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Abstract

Background and purpose: High acute stress may presage the development of subsequent cardiovascular ailments. Understanding how best to assess acute stress may inform early interventions seeking to prevent long-term morbidity/mortality following stroke. A mixed methods approach examined early post-stroke acute stress symptoms using the post-traumatic stress disorder checklist-5 (PCL-5) and the acute stress disorder scale (ASDS).

Methods: A focus group of stroke survivors and/or their caregivers ($N=8$) evaluated PCL-5/ASDS feasibility, and 20 patients hospitalized for acute stroke were interviewed 2–10 days post-stroke onset, using either the PCL-5 or the ASDS.

Results: Acute stress symptoms were present and measurable during acute stroke recovery. Assessment of acute stress in hospitalized patients with stroke is feasible; a briefer modified ASDS has advantages over the PCL-5.

Conclusions: The ASDS is a viable and useful measure for assessing psychological distress during the acute post-stroke aftermath. Findings suggest that acute stress symptoms are present among patients with stroke, warranting greater attention to psychological responses in the early post-stroke period. Given that acute stress has serious potential long-term health consequences, additional research on stroke-related acute stress may prove useful for understanding post-stroke morbidity/mortality.

Keywords

Stroke, acute stress, post-traumatic stress, assessment

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Introduction

The burden of stroke-related disability is rising. Of the 795,000 new strokes occurring annually in the USA, over 90% of the patients survive the acute episode and have significant long-term impairments, making stroke a leading cause of human disability and poor quality of life.^{1–3} One in four patients reports post-traumatic stress symptoms (PTSS) within a year of their stroke.⁴ Growing evidence suggests that early psychological responses to trauma may predict patients' subsequent health outcomes.^{5,6} Given that stroke is a life-changing, potentially traumatizing event, high acute stress (AS) symptoms (i.e., early PTSS) among stroke patients may presage poor mental or physical health months to years later,⁷ thus contributing to stroke-related morbidity and mortality (See Garfin, Thompson and Holman, paper in preparation, 2017). The early identification of patients at risk for poor outcomes could inform and improve

treatment planning. However, the presence and measurability of AS in hospitalized acute stroke patients have not been verified. We focused on examining the feasibility of assessing AS symptoms during acute hospitalization for stroke.

To date, two measures have been used to examine AS in hospitalized patients following trauma: the acute stress disorder scale (ASDS)⁸ and the post-traumatic stress disorder (PTSD) checklist (PCL-C).⁹ The 14-item ASDS, a

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measure specifically developed to assess AS disorder, has been used in emergency room and trauma center patients, but has not been administered in the early post-stroke aftermath. The 17-item PCL-C assesses PTSD symptoms (e.g. hyper-arousal, avoidance, and intrusive thoughts) and has been used to compare hospitalized stroke patients' PTSD symptoms with those of other hospitalized patients, with no differences found.¹⁰ A 20-item revision of the PCL-C has been updated to fit the new Diagnostic and Statistical Manual of Mental Disorders-5 PTSD criteria¹¹ and adapted for use in hospital settings as well (Zatzick, personal communication, 30 December 2015).

In the current study, we tested the feasibility of using the ASDS and PCL-5 during acute stroke recovery. First, a focus group of stroke survivors and caregivers described the early post-stroke period providing feedback about whether each measure would adequately capture that experience. Responses were used to guide a pilot study exploring the feasibility of using the ASDS versus the PCL-5 in 20 hospitalized acute stroke patients.

Methods

Focus group

Six stroke survivors and two caregivers recruited from a local stroke network partook in a focus group in December 2015. Survivors' strokes had occurred between 9 and 61 months (median 31.5) before the focus groups were conducted. Survivors were asked to: (a) describe their emotional experiences and recovery after their stroke; (b) review the ASDS and PCL-5 measures and evaluate how well each captured that experience; and (c) comment on the feasibility of using each measure in the acute aftermath of stroke. Caregivers provided insight on the patient's mental status during his/her hospitalization and the feasibility of using these measures. Discussions were recorded, transcribed, and coded into common themes by the research team.

