis of data collected from the National Hospital Ambulatory Medical Care Survey (NHAMCS), and met criteria for exemption by the Institutional Review Board.

2.2. Study setting and population

NHAMCS is an annual, national probability sample of ambulatory visits to non-federal, general, and short-stay hospitals in the United States (U.S.) [13]. NHAMCS uses a four-stage probability sampling design, collecting a nationally representative sample of ED visits. At each sampled hospital, trained hospital staff members monitored by the U.S. Census

Bureau's agents complete a patient record form of each sampled visit during a randomly assigned 4-week reporting period.

We analyzed NHAMCS data from 2010 to 2014. The study population was defined as ED visits by patients 18 years old in which the patient was transferred to a psychiatric facility or admitted to a mental health or detoxification facility.

2.3. Study protocol

The primary predictor variable was hospital geographic region (West, Northeast, Midwest, or South). Additional predictors included patient age, sex, race, insurance status, presence of at least one of the following chronic medical conditions (HIV, diabetes, stroke, dialysis, or congestive heart failure), visit related to injury or poisoning, and provider type. Providers were categorized as having been seen by an attending physician, resident (defined as intern or resident), or advanced practice provider (physician assistants and nurse practitioners).

2.4. Outcome

The primary outcome measured was presence of at least one of the following medical clearance studies [14]: complete blood count (CBC), electrolytes, blood urea nitrogen/creatinine (BUN/Cr), blood alcohol concentration (BAC), liver function tests (LFT), toxicology screen, or electrocardiogram (EKG). Toxicology screen included both urine and serum tests. This list was chosen because it includes several tests routinely requested by inpatient psychiatric facilities prior to psychiatric admission independent of a medical indication for testing.

2.5. Data analysis

We reported unweighted raw ED visits along with weighted national representative size and proportions. We reported the yearly trends of number of visits which ended with a transfer to a psychiatric facility or admitted to a mental health or detoxification facility. We performed a multivariable logistic regression to assess the independent associations between the presence of medical clearance labs and predictors.

All analysis were conducted using SAS 9.4 (Cary, NC) and incorporated NHAMCS complex survey design features including cluster, strata, and probability weights to produce nationally representative estimates. As recommended, prior to analysis we evaluated for any estimates that had <30 samples per cell [15]. Statistical significance was defined by $p < 0.05$.

3. Results

From 2010 to 2014, the NHAMCS included an unweighted total of 112,293 ED visits, representing a weighted sample of 133 million yearly ED visits, of which an estimated 1.2 million (0.91%) visits resulted in a transfer to a psychiatric facility or admission to a mental health or detoxification facility. The average age in our sample was 41.8 years old (95%CI 40.6, 42.9) and the majority of visits were by males (55.17%) and non-Hispanic white patients (69.44%). Of note, estimates for non-Hispanic-other patients were excluded due to a

small subgroup size and poor reliability in standard error estimates. Additional visit characteristics are reported in Table 1.

Over the 5-year study period, 80.37% of patients undergoing psychiatric admission received at least one medical clearance test. Fig. 1 displays the proportion of ED visits admitted to a psychiatric facility that had medical clearance testing across the study years. The most frequently ordered tests were CBC (68.67%) and toxicology screening (50.61%). Additional frequencies of tests are reported in Table 2. Of note, 24.7% of included visits that received testing had a diagnosis consistent with injury or poisoning.

A multivariate logistic regression showed a statistically significant increased odds ratio (OR) of medical clearance testing in the Midwest region as compared to the Northeast region (OR 2.2, 95% confidence interval [CI] 1.09, 4.46), based on age (OR 1.02, 95%CI 1.01, 1.03), and among visits involving an injury or poisoning (OR 2.38, 95%CI 1.54, 3.68), after adjusting for sex, race, insurance status, presence of at least one of the following chronic medical conditions (HIV, diabetes, stroke, dialysis, or congestive heart failure), and provider type. The results of the multivariate logistic regression are reported in Table 3.

4. Discussion

In this analysis of national survey data, we found that medical clearance testing was ordered in >4 out of 5 ED visits ending with a transfer to a psychiatric facility or admission into a mental health or detoxification facility. After adjusting for other predictors, visits related to injury or poisoning, ED visits in the Midwest compared to the Northeast, and age were each statistically significant for an increased OR of ordering medical clearance testing. Our findings have important implications from a clinical practice and health policy perspective.

First, the ACEP clinical policy specified that routine laboratory testing without a medical indication, including toxicology screening, for patients with acute psychiatric illness has little or no use in the ED [1]. Yet, our study showed that, on a national level, 80% of ED visits resulting in psychiatric facility admission had a medical clearance test ordered. While there likely was medically indicated testing based on the examination and history of the patients, a large percentage of the testing may have been performed for screening purposes. Consistent with a prior regional study evaluating medical clearance testing in the ED [3], the most commonly ordered tests among our nationally representative sample of ED visits ending with an admission to a psychiatric facility were a CBC and toxicology screen.

Indications and objectives of medical clearance testing for psychiatric admission are a vaguely-defined concept [12]. This likely contributed to the variation and proportion of medical clearance testing. In addition, an external factor, such as local psychiatric admission policies, may require testing of all patients with acute psychiatric illness prior to admission to a psychiatric facility. Although our results do not suggest an ideal proportion of testing, a substantial body of literature has demonstrated that these tests rarely result in a change in management [3,5,7–12]. Additional research should compare outcomes and costs associated with mandatory versus clinically indicated medical clearance testing psychiatric admission policies.

The financial implications of these tests were substantial. Within the 5-year study period, there were 1120 visits in the sample, representing 833,200 ED visits a year ending with an admission to a psychiatric facility, where a CBC was ordered. Although actual costs for patients covered by different insurers at different hospitals may differ, the 2017 Medicare clinical diagnostic laboratory fee schedule rate for a CBC is \$10.66 [16], resulting in an estimated cost of \$8.9 million per year.

Second, after controlling for predictors, compared with the Northeast region, the Midwest had a statistically significant higher rate of medical clearance testing. Our results were consistent with prior studies that also found a higher use of certain tests in the Midwest [17–19]. Reasons for these regional differences in utilization of testing are multifactorial and most likely due to differences in local practice patterns, local policies, and access to healthcare [17]. Collaboration between the specialties of emergency medicine and psychiatry to establish national standards for medical clearance testing indications and quality measures may be necessary to reduce this variation.

Third, increasing age and visits associated with injury or poisoning were each associated with a statistically significant OR of ordering medical clearance tests after adjusting for other predictors. These results provide face validity to the model as it clinically makes sense that a clinician would be more likely to order tests during an ED visit for older patients, due to diagnostic uncertainty, or for a patient who attempted to injure him or herself. However, of all the ED visits that included a medical clearance test, only 24.7% had a patient diagnosis associated with an injury or poisoning, suggesting that acute self-injury alone was unlikely to fully account for the reasons for testing.

4.1. Limitations

This was a secondary analysis of a nationally representative database, which provided visit-level data and lacks the granularity of clinical information. As a result, we cannot comment on the clinical appropriateness of the medical clearance testing performed. However, despite these limitations, NHAMCS provides us the best ability to analyze practice variations and trends at a national level [17].

5. Conclusions

Although the ACEP guidelines recommend against routine medical clearance testing, our study demonstrated that the majority of ED visits ending with a psychiatric admission have such testing, with the prevalence highest in the Midwest. Future research is needed to investigate the reasons underlying the variation in ordering patterns across the country, including the effect of local psychiatric admission policies.

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Fig. 1.
Percent of emergency department visits with psychiatric admission that received medical clearance testing by year.

Table 1

Characteristics of ED visits for patients admitted to psychiatric facilities.

	Unweighted ED visits	Weighted ED visits in thousands	Standard error	Percent of total ED visits with psych admit	95%CI
Age					
18-29 years old	502	338.2	30.2	27.87	24.67 31.07
30-44	526	357.1	27.9	29.43	26.39 32.46
45-59	532	367.3	27.5	30.27	27.59 32.94
60 years old	204	150.9	18.7	12.44	9.60 15.27
Sex					
Female	776	544.0	38.3	44.83	41.07 48.58
Male	988	669.5	47.8	55.17	51.42 58.93
Race					
Non-Hispanic White	1100	842.6	58.7	69.44	65.16 73.72
Non-Hispanic Black	376	229.3	26.2	18.90	15.26 22.54
Hispanic	224	113.7	14.0	9.37	7.28 11.45
Insurance					
Private	321	242.7	22.5	20.01	17.07 22.95
Medicare	383	270.0	24.3	22.25	19.16 25.35
Medicaid	535	328.7	29.4	27.09	23.51 30.67
Other	108	58.9	10.6	4.85	3.28 6.43
Uninsured	259	218.7	25.7	18.02	14.49 21.55
Unknown	158	94.3	15.5	7.77	5.51 10.04
Provider					
Attending	1224	883.8	58.4	74.63	70.47 78.79
Resident/intern	261	129.1	20.8	10.90	7.64 14.17
PA/NP	219	171.3	23.4	14.47	11.07 17.87
Region					
Northeast	563	281.4	37.2	23.19	18.01 28.37
Midwest	317	264.2	33.6	21.78	16.96 26.60
South	521	456.6	43.8	37.63	31.99 43.27
West	363	211.1	28.5	17.40	13.15 21.65

	Unweighted ED visits	Weighted ED visits in thousands	Standard error	Percent of total ED visits with psych admit	95%CI
Any significant chronic medical condition					
No	1592	1089.3	67.3	89.77	87.73 91.82
Yes	172	124.1	14.1	10.23	8.18 12.27
Whether visit was for poisoning or injury					
No	1395	939.6	62.9	77.44	74.12 80.75
Yes	369	273.8	23.9	22.56	19.25 25.88
Total	1764	1213.4	72.4	100.00	

Table 2

Study emergency department (ED visits) with medical clearance tests.

	Unweighted ED visits	Weighted ED visits in thousands	Standard error	% of total visit	95%CI
Total study visits	1764	1213.4	72.4	100.00	
Screening tests	1327	975.2	59.9	80.37	76.62 84.11
Complete blood count	1120	833.2	53.6	68.67	64.49 72.84
Toxicology screen	859	614.1	46.2	50.61	45.41 55.81
BUN and creatinine	744	515.1	43.3	42.45	37.40 47.49
Electrolytes	614	409.9	36.9	33.78	28.90 38.66
Blood alcohol level	502	364.1	31.3	30.01	26.18 33.83
EKG	386	294.0	22.9	24.23	20.75 27.72
Liver function tests	361	221.0	27.0	18.21	14.49 21.94

CI = confidence interval, EKG = electrocardiogram.

Table 3

Multivariate logistic model of medical clearance testing.

Effect	Odds ratio	95% confidence limits		p-Value
Age	1.02	1.01	1.03	<0.0001 *
Female	1.10	0.74	1.65	0.6336
Race				
Non-Hispanic White	Ref			
Hispanic	0.86	0.50	1.50	0.9677
Non-Hispanic Black	1.08	0.65	1.80	0.3035
Insurance				
Private	Ref			
Medicaid	1.17	0.67	2.01	0.6729
Medicare	0.88	0.49	1.57	0.3652
Other	1.12	0.44	2.85	0.9058
Uninsured	1.53	0.79	2.99	0.1288
Unknown	0.87	0.42	1.80	0.3909
Provider				
Attending	Ref			
PA/NP	1.15	0.61	2.14	0.4108
Resident/intern	0.76	0.42	1.38	0.288
Had injury or poisoning	2.38	1.54	3.68	<0.0001 *
Region				
Northeast	Ref			
Midwest	2.20	1.09	4.46	0.044 *
South	1.72	0.99	2.97	0.2127
West	0.96	0.47	1.97	0.1266
Has chronic disease	0.79	0.41	1.51	0.4785

Ref = reference.

PA = physician assistant.

NP = nurse practitioner.

* Statistically significant.