

RETROSPECTIVE CHART REVIEW OF THE TRIAGE ALGORITHM FOR PSYCHIATRIC SCREENING (TAPS) FOR PATIENTS WHO PRESENT TO EMERGENCY DEPARTMENTS WITH PSYCHIATRIC CHIEF COMPLAINTS

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Contribution to Emergency Nursing Practice

- The TAPS tool can be used reliably to rule out acute medical illness in patients with psychiatric chief complaints in community hospital settings with on-site inpatient psychiatric units.
- The TAPS tool appropriately identified low-acuity patients without significant medical illness (TAPS of 0).
- Addiction chief complaints was a confounding variable because these patients often had mental health complaints in addition to medical complaints. The TAPS tool is a simple and cost-effective tool to use in the emergency department during triage.
- The TAPS tool could be used in selected settings to expedite psychiatric care and reduce unnecessary laboratory testing.

Abstract

Introduction: There is a growing number of mental health illnesses (MHIs) in the nation and no standardization of the medical screening examination (MSE) in the emergency department. Many health care organizations are at the tipping point of discarding a battery of laboratory workups. A triage tool—specific to psychiatric chief complaints and cost effective—is needed for the emergency department.

Methods: A nonexperimental, retrospective overlay of the Triage Algorithm for Psychiatric Screening (TAPS) onto previous psychiatric

patients' records was performed to determine the sensitivity and specificity of the TAPS in ruling out acute medical illness. The laboratory test results, length of stay (LOS), and cost of treatment for all psychiatric patients were examined to determine if there was a correlation with their TAPS scores or if the use of the TAPS would have resulted in efficient care and cost savings.

Results: This study shows the TAPS tool can be used reliably to rule out acute medical illness in patients with psychiatric chief complaints in a community hospital setting with an on-site inpatient psychiatric unit. The TAPS tool appropriately identified low-acuity patients without significant medical illness (TAPS of 0). As such, the TAPS tool could be used in selected settings to expedite psychiatric care and reduce unnecessary laboratory testing.

Implications for Practice: The results of this project represent a valuable step forward in improving the triage of adult patients who present to the emergency department with psychiatric chief complaints. A reproducible study of the TAPS method was the next practice step in determining feasibility. Use of the TAPS tool can be a method to decrease costs and ED crowding. For research and quality improvement projects in the future, addiction chief complaints should be treated as a separate category from psychiatric or medical complaints, as they meet the criteria of both.

Key words: Emergency department; Psychiatric; Mental health; Medical clearance; Triage algorithm

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More than 9.8 million (4.1%) people in the United States were diagnosed with mental health illness (MHI) in 2014.¹ Because of regulatory mandates, staff shortages (nurses, psychiatrists, social workers), and insufficient resource allocation, many patients with MHI lack adequate health care services²⁻⁵; therefore, they go to emergency departments for care.^{6,7} ED providers typically use screenings and medical tests to rule out acute medical illness in psychiatric patients.⁸⁻¹⁰ These tests increase patients' length of stay (LOS) in the emergency department¹¹⁻¹⁴ and the related costs.¹⁵⁻¹⁸ Furthermore, they have been shown not to have a significant impact on medical decision making in patients with established MHI diagnoses.⁸ A medical screening examination (MSE) tool specific to psychiatric patients will allow providers to identify patients with low likelihood of medical illness at presentation versus those likely to require further laboratory testing.¹⁹

Miller et al examined the utility of a 6-component screen, the triage algorithm for psychiatric screening (TAPS), to rule out acute medical illness in a community teaching hospital with an inpatient psychiatric unit.¹⁹ The TAPS tool assesses the following indicators to rule out acute medical illness: age younger than 65 years; normal vital signs; no medical complaints; no evidence of recent substance use; and no history of schizophrenia, mental retardation, or hallucinations (Figure).¹⁹ The TAPS tool was used to assess 1,179 patients presenting with mental health complaints, and the tool was able to appropriately identify the absence of acute medical illness in 825 (70%)

patients (TAPS score of 0). Of the sample, 71% of patients had histories of mental illness, 55% were admitted (the majority to the Emergency Behavioral Unit), 27% had subsequent laboratory testing (urine drug screen, pregnancy test, and serum lithium level), and 31% received medications (over-the-counter or sleep aids). The medical course for sample patients was followed for a 6-month period. None of the patients with a TAPS score of zero was diagnosed or treated for an acute medical illness (95% confidence interval [CI], $P < .05$). The TAPS tool is clinically useful for identifying the absence of medical illness in patients presenting with psychiatric chief complaints.¹⁹

The current MSE practice at a community teaching hospital emergency department is to order an ED Psych Order Set, which includes routine tests including complete blood count, basic metabolic panel, urine and serum drug screen, urinalysis, glucose, and pregnancy test. The TAPS tool can be established as a method to screen for acute medical illness in psychiatric patients during triage. Those patients who have TAPS scores of zero (indicating low acuity) could potentially incur lower costs, require fewer medical screening tests, and experience shorter time-to-psychiatry referral and overall ED LOS.

Purpose

The purpose of this quality improvement project is to replicate the study by Miller et al¹⁹ and evaluate if the TAPS

| Criteria | Yes | No |
|---|-----|----|
| 1. Age >65? | Yes | No |
| 2. Abnormal Vital Signs? | Yes | No |
| T > 100.4F | | |
| HR > 100 or < 60 bpm | | |
| SBP > 180 or < 100 mmHg | | |
| DBP > 100 or < 60 mmHg | | |
| RR < 10 or > 24per/minute | | |
| 3. Patient has a medical problem as a chief complaint? | Yes | No |
| 4. Hallucinations or delusions with no prior history of the same? | Yes | No |
| 5. Schizophrenia or mental retardation history? | Yes | No |
| 6. Visibly intoxicated or admits to drug or alcohol use within the last 8 hours? | Yes | No |

FIGURE

Triage algorithm for psychiatric screening (TAPS). This figure was replicated with permission from Andrew Miller at Lehigh Valley Hospital and Health Network.¹⁹

tool can identify patients with an absence of a serious medical illness at a community teaching hospital emergency department with an on-site inpatient psychiatric unit. A retrospective overlay of the TAPS tool onto previous patients' records was performed to see if it would be valuable to implement into the triage process.

Procedures

A nonexperimental, retrospective chart review was implemented for use with the TAPS scoring tool, based on patients' data on arrival to the emergency department. All patients meeting inclusion criteria were assigned TAPS scores and had their medical treatments tracked for a 3-month period after the ED encounter to discern if any tests had clinically meaningful results consistent with acute medical illness. The sensitivity and specificity of the TAPS tool,¹⁹ overall LOS, and associated cost of a ED Psych Order Set was evaluated.¹⁰

Methods

DESIGN

A nonexperimental, retrospective overlay of the TAPS tool¹⁹ was performed to evaluate its value in the triage process. This quality improvement (QI) project was formally evaluated by the institution using a QI criteria checklist and was determined not to be human subjects research. Chart review of a sample of patients was performed to determine TAPS scores upon arrival to triage area in the emergency department. One investigator collected a convenience sample of all patients meeting designated criteria: emergency department, community teaching hospital, arrival date (7/31/15 to 1/31/17), age at arrival (18 years or older), problem group presenting with mental illness, and non-pregnant. DEDUCE is a Web-based institutional clinical research and quality improvement tool and was used to deductively select eligible patients. De-identified DEDUCE data and administrative reports were used.²⁰ The medical course was tracked for a 3-month period to identify if any tests had clinically meaningful results. The sensitivity and specificity of the TAPS tool, overall LOS, and associated cost of an ED Psych Order Set was evaluated.²¹

STATISTICAL ANALYSIS

IBM SPSS statistical software was used for statistical analyses. Alpha was set to 0.05. A G*power analysis was

calculated, and a minimum of 26 chart audits was adequate. A minimum of 52 and 54 charts was needed to calculate sensitivity and specificity, respectively. Chi square tests were conducted to examine the association between TAPS scores and laboratory results. Sensitivity and specificity were calculated for each TAPS score (yes/no) as the testing variable and laboratory tests (not ordered/normal; abnormal/not clinically significant; abnormal clinically significant) as the condition variable. To determine if TAPS scores were related to LOS, a Spearman's rho correlation was conducted. The total cost per day for each patient was computed. Cost per day was determined by emergency severity index (ESI) level, with an ESI of 1 indicating highest day cost. Average cost for each TAPS score category was calculated.

Results

A total of 154 patient charts were initially considered for review. Of the 154 charts, 53 charts were excluded, and, of those charts, 20 patients had medical diagnoses, 12 were seen at another hospital, 9 were duplicates, 6 fell out of the time period, 5 patients were found to be pregnant, and 1 was registered in error. A total of 101 charts were included for full review.

The hospital ED Psych Order Set was ordered on 76 patients (75.2%). Of 101 patients, 33 patients (32.7%) had TAPS scores of 0. Descriptive statistics (n, %) for TAPS scores across the 101 patients is displayed in [Table 1](#). A 1-way analysis of variance (ANOVA) revealed no statistically significant differences in age, $F(5, 95) = 0.73, P = .60$. [Table 2](#) displays the mean standard deviation (SD) for age in years for each of the TAPS scores. [Table 3](#) displays mean SD for vital signs including temperature, pulse, respirations, systolic blood pressure, diastolic blood pressure, and oxygen saturation. Follow-up comparisons (excluding TAPS = 5 due to only 1 patient being in this group) for pulse showed significant differences between TAPS of 0 and all other TAPS scoring

TABLE 1
Descriptive statistics (n, %) for TAPS score

| TAPS Score | n | % |
|------------|----|------|
| 0 | 33 | 32.7 |
| 1 | 31 | 30.7 |
| 2 | 26 | 25.7 |
| 3 | 8 | 7.9 |
| 4 | 2 | 2.0 |
| 5 | 1 | 1.0 |

TABLE 2
Mean (SD) for age by TAPS score

| TAPS Score | Mean (years) | SD (years) |
|------------|--------------|------------|
| 0 | 27.09 | 8.67 |
| 1 | 29.06 | 11.56 |
| 2 | 29.65 | 13.46 |
| 3 | 32.87 | 13.36 |
| 4 | 24.00 | .00 |
| 5 | 42.00 | .00 |

SD = standard deviation.

groups (all $P < .05$). For systolic and diastolic blood pressure, TAPS scores of 3 were significantly different from patients with TAPS scores of 0, 1, and 2.

Sensitivity and specificity for each TAPS score and each laboratory test are presented in Tables 4 and 5. The overall sensitivity (true positive rate) was 71.43%, and the specificity (true negative rate) was 32.98%. There were 31 patients with TAPS scores of 0 who did not have clinically significant laboratory results and 2 patients who had clinically significant laboratory results. Those 2 patients had discharge diagnoses of substance-induced mood disorder and polysubstance dependence. Both patients had at least 3 illegal drugs revealed in their urine drug

TABLE 3
Mean (SD) for vital signs by TAPS score

| Variable | TAPS Score | | | | | | P value |
|--------------------------|----------------|----------------|----------------|---------------|-------------|----------|---------|
| | 0 | 1 | 2 | 3 | 4 | 5 | |
| Temperature, mean (SD) | 98.22 (.41) | 98.27 (.44) | 98.24 (.47) | 98.31 (.63) | 98.85 (.35) | 97.7 (.) | .392 |
| Pulse, mean (SD) | 81.06 (11.00) | 93.33 (14.82) | 93.23 (16.27) | 94 (17.93) | 111 (4.24) | 108 (.) | .001 |
| RR, mean (SD) | 18.16 (1.97) | 18.93 (6.18) | 18.36 (2.06) | 17.75 (1.28) | 17 (1.41) | 24 (.) | .653 |
| Systolic BP, mean (SD) | 132.12 (16.50) | 137.23 (19.98) | 130.96 (14.33) | 154 (29.11) | 151 (21.21) | 102 (.) | .011 |
| Diastolic BP, mean (SD) | 82.42 (12.86) | 83.67 (11.92) | 79.54 (12.01) | 96.25 (14.18) | 93 (29.7) | 68 (.) | .027 |
| O2 saturation, mean (SD) | 98.3 (1.61) | 98.34 (1.54) | 97.35 (2.12) | 97.14 (2.04) | 96 (4.24) | 100 (.) | .074 |

SD = standard deviation.

TABLE 4
Sensitivity rates* for laboratory results by TAPS score

| TAPS Score | CBC | BMP | i-STAT™ † | Urinalysis | SDS | UDS | Glucose |
|------------|-----|-----|-----------|------------|-----|-----|---------|
| 0 | 0 | .4 | 0 | 0 | 0 | .4 | 0 |
| 1 | 1.0 | .60 | .50 | 0 | 0 | .20 | 0 |
| 2 | 0 | 0 | .50 | 0 | .50 | .40 | 1 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | .50 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

CBC = complete blood count; BMP = basic metabolic panel; SDS = serum drug screen; UDS = urine drug screen.

* Sensitivity is correctly identifying those patients with clinically significant laboratory results.

† i-STAT™ is a blood analyzer manufactured by Abbott Laboratories.

TABLE 5
Specificity rates* for laboratory results by TAPS score

| TAPS Score | CBC | BMP | i-STAT™ † | Urinalysis | SDS | UDS | Glucose |
|------------|-----|------|-----------|------------|------|------|---------|
| 0 | .67 | .677 | .667 | .663 | .663 | .677 | .667 |
| 1 | .70 | .708 | .696 | .285 | .683 | .687 | .686 |
| 2 | .74 | .729 | .747 | .734 | .755 | .75 | .7575 |
| 3 | .92 | .917 | .919 | .918 | .918 | .917 | .919 |
| 4 | .98 | .979 | .979 | .979 | .989 | .979 | .979 |
| 5 | .99 | .989 | .989 | .989 | .989 | .989 | .989 |

CBC = complete blood count; BMP = basic metabolic panel; SDS = serum drug screen; UDS = urine drug screen.

* Specificity is correctly identifying those with laboratory results that are not clinically significant.

† i-STAT™ is a blood analyzer manufactured by Abbott Laboratories.

screens that required medical treatment, but they did not self-report drug use during triage.

Chi square tests revealed no statistical significance (all $P > .05$) between TAPS score and laboratory results, with the exception of TAPS and serum drug screen. This was not a clinically significant finding. There was 1 outlier for LOS for significant LOS at 25 days. Owing to this non-normal distribution, a Spearman's rho correlation was used. The TAPS scores were not related to LOS in the emergency department ($\rho = 0.141$, $P = .160$).

None of the patients who received a TAPS score of 0 ($n = 33$) was admitted to a medical unit. Thirteen patients (39.39%) went home, and 20 patients (60.61%) were admitted to psychiatry units. Of those 33 patients, 13 had chief complaints of psychiatric evaluation, 8 had suicidal ideation, 6 had anxiety, 3 were depressed, 2 were manic, and 1 was assigned medical clearance. Of the 33 patients, 8 (24.24%) had follow-up psychiatric-related visits to system facilities within 3 months.

Costs were calculated by summing all the resulted laboratory costs and day costs for each patient. The average was then computed for each TAPS score. Table 6 displays the mean

laboratory and day costs in dollars for TAPS scores. Nonparametric correlations revealed no correlation of TAPS with day cost ($\rho = 0.031$, $P = .757$) or ESI²² ($\rho = -0.031$, $P = .757$).

Discussion

This retrospective study suggests that the TAPS tool can be used reliably to rule out acute medical illness in low-acuity patients with psychiatric chief complaints in community hospital settings. This is consistent with the original validation of the TAPS tool.¹⁹ Previous studies concur that routine laboratory tests are low yield and seldom change care management and disposition.^{23–25} Other studies argue in favor of routine laboratory testing^{10,26} because of the unreliability of patient self-reporting in the ED setting, particularly in reference to substance use.²⁷

There are increasing arguments from both emergency medicine and emergency psychiatry that there needs to be better identification of low-risk psychiatric patients. The American Association for Emergency Psychiatry Task Force Part II recommended developing protocols that identify low-risk categories and conditions.²⁵ The sensitivity and specificity of the TAPS tool was lower than expected; however, the TAPS sensitivity would have been 100% if the 2 addiction cases had been omitted. Addiction chief complaints was a confounding variable because these patients often had mental health complaints (addiction) combined with medical complaints (withdrawal) and were medically treated for intoxication, dependency, withdrawal, and/or overdose. We noted that higher TAPS scores were associated with a greater likelihood of laboratory workup and medical or rehabilitation disposition. High-risk patients often had abnormal vital signs; they were older and presented with medical problems and/or self-reported substance use.

