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Screening for Delirium in the Emergency Department

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Abstract

Delirium is a problem for many older adults who are acutely ill. Delirium often comes on suddenly, can be severe, and is often difficult to diagnose, especially in the presence of dementia. Missed delirium has a mortality rate of 30.8% and costs millions. What is the purpose of this study?

Methods The 4A's Test screening instrument was implemented and evaluated in the Emergency Department of a rural Midwestern hospital from May 1, 2019 through August 31, 2019.

Results There were 122 participants in the study with 61 in each cohort. In 2018, three (5%) were diagnosed with delirium without a screening instrument. In 2019, 10 (6.1%) screened positive and were diagnosed with delirium. A Fisher's exact test compared the 2018 and 2019 cohorts. The relationship between screening with or without a screening tool was statistically significant at the .05 level ($p = 0.3227$). A Fischer's Exact Test was also performed on patients with and without previously diagnosed dementia. Twenty-two (36%) subjects had dementia and eight (13%) were positive with 39 (64%) subjects without dementia and seven (11.8%) screening positive. The relationship with and without a previous diagnosis of dementia was statistically significant at the 0.5 level ($p = 0.2495$).

Implications for Practice The study found an 11.5% increase in recognition of delirium in the ED in general psychiatric presenting patients and an 18.5% increase in recognition of delirium in the ED in psychiatric presenting patients with a previous diagnosis of dementia.

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Screening for Delirium in The Emergency Department

Delirium primarily affects older adults who are acutely ill, and may be defined as, “an acute disorder for attention, cognition, and psychomotor activity” (De & Wand, 2015, p. 1080). Delirium has an acute onset and can severely deviate from a normal orientation and cognition. This condition is usually temporary and reversible (Jasmin & Zieve, 2017). Delirium may display a variety of symptoms ranging from appropriate orientation, hyperactivity, disorientation, to lethargy (Field & Wall, 2013). Often, delirium can be mistaken for a psychiatric disorder because of the behaviors exhibited.

Delirium has been attributed to a loss of productivity, increased health care expense, serious negative health outcomes and even death (Inouye et al., 2014). Field and Wall (2013) reported over 12 million patients suffer from delirium annually and the associated costs are over \$150 billion. Kakuma et al. (2003) found a significant incidence of death and other health deficits occurred within six-months following a missed diagnosis of delirium in the emergency department (ED). Those with delirium who were not accurately diagnosed in the ED had a mortality rate of 30.8%, which is nearly a third of the patients studied (Kakuma et al., 2003). The authors also found patients who were accurately diagnosed with delirium in the ED had a mortality rate similar to those who did not have delirium (Kakuma et al., 2003).

Delirium is considered a medical emergency with potentially life-threatening consequences; hence, early recognition can be lifesaving. Conley (2011) recommended for nurses to recognize risk factors for delirium during admission since early intervention posed the best outcomes for the patients. However, recognition and accurate diagnosis of delirium can be a challenge based on the wide spectrum of presentations. For example,

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patients who present with a hyperactive delirium are more easily recognized, while patients who present with a hypoactive delirium have a less obvious presentation (Field & Wall, 2013). In patients admitted to the psychiatric unit, a delayed psychiatric examination may suspend care for the patient with delirium, resulting in long-term negative health consequences for the patient (Greer et al., 2011).

Early screening for delirium may minimize deleterious consequences from a delayed diagnosis. In most hospitals, screening for delirium in the ED is uncommon. The use of a validated, standardized screening instrument for delirium in the ED in addition to a psychiatric consult, may alert all providers to the possibility of delirium. In addition, patients who are screened may receive more timely interventions to treat the delirium or its underlying cause (Greer et al., 2011). Early screening for delirium may result in improved health outcomes and may assist in the recognition of delirium that was previously thought to be a new, or worsening mental illness (Greer et al., 2011). Furthermore, distinguishing delirium from dementia is particularly useful in the older adult population because delirium can be especially difficult to distinguish in the patient with a worsening dementia.

Thirty-eight screening instruments for delirium currently exist, however, five are commonly used (Grover & Kate, 2012). These include the *Confusion Assessment Model* with a sensitivity of 46-100% and a specificity of 63-100% depending on operator experience; the *4As Test* with a sensitivity of 89.7% and specificity 84.1%; the *Delirium Rating Scale* with a sensitivity of 91-100% and a specificity of 84-92%; the *Nursing Delirium Screening Scale* with a sensitivity of 85.7% and a specificity of 86.8%; and, the *Single Question in Delirium* with a sensitivity of 80% and a specificity of 71% (De &

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Wand, 2015). Various screening instruments can be used in different clinical situations, but when delirium is superimposed on dementia, diagnosis can be exceptionally difficult (De and Wand, 2015). The *4As Test* screening instrument was the only one developed to detect delirium superimposed on dementia (Apold, 2018).

In a rural, Midwestern hospital ED, patients were not formally screened for delirium and were later being diagnosed with delirium after admission into the inpatient psychiatry unit. Often, these patients were older adults who may have also had an underlying diagnosis of dementia. In May 2019, the hospital began utilizing the *4A's Test* for screening in the ED. Previous practice in the ED included a consult for a psychiatric evaluation only. If the psychiatric intake provider recommended admission to an inpatient psychiatric floor, a psychiatrist then evaluated the patient where a formal diagnosis may or may not have included delirium.

The purpose of this study was to evaluate the effectiveness of the *4A's Test* delirium screening instrument in the ED. The aim of the study was to increase the accuracy of a delirium diagnosis by 10% within 24 hours of admission to the psychiatric unit. The primary outcome measures of interest were the number of patients who had a delirium screening performed in the ED. Secondary outcome measures included those patients who had psychiatric intake evaluations, psychiatrist evaluations, and those who had delirium with dementia. The questions for this study were: In ED patients aged 65-years and older with cognitive or behavioral changes,

1. how does delirium screening with the 4A's test compared with only a psychiatric intake evaluation affect a diagnosis of delirium?

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2. how does delirium screening with a 4A's test and a psychiatric intake evaluation affect a diagnosis of delirium in patients with dementia?

Literature Review

The literature search was performed using CINAHL, Google Scholar, Summon, PsychINFO, PubMed, and the Cochrane Library. Search terms used included *delirium*, *delirium AND dementia*, *delirium AND emergency department*, *delirium AND screening tools*, and *outcomes of delirium screening in the emergency department*. The search included only the years between 2003-2018. Inclusion criteria were studies done in medical centers, elderly age, and delirium. Exclusion criteria included age less than 50-years and studies where delirium was an ancillary topic. There were 16 studies initially and 11 of those met the inclusion criteria. The publications included prospective observational studies, prospective cross-sectional studies, case control studies, retrospective chart audits, and meta-analyses of screening tools used in emergency departments with their validity in finding delirium, including with and without underlying dementia. Ultimately, 10 publications were selected for this review.

The diagnosis of delirium is difficult and can be mistaken for other illnesses. Delirium is frequently misdiagnosed as dementia. In fact, Apold (2018) estimated approximately 70% of cases of inpatient delirium went undetected and found nursing staff identified delirium only 31% of the time. Leonard et al. (2016) performed a study of 176 elderly patients regarding key characteristics to distinguish delirium from dementia. Results revealed attention and vigilance were key characteristics to distinguish dementia from delirium (Leonard et al., 2016). While patients with dementia had problems with memory, it was the patients with delirium superimposed on dementia who had problems

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with attention span and vigilance (Leonard et al., 2016). In another study, Loftus and Wiesenfeld (2017) attempted to detect and provide early interventions for participants over the age of 50-years by conducting retrospective chart audits on 186 patients. Audits searched for symptoms suggestive of delirium that may have been missed. They found 17 patients were diagnosed with delirium, but 21 patients had symptoms of delirium without being diagnosed (Loftus & Wiesenfeld, 2017).

Early detection of delirium is important since treatment can be a challenge. Current international practice in healthcare is to treat delirium with antipsychotics, but this treatment is dated and without supportive data. Barr et al. (2013) stated there are “no double-blind, randomized, placebo-controlled trials” which can adequately establish “the efficacy or safety of any anti-psychotic agent in the management of delirium” (p. 283). Also, there are no medications approved by the Federal Drug Administration (FDA) for delirium treatment (Delirium, 2012).

Screening for delirium risk may enhance its early diagnosis. Hare et al. (2013) did a prospective cross-sectional study in the ED to develop a clinical risk-screening instrument to assess for common risk factors increasing the risk for developing delirium in the elderly. They found 7.2% of the participants did have delirium. They also found three risk factors having a strong association with the risk of developing delirium: cognitive impairment, abnormal heart rate and/or rhythm, and depression (Hare et al., 2013). The authors concluded a risk factor screening performed during an initial nursing assessment could improve identification of delirium in the ED, leading to earlier detection, however, the study did not extend to patient outcomes (Hare et al., 2013). Similarly, Fick, Hodo, Lawrence, and Inouye (2007) found screening for risk factors

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attributing to the development of delirium may assist in more quickly identifying delirium development. While neither study confirmed whether screening for risk factors resulted in positive patient outcomes, the current evidence suggested early identification and treatment of delirium should result in improved outcomes.

In addition, predictive factors have been identified for delirium. Kennedy et al. (2014) performed a prospective observational study to determine predictive factors for delirium in the elder ED patient population. This study compared mortality outcomes for elderly patients with and without delirium in an ED in an urban community (Kennedy et al., 2014). Findings included a positive delirium diagnosis in 9% of the study participants. Participants in this study who were found to have delirium had a two-time longer median hospital stay (four days vs. two days); needed ICU admission more than twice as often (13% vs 6%); and were four times as likely to be admitted to a long-term care facility (37% vs 9%) (Kennedy et al., 2014). In addition, patients found to have delirium in the ED were six times more likely to expire within 30 days (6% vs 1%), and 30-day readmission rates were doubled (27% vs 13%) (Kennedy et al., 2014). Correctly diagnosing delirium in the ED may initiate interventions more quickly and reduce the severity of negative health outcomes. Kennedy et al. (2014) also determined a risk prediction rule, or a set of factors predicting a higher than average risk of developing delirium. The predictive risk could be used to help identify those patients with a higher risk of developing delirium but recommended the risk to be externally validated (Kennedy et al., 2014).

Early recognition and diagnosis for delirium may reduce readmissions. Delaney et al. (2015) conducted a study of participants 65-years of age and older in the ED with the

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goal of the study to identify delirium in patients in the ED and provide prompt treatment. This study also aimed to decrease readmissions to the ED (Delaney et al., 2015). Delaney et al. (2015) found screening patients for delirium resulted in improved identification and a reduction in readmissions by over 50%.

Screening instruments for delirium in the ED have had remarkable success. There are many delirium screening instruments available requiring little time and no special training, however, these are not well-known, nor are they commonly used. Apold (2018) found the *Confusion Assessment Method* was the most common, but required specific training for optimal use. Likewise, De and Wand (2015), also found the *Confusion Assessment Method* required staff who had been specifically trained in its administration. In fact, De and Wand (2015) performed a systematic review of five of the most common screening instruments for delirium. The *Confusion Assessment Method* (mentioned previously), the *Delirium Rating Scale*, the *Nurses' Delirium Screening Scale*, the *Single Question in Delirium*, the *Memorial Delirium*, and the *4A's Test* were evaluated for what might be the best for use in non-critically ill hospital inpatients over the age of 65-years. The *Delirium Rating Scale* is a screening tool similar to the *Confusion Assessment Model* but takes time to administer and requires the screener to have special training in psychiatry, however, the *Delirium Rating Scale* is appropriate for use in various settings and has a high sensitivity and specificity (De & Wand, 2015). This makes the *Delirium Rating Scale* one of the most potentially useful screening tools, but the requirement of skilled training presents a challenge.

Likewise, the *Nursing Delirium Screening Scale* has often been used by nurses who needed to determine if the patient was delirious (Heidenreich & Gesbach, 2018).

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The *Nursing Delirium Screening Scale* does not require prior knowledge of the patient's behaviors to perform the screening (Heidenreich & Gesbach, 2018; De & Wand, 2015). Because of this, there is a risk of false positives. Similarly, the *Single Question in Delirium* is useful for oncology patients, but has limitations (De & Wand, 2015). This screening instrument simply asks the caregiver if the patient has been more confused than normal (De & Wand, 2015). While this instrument has a lower sensitivity and specificity than other tests, there is a requirement for staff or caregivers to have knowledge of the patient's cognition within the last 24-hours (De & Wand, 2015). Additionally, The *Memorial Delirium Assessment Scale* contains 10 parts and must be performed by a physician (De & Wand, 2015). This assessment scale assesses for abnormalities in the level of consciousness/arousal, cognition, and psychomotor activity (De & Wand, 2015). The *Memorial Delirium Assessment Scale* is used to quantify the severity of delirium and is used in surgical, oncology, and palliative care most often (De and Wand, 2015).

Finally, the *4 A's Test* screening instrument is a validated tool for delirium screening requiring little time (Du & Wand, 2015). This instrument can be used in four-minutes or less and does not require special training for accurate results. In addition, the *4A's Test* can determine delirium with dementia present, and was found to be the best for persons already diagnosed with dementia (Apold, 2018). De, Wand, Smerdely, and Hunt (2016) completed a study attempting to validate the *4A's Test* screening instrument for delirium in the hospital within 72-hours of admission in patients at least 65-years of age. With 257 subjects, investigators found over half of the participants screened positive for delirium and were later assessed for delirium by professionals without knowledge of the screening score (De et al., 2016). The specificity and sensitivity of the *4 A's Test* were

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found to be 87% and 80% respectively. The *4A's Test* has been found as an effective screening instrument for delirium, especially in a dementia patient (De et al., 2016).

In summary, this literature review found delirium was often missed, could be compromising for the patient, and costly to healthcare. The early identification of delirium may enhance therapies to treat the cause of the delirium and prevent readmissions. Screening instruments for delirium have been found to increase the identification of delirium risk, but some require time and/or special training. The *4A's Test* required little time, can be performed without special training for staff, and has been validated in cases of delirium superimposed on dementia.

The framework for this quality improvement initiative was the Plan-Do-Study-Act model. Dr. Walter Shewhart's first proposed the model which is now widely utilized in healthcare and many other companies. This model allows for planning a change, implementing the change, evaluating the outcomes of the change, and adjusting the change as needed. This model allows for a continuous process of improvement. (Moen, 2009).

Methods

Design

This study was a descriptive, observational study design utilizing a retrospective medical record review. The rate of delirium diagnosis in the ED from May 1, 2018 through August 31, 2018 when a psychiatric intake assessment only was completed, and again from May 1, 2019 through August 31, 2019 when the *4A's Test* was implemented, in addition to the psychiatric intake assessment was studied. Of interest were those

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patients with dementia as delirium for this chronic condition was evaluated as a potential exacerbation of dementia symptoms.

Setting

The setting was a rural, Midwestern general ED serving an average of 33,500 patients annually. People aged 65-years and older accounted for 16% (nearly 11,000) of the county's population. This ED is one of two in the county (US Census Bureau, 2018).

Sample

The sample was a convenience sample of patients treated in the ED. Inclusion criteria included patients aged 65-years and older who were evaluated in the ED, consulted for a psychiatric evaluation for cognitive or behavior changes, and were hemodynamically stable. Exclusion criteria were patients less than 65-years of age, patients who were not hemodynamically stable, and patients who did not receive a psychiatric consultation for evaluation.

Data Collection and Analysis

The number of ED patients who had a screening performed with the *4As Test*; the number of ED patients having a psychiatric intake evaluation only; the number screening positive for delirium with the *4As Test* and a confirmed diagnosis within 24-hours; the number identified with delirium by psychiatric intake only and confirmed by diagnosis within 24-hours; the number screening negative but diagnosed with delirium within 24-hours of admission; the number identified without delirium by psychiatric intake but diagnosed with delirium within 24 hours of admission; the number who screened positive and had a psychiatric intake evaluation indicating delirium in the patient with dementia.

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The demographic information of age, gender, race/ethnicity, and payer status were also obtained.

All data were de-identified, and patients were assigned a numbered code. Patients in the 2018 cohort were coded as 18-1, 18-2, 18-3, etc. Patients in the 2019 cohort were coded as 19-1, 19-2, 19-3, etc. All patient information was saved on a password-protected computer only the primary investigator (PI) was able to access. Data analysis consisted of the Fisher's exact test using Microsoft Excel.

Procedures

A team of stakeholders was formed to include the primary investigator (PI), 2 physicians, the program director, and 3 intake staff members. The process questioned was identifying delirium in the ED prior to patients being admitted. After discussion with the program director, physicians, and intake staff, the *4As Test* delirium screening instrument was selected for use. The process involved the ED provider who would determine if a psychiatric evaluation was necessary. Once this was determined, the patient was screened with the *4As Test* by the psychiatric intake counselor, then the patient was evaluated as usual. Results of the screening and the psychiatric intake evaluation were discussed with the psychiatrist on-call and the psychiatrist determined if admission was warranted. Evaluation by a psychiatrist within 24-hours was recommended.

Approval Process

Approval was obtained from administration in the rural, Midwestern ED. Additional approvals by the doctor of nursing practice (DNP) committee and the university institutional review board (IRB) were obtained. There were minimal risks as this was a retrospective medical record review. The risk for patient identification was

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minimized by the de-identification of collected data. Benefits to the participants included early detection and management of delirium.

Results

There were 61 participants in the 2018 cohort ($N=61$). The age range was 65-92 with the mean age being 75-years old ($SD=7.6$). The 2018 cohort's gender was male ($n=34$, 56%) and female ($n=27$, 44%). The 2018 cohort included both white participants ($n=59$, 96.7%) and black participants ($n=2$, 3.3%) with no other races or ethnicities in the study. Payer status included patients with Medicare ($n=39$, 63.9%), patients with Medicaid ($n=7$, 11.5%), private insurance patients ($n=10$, 16.4%), and self-pay patients ($n=5$, 8.2%). In addition, 29 (48%) of the subjects had been previously diagnosed with dementia.

From May 1, 2019-August 31, 2019, there were also 61 subjects screened with the *4As Test* for delirium in the emergency room ($N=61$). The age range was 65-95 with the mean age of 76-years ($SD=8.5$). Gender identity found 39 (64%) were female and 22 (36%) were male. The 2019 cohort included both white participants ($n=58$, 95.1%), black participants ($n=2$, 3.3%) and Hispanic participants ($n=1$, 1.6%) with no other races or ethnicities in the study. Payer status included patients with Medicare ($n=42$, 68.9%), patients with Medicaid ($n=10$, 16.4%), VA insurance ($n=1$, 1.6%), private insurance patients ($n=5$, 8.2%), and self-pay patients ($n=3$, 4.9%). In addition, 28 (45.9%) of the subjects had been previously diagnosed with dementia.

In 2018, three (5%) of the subjects were diagnosed with delirium within 24 hours of admission to the psychiatric unit without the use of a validated screening instrument. In 2019, the *4As Test* screened positive for 14 (23%) subjects and of those, 71% ($n=10$)

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were diagnosed with delirium by a licensed psychiatrist within 24 hours of admission to the psychiatric unit. Overall, of the 61 subjects, 23 (38%) had previously been diagnosed with dementia with nine (15%) of the patients who were previously diagnosed with dementia screening positive for delirium and 4 of those were diagnosed with delirium by a licensed psychiatrist. A Fisher's exact test of independence compared the 2018 cohort to the 2019 cohort. During 2018, without the use of a validated delirium screening instrument, three (5%) subjects were diagnosed with delirium within 24 hours of admission to the psychiatric unit. In the 2019 cohort using the *4As Test*, seven ($n=7$, 11%) were diagnosed with delirium within 24 hours of admission to the psychiatric unit. The relationship between screening with or without a validated screening instrument was statistically significant at the .05 level ($p = 0.3227$). Thus, screening with or without a validated instrument were independent of each other.

A Fischer's Exact Test was performed using only the data from the 2019 cohort. Instead of comparing the data from the previous year, a comparison was done on the patients with a previous diagnosis of dementia and the patients without previously diagnosed dementia. In 2019, 22 (36%) subjects were previously diagnosed with dementia prior to presentation in the ED. Eight (13%) of the subjects with a previous diagnosis of dementia were diagnosed with delirium within 24 hours of admission to the psychiatric unit. Of the remaining 39 (64%) subjects, seven (11.8%) of them were diagnosed with delirium within 24 hours of admission to the psychiatric unit. The relationship between individuals who screened positive with and without a previous diagnosis of dementia was statistically significant at the 0.5 level ($p= 0.2495$). Thus,

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screening individuals for delirium with and without a previous diagnosis of dementia were also independent of each other.

Discussion

This study did reveal there is a non-random relationship between screening for delirium in the emergency department and an increase in diagnosis of delirium within 24 hours of admission to the psychiatric unit. This study also revealed that there is a non-random relationship between delirium screening in patients with a previous diagnosis of dementia and patients without a previous diagnosis of dementia. The primary outcome measure of this study was to increase the number of patients identified to have delirium within 24 hours of admission to the psychiatric unit by 10%. Three (4.9%) subjects were diagnosed with delirium within 24 hours of admission to the psychiatric unit in the 2018 cohort. Ten (16.4%) subjects were diagnosed with delirium within 24 hours of admission to the psychiatric unit in the 2019. There is an increase of seven patients, or 11.5%, thus meeting the outcome measure of the study.

The study also revealed there is a non-random relationship between screening for delirium in the emergency department in those patients with and without a previous history of dementia. Eight (36.4%) of the subjects with a previous history of dementia screened positive for delirium and were later diagnosed as compared with seven (17.9%) patients who screened positive and were later diagnosed without a previous history of dementia. Thus, screening for delirium in the emergency department is 18.5% more accurate in patients with a previous history of dementia.

Implications for practice include use of the screening tool in the emergency department for early recognition of delirium, especially for patients who have a previous

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history of dementia. As delirium is a medical diagnosis, patients may be best treated on a medical unit, not a psychiatric unit. Recognition of delirium in the emergency department via use of a screening tool will allow the patient to be assessed by a licensed psychiatric provider in the emergency department. Once diagnosed, delirium can be treated appropriately and urgently, thus allowing for the most effective treatment of delirium.

Conclusion

Findings of the study include usefulness of the 4A's Test screening tool in the emergency department along with a psychiatric intake assessment. By screening patients in the ED for delirium, the number of patients in general with recognized delirium rose 11.5%. The number of patients with a previous history of dementia with recognized delirium rose 18.5%. It is recommended that all patients presenting to the ED with a need of a psychiatric evaluation be screened for the presence of delirium, and all positive screenings be immediately evaluated by a licensed psychiatric practitioner for immediate diagnosis and treatment of delirium.

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Appendix A

Table 1. Prevalence of Delirium in 122 elderly emergency department patients by demographic variables

Demographic Variables (Number of Participants):		
	2018 Cohort	2019 Cohort
Age		
65-74	31	34
75-84	22	15
85+	8	12
Gender		
Male	34	22
Female	27	39
Ethnicity		
White	59	58
Black	2	2
Hispanic	0	1
Payor Status		
Medicare	39	42
Medicaid	7	10
Veteran's Administration	0	1
Private Insurance	10	5
Self-Pay	5	3
History of Dementia Diagnosis		
Positive History	26	28

SCREENING FOR DELIRIUM IN THE EMERGENCY DEPARTMENT

Negative History	35	33
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2019 Cohort Breakdown of 4A's Test Screening for Delirium:

	Diagnosed with Delirium	Not Diagnosed with Delirium
Screened Positive	5	9
Screened Negative	2	45

Number of people screened: 61 Sensitivity: 71% Specificity: 83%

2018 Cohort Breakdown of Participants Who Were Not Screened:

Patients Diagnosed with Delirium Prior to Implementation of Screening Tool	Patients Not Diagnosed with Delirium Prior to Implementation of Screening Tool
3	58

Number of patients screened: 61