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Literature Review

Screening Tools in Post-Stroke Delirium: Review of Literature

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Abstract

Post-stroke Delirium (PSD) continues to be a pathology that needs continued research. The most common subtype of delirium after a stroke is hypoactive and can happen in an acute setting which may conclude with long-term cognitive impairment. In relation to hypoactive delirium, aphasia is a very common risk factor that causes further complications due to screening tools missing the mark. Main screening tools used today include the Confusion Assessment Model and the Intensive Care Delirium Screening Checklist. These are both found to be inadequate for patients that have aphasic characteristics. A proper screening tool for patients can prevent higher hospitalization rates, longer course of stay, and increased mortality. This review of the literature goal is to bring light to the evident error in not considering aphasia with post-stroke delirium and warrants research to continue searching for a more accurate screening tool.

Keywords: *Post-Stroke Delirium; Stroke; Delirium; Aphasia; Screening Tools*

Abbreviations

PSD: Post-Stroke Delirium; DSM-5: Diagnostic and Statistical Manual of Mental Disorders; CAM: Confusion Assessment Model; MMSE: Mini-Mental Status Exam; ICU: Intensive Care Unit; CAM-ICU: Confusion Assessment Model-Intensive Care Unit; ICDSC: Intensive Care Delirium Screening Checklist; DRS: Delirium Rating Scale; RASS: Richmond Agitation-Sedation Scale; NIHSS: National Institutes of Health Stroke Scale; PANDA: Prior Delirium, Alcohol, NIHSS ≥ 5, Dementia, and Auditory/Visual Impairment; CT: Computed Tomography; LFT: Liver Function Test; RFT: Renal Function Test; MRI: Magnetic Resonance Imaging; CBC: Complete Blood Count; ABG: Arterial Blood Gas; EEG: Electroencephalogram

Introduction

Post-stroke delirium (PSD) is a common manifestation that may be troublesome for clinicians to diagnose accurately due to poor research and literature regarding etiology and screening tools. Limited research shows a negative impact on mortality and morbidity rates, increased hospital days, higher complication rates, and a possible increase in dementia [1]. Recognizing PSD in the acute setting requires identifying predisposing factors that may be evident before the presentation or during discharge [2]. This acute setting is shown to be within 5 days and has an incidence rate of 13 - 48% [3]. Many risk factors can lead to post-stroke delirium, including pre-stroke dementia, use of anticholinergic medication, smoking, alcohol use, and the type of stroke [3]. Early detection of these risk factors may improve

patient survival rates and underlying anxiety and depression [4]. Post-stroke delirium is a concerning development for patients as it increases morbidity and mortality. Recognizing risk factors enables clinicians to prepare and coordinate for the onset of acute delirium and provide treatment. Various screening tools have been implemented for the diagnosis.

Delirium definition

Delirium is a serious condition characterized by a change in the mental state, producing confusion and possible disorientation. DSM-5 defines delirium as a major neurocognitive disorder due to another medical condition or substance/medication-induced [5].

Pathophysiology

Delirium is a common manifestation that may arise from many etiologies, including urinary tract infections and other infectious foci, stroke, adverse medication effects, heart dysfunction, and autoimmune etiologies. How these etiologies cause delirium is still uncertain and diagnostic tools used vary based on the culprit. The two pathophysiologic hypotheses for delirium alone include neuroinflammation from peripheral infection and neurotransmitter imbalance from acetylcholine deficiency [6].

Delirium subtypes

The three main types of delirium include hyperactive, hypoactive, and mixed. Hyperactive delirium presents as an increase in restlessness, agitation, and a refusal of care. Conversely, hypoactive delirium presents with lethargy and may be mistaken as sedation. Mixed delirium shows signs of hyperactive and hypoactive delirium. Most of the literature indicates that hypoactive is the most common form of delirium and has the worst prognosis [1,7,8]. Hypoactive delirium is shown to have more severe symptoms and a significantly extended hospitalization when observed with an ischemic stroke [9].

Concerns with hypoactive delirium

The primary concern with hypoactive delirium and a stroke is the development of aphasia. Aphasia is the loss of the ability to understand or express speech clearly. Aphasia is often problematic for clinicians as it introduces barriers to communication and complicates patient care. The Confusion Assessment Model (CAM) is the most used screening tool to evaluate delirium. However, in aphasic patients, the CAM struggles to diagnose delirium accurately. The lack of accuracy of aphasic delirious patients makes it a common limitation in studies [10-12]. Silva shows that some factors in reducing delirium include practices that help with sleep quality, including beds in single rooms, presence of loved ones in the room, windows with natural lighting, minimization of mechanical restraint, and practicing sleep hygiene [1]. This brings us to the conclusion that sleep quality may benefit the patient with PSD.

Delirium evaluation

Delirium can be challenging to recognize and diagnose correctly. Failure to properly diagnose and manage delirium leads to increased hospitalization rates. Setters., *et al*. state that 30 - 40% of delirium is preventable, but once it occurs, it makes a significant public health burden [13]. The challenge for clinicians is to be vigilant of mental status changes and not to presume that lethargy or confusion is due to the primary underlying disease. The initial workup should start broadly performing a history, physical exam, and labs. Assessing delirium in post-stroke patients may be problematic for clinicians to obtain the necessary information. Patients may not cooperate with the physical examination, so a physician should concentrate on subjective findings such as vital signs, state of hydration, skin findings, or potential infectious foci [14]. The initial and further evaluation can be observed in figure 1 [31]. Two tests that can be utilized to assess delirious patients include the Digit Span Test and the Vigilance "A" Test. With the digit span test, physicians ask the subject to listen as they repeat a series of random numbers. Failure to repeat five consecutive digits yields a positive Digit Span Test and indicates probable impairment

[14]. The Vigilance "A" Test can also be done at the bedside by reading 60 letters and asking the patient to tap the table when they hear "A." More than two errors are considered to be abnormal [14]. The last step that can be considered is using the Confusion Assessment Model or the Mini-Mental Status Exam (MMSE). It is found that the MMSE exam is inaccurate with the diagnosis of delirium, but the CAM method shows proper sensitivity and specificity. All these tests are essential in assessing delirium but can be problematic in the PSD setting when the patient also has a co-occurrence of aphasia.

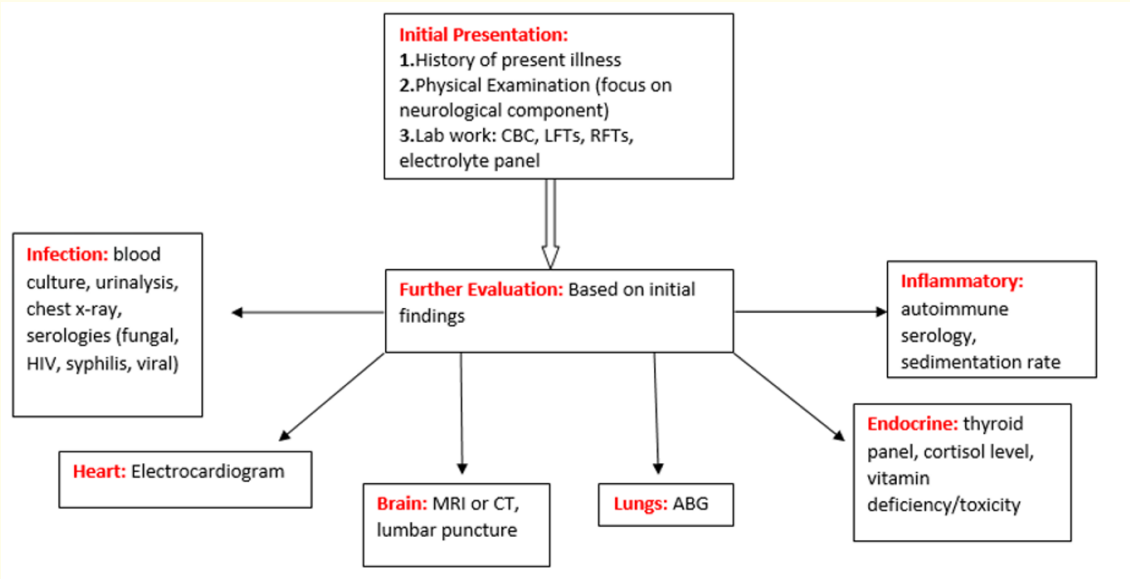

Figure 1: *Work-up of delirium starting with the initial evaluation of history of presenting illness, physical examination, and basic lab work. Depending on the findings, further work-up different organ systems is warranted [31].*

Delirium screening tools

With hypoactive being the most common occurrence of delirium in the acute setting, healthcare personnel will guide themselves down the wrong tract. Screening tools allow healthcare personnel to screen for delirium, primarily if clear risk factor indications exist. However, there is yet to be a consensus on which screening tool is superior. Screening tools need to be used regularly throughout the day for assessment because the risk of delirium formation is even greater at night and PSD occurs 1 in out of every 4 patients [18,19]. Figure 2 shows the timeline of the different screening tools used to evaluate delirium. Significantly, the only non-inferior screening tool assessed under the DSM-5 criteria is the Confusion Assessment Model [20]. Created in 1988, CAM is one of healthcare's most studied and used screening tools to identify and diagnose delirium [21]. There was a modification in 2001 to include intensive care unit (ICU) patients. The modification allowed physicians to make their assessments on patients that are on ventilators and not able to answer questions. The four features of the CAM include 1. acute onset of the fluctuating course, 2. inattention, 3. disorganized thinking, and 4. altered level of consciousness [22]. The diagnosis of delirium requires acute onset of fluctuating course and inattention with either disorganized thinking or an altered level of consciousness. This is a reliable source to determine delirium in any setting. However, the CAM-ICU is less reliable when a patient is aphasic, disoriented, or has other neurological deficits [23]. CAM becomes an unreliable source in more complex neurological cases, and a more in-depth investigation is needed [24].

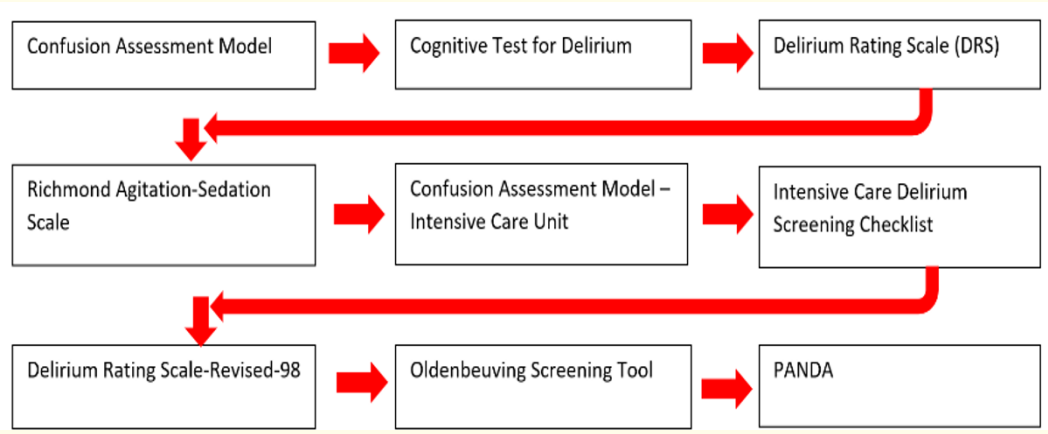

Figure 1: *Delirium screening tools timeline.*

Many of the assessment models for delirium utilize a language component. This becomes problematic for researchers as it forces them to exclude aphasic patients from their study. Aphasia has been shown to occur in pathological cases where brain damage might be occurring and is also likely a risk factor for delirium [11]. This common sign is seen more when there is an insult to the patient's dominant hemisphere, the left being more common than the right. However, research shows conflicting evidence on whether it is essential to observe aphasia in acute delirious patients in the post-stroke setting [10]. Since the CAM method is inaccurate, a test that may be able to detect delirium in aphasic patients is the Intensive Care Delirium Screening Checklist [12]. In intracerebral hemorrhage patients, the literature shows that the Intensive Care Delirium Screening Checklist (ICDSC) might be a better tool to use [15,16]. This checklist looks at the patient's level of consciousness, inattentiveness, disorientation, hallucinations, psychomotor agitation, inappropriate speech or mood, sleep/wake cycle disturbances, and symptom fluctuation. A score of ≥ 4 gives the diagnosis of delirium. The ICDSC has been shown to have high specificity but lower sensitivity but still has limitations with aphasia [17].

Some tools may assess the severity of PSD. Three tools can be used: the Delirium Rating Scale (DRS), the Delirium Rating Scale-Revised-98, and the Cognitive Test for Delirium [6]. When screening for PSD, the CAM and DRS have similar results, but the DRS takes longer [24]. Some instruments can assess motor subtypes within delirium, including the 30-item Delirium Motor Checklist, the 13-item Delirium Motor Subtyping Scale, and the Scale's abbreviated four-item version [6]. The Richmond Agitation-Sedation Scale (RASS) is also a screening tool that can observe the severity of a neurological event but is not specific to a neurological basis and is commonly used with subarachnoid hemorrhage [25]. This tool is vital because assessing the severity of the disease will allow physicians to withstand pulling life-saving treatment, which may be witnessed when a patient has delirium [26]. The advantages and disadvantages of the CAM, ICDSC, and DRS are seen in the table.

Ongoing research regarding risk factor assessments is in development for predicting delirium. In 2013, Oldenbeuving developed an assessment that investigates the patient's age, National Institutes of Health Stroke Scale (NIHSS), and the stroke subtype [27]. The NIHSS is a tool used to quantify the impairment caused by a stroke. There were some limitations to this tool as it does not consider non-disabled patients and also was limited to the Netherlands, where there can be different practices and resources used [28]. In 2020, Nakamizo., *et al*. designed a prediction tool using a score of prior delirium, alcohol, NIHSS ≥ 5, dementia, and auditory/visual impairment (PANDA) [29].

Scale	Advantage	Disadvantage
Confusion Assessment Model	High sensitivity; High specificity; quick (2-5 min.); accurate; ICU version for ventilated patients; ability to distinguish delirium from other neurological impairment	Not used for complex neurological case; can not bypass aphasia limitation; does not assess severity of condition
Intensive Care Delirium Screening Checklist	High specificity; based on observation rather than interaction; allowing diagnosis of subsyndromal delirium	Can't bypass aphasia limitation; low sensitivity; difficulty assessing with decreased level of consciousness
Delirium Rating Scale	Allows grading of delirium severity; Same level of efficiency as CAM when used by trained psychiatrist	Can't bypass aphasia or neglect limitations; difficult to apply w/o psychiatry training; time consuming; hard to assess with decreased level of consciousness

Table: *Showing the advantages and disadvantages of the three most commonly used screening tools for delirium. The confusion assessment model (CAM), the Intensive Care Delirium Screening Checklist (ICDSC), and the Delirium Rating Scale (DRS).*

However, this study has limitations, including small sample size, quality dependent on history taking, unnoticed sub-clinical delirium, and only internal validity [29]. Clinical predictors are only helpful if PSD shows those specific manifestations. Lastly, Czyzycki., *et al*. investigated computed tomography (CT)- based indices to look for additional information about the associated risks [30]. Unfortunately, there were no significant results in the study. These newly described screening tools will have no efficacy until they accept the aphasia occurrence in delirium.

Conclusion

We are currently witnessing positive trends in the search for a clear screening tool for PSD. However, these new interventions must consider the limitations presented by aphasic patients. The exclusion of patients with aphasia creates incomplete data and inaccurate results. Accounting for all risk factors and complications will help healthcare professionals more readily diagnose and treat PSD. CAM and ICDSC are vital screening tools commonly used to diagnose delirium. These screening tools, however, fail to consider aphasia as a symptom. As such, aphasic patients are excluded from these screening tools, leading to the incomplete data. New literature is desperately needed to modify our screening tools to include aphasic patients.

Conflict of Interest

There were no conflicts of interest in making of this study.

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