Inpatient study

Between January and March of 2016, 20 consecutive acute stroke patients were recruited from UC Irvine Medical Center, a certified comprehensive stroke center. Eligible patients were aged 18 years or older, had a radiologically confirmed supratentorial ischemic stroke or intracerebral hemorrhage with onset 2–10 days earlier, and were English speaking. Patients with significant pre-stroke disability (Rankin score >2), impaired cognition, mental health hospitalization in the previous year, or stroke within 90 days of the index event were excluded. Patients' cognitive status and ability to provide autonomous consent and complete the interview were assessed with the Glasgow coma scale (GCS; score must be 15),¹² two questions from the mini mental status exam (MMSE; score must be ≥ 7 out of

10).¹³ In addition to these pre-screening assessments, patients were asked three screening questions to determine their ability to comprehend and respond to sample questions using the scales included in the interview. Respondents were only consented and interviewed if they met the criteria for the GCS and MMSE described above and also responded to the three screening questions appropriately.

Twenty patients (Table 1) provided consent and completed an interview (ASDS, $N=10$; PCL-5, $N=10$). An 8.5 × 11 inch card depicting a visual analog of the 5-point Likert response scale was used as a visual aid for patients to respond to both measures. The interviewer introduced each level of the scale prior to the interview, and held the card approximately 3 feet in front of the patient. The interviewer recorded patients' responses and carefully noted patients' verbal/non-verbal behaviors as indicators of their cognitive and physical status. Notes were categorized into common themes identified by the research team. The interviewer – a registered nurse who was cognizant of the potential for patients to experience emotional lability – remained sentinel to factors such as patient fatigue and emotional response. The investigation conforms to the principles outlined in the Declaration of Helsinki. The University of California, Irvine Institutional Review Board reviewed and approved all study procedures.

Measures

Acute Stress Disorder Scale. Patients reported how much they had been bothered by 14 AS symptoms since their stroke on a scale from 1 (not at all) to 5 (extremely).⁸ Items were summed for a total score (possible range 14–70); higher scores indicate greater AS ($\alpha=0.93$). All patients completed the interview, with no missing data.

Post-traumatic Stress Disorder Checklist. Patients reported how much they had experienced 20 stress-related symptoms since their stroke on a scale from 1 (not at all) to 5 (extremely).¹¹ Items were summed for a total score (possible range 20–100); higher scores indicate greater post-traumatic stress ($\alpha=0.96$). Two patients were missing data for one to three of the items (4/200 total items missing, corresponding to 2% of PCL-5 data points; and to 1.2% of all data collected); missing items were replaced with the mean of the respondents' non-missing items for the measure.¹⁴

Results

Focus group

Participants confirmed experiencing symptoms related to AS such as fear, panic, distress, and intrusive thoughts about the stroke, and confirmed that they could have answered items from both the ASDS and the PCL-5 during their acute hospitalization. Focus group participants

Table 1. Participant characteristics.

Variable	Total Sample (N=20)	ASDS Group (n=10)	PCL-5 Group (n=10)	P value
	Mean (SD)	Mean (SD)	Mean (SD)	
Age (years)	68.2 (14.2)	72.2 (14.27)	64.2 (13.71)	0.217
	Total N	Total n	Total n	P value
Sex				1.000
Male	10	5	5	
Female	10	5	5	
Ethnicity				0.305
Hispanic descent	1	1	0	
Non-Hispanic descent	19	9	10	
Race				0.019*
Caucasian	12	9	3	
All others	6	1	5	
Education				0.502
Some college or more	12	6	6	
High school or less	6	4	2	
Stroke type				0.513
Ischemic	16	8	8	
Hemorrhagic	3	1	2	
Both	1	1	–	
Prior mental health diagnosis				0.264
Yes	4	1	3	
No	16	9	7	

Note: Independent sample *t*-tests and Pearson's chi square tests were conducted for group comparison tests.