TABLE 6
Average day cost* by TAPS score

| TAPS Score | n | Mean (dollars) | SD (dollars) |
|------------|-----|----------------|--------------|
| 0 | 33 | 1887.42 | 1180.999 |
| 1 | 31 | 5632.03 | 9931.553 |
| 2 | 26 | 2819.00 | 2503.174 |
| 3 | 8 | 2370.38 | 2067.525 |
| 4 | 2 | 4871.50 | 1673.722 |
| 5 | 1 | 7376.00 | .00 |
| Total | 101 | 3428.26 | 5882.459 |

SD = standard deviation.

* Average day cost was multiplied by the number of days in the emergency department.

Although the sample size was adequate, the LOS was variable and did not have normal distribution. There was no significant correlation between TAPS score and LOS; other contributors to LOS included available resources, bed capacity, severity of disease, comorbidities, and health insurance.^{28–30}

The TAPS tool is straightforward and simple to use. It should be considered for triaging patients with psychiatric complaints who present to on-site inpatient psychiatric units. Our data indicate that those patients with TAPS scores of 0 signify low medical complexity and, after MSE by ED providers, would require minimal medical workups and could have expedited admission to inpatient psychiatry units or discharge to home. In facilities with on-site psychiatric units, these low-acuity patients could also be considered for direct psychiatric inpatient admission. The TAPS tool can be used by nurses, which is a significant advantage because the triage process for organizations varies (ie, nurse first).³¹ For organizations that use electronic medical records, the TAPS tool can be added to the narrator.

Through the establishment of a standardized triage algorithm, the adult patients who present with psychiatric chief complaints can be appropriately and cost effectively evaluated in a timely manner in the emergency department. This is particularly relevant for patients who are high users of the emergency department and are low risk.

Limitations

This study had a few limitations. The DEDUCE tool was technically complex. There was a transition from the ICD-9 codes in October 2015 to ICD-10 codes, which complicated the DEDUCE search. Therefore, rather than selecting individual ICD codes, a problem group presenting with mental illness was selected. Two patients did not self-report drug use and were given TAPS scores of 0 when they should have received TAPS scores of at least 1; this affected the TAPS of 0 aggregate results.

Implications for Practice

Patient acuity, laboratory screening tests, and day costs all contribute to increasingly high costs when psychiatric patients are “boarded” in emergency departments. Use of the TAPS tool can be a method to decrease costs and improve ED throughput.^{32–34} Those patients who do not have indications for medical screening tests by the TAPS tool (TAPS of 0) could have shorter time-to-psychiatry referrals and overall ED LOS. There is growing consensus

that medical screening guidelines for psychiatric patients need to be implemented.²⁵ This will enhance flow in the emergency department, increase efficiency, and diminish redundancies. There should be a candid dialogue to establish congruency between the emergency department and psychiatry providers regarding clinically meaningful workup requirements. A clinically meaningful workup for low-risk patients could include an i-STAT™ 6+ (sodium, potassium, chloride, urea nitrogen [BUN], glucose, hematocrit, and hemoglobin) and a urine drug screen. Future considerations should include studying the TAPS tool at trauma and rural hospitals as well as in the pediatric and addiction population.

Conclusions

This study shows the TAPS tool can be used reliably to rule out acute medical illness in patients with psychiatric chief complaints in community hospital settings with on-site inpatient psychiatric units. The TAPS tool appropriately identified low-acuity patients without significant medical illness (TAPS of 0). As such, the TAPS tool could be used in selected settings to expedite psychiatric care and reduce unnecessary laboratory testing.

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