ASDS: acute stress disorder scale; PCL-5: post-traumatic stress disorder checklist.

**P*<0.05.

generally thought that the briefer ASDS was preferable to the PCL and made several suggestions for conducting interviews soon after a stroke. Because some experienced a 'mental fog' or difficulty understanding others early after stroke onset, participants suggested that the interview should take no more than 20 minutes and simplified as much as possible to avoid interviewee fatigue.

Inpatient study

The majority of interviews (seven ASDS interviews; nine PCL-5 interviews) occurred between 2 and 4 days post-stroke (mean 3.7; median 3; range 2–9); field notes indicated no apparent differences between interviews conducted on or before day 4 versus after day 4 post-stroke. Interviews averaged 21 minutes (median 11; range 10–90). The average ASDS score was 25.3 (SD 12.7; median 20; range 14–63). The average PCL-5 score was 30.2 (SD 11.8; median 26.5; range 20–57).

Qualitative data suggested assessing AS among hospitalized patients post-stroke is feasible. ASDS interviewees had a higher completion rate than PCL-5 interviewees, with all 10 ASDS patients answering all items, but only eight of 10 PCL-5 patients doing so; two PCL-5 patients had one to three missing items. Incomplete assessments

occurred due to patient inattentiveness, fatigue, not wanting to answer a question, and/or being distracted by pain.

A challenge to assessing AS in both groups included difficulty concentrating on and understanding the questions. To address this, the interviewer first asked whether the patient experienced the symptom (yes/no response), and second, how bothersome was that symptom. On occasion, the interviewer had to re-explain response options and confirm the patient's response. Although this approach may have contributed to fatigue, it ensured that patients understood the questions and improved interview flow. Two patients denied that they had a stroke; to adapt, the stem question was modified from 'Since your recent stroke...' to 'Since your hospitalization...'.

Conclusion

This study used mixed methods to explore whether the assessment of AS symptoms is feasible in the early post-stroke aftermath. Focus group participants retrospectively reported that they had experienced AS symptoms and believed these could be measured soon after the stroke. A subsequent pilot study of hospitalized patients 2–10 days post-stroke found symptoms of AS, using two different measures. The pilot study suggests that although patients

may need questions repeated to ensure comprehension, once this is done they provide meaningful answers. In fact, several patients responded with detailed stories about their experience as it related to the specific questions. This may make assessments more challenging if the interview becomes lengthy, but it nonetheless appears that both the ASDS and PCL-5 can be feasibly administered to patients during the initial days following a new, mild stroke.

Our findings also suggest that the ASDS had advantages over the PCL-5. Given the missing data and greater difficulty concentrating that was observed during the PCL interview, the briefer ASDS appears a better instrument in this setting. Moreover, using the yes/no dichotomous response format as part of the interview version of the ASDS improved interview flow and minimized fatigue.

We acknowledge limitations of this pilot study: our eligibility criteria tend to limit the sample to patients with milder strokes, better prognosis, and/or less disability. The focus group size was small; a larger, more diverse group may provide additional insight about patients' early psychological responses. Finally, because our pilot study sample is small, and ASDS versus PCL-5 completion was associated with race, these findings must be considered preliminary. Nevertheless, this study is the first to find evidence for AS symptoms during acute stroke recovery, contributing important and novel information to the existing research on risk factors for health outcomes after stroke.¹⁵

In sum, AS symptoms are measurable in the immediate post-stroke phase among patients with a relatively mild stroke. Given the potential lasting health implications of AS, future studies should examine whether the early post-stroke psychological response is associated with subsequent stroke-related morbidity and mortality.

Implications for practice

- Acute stress symptoms may be present post-stroke.
- Assess acute stress with yes/no questions.
- Use a brief measure to optimize responses.

Conflict of interest

Steve Cramer has consulted for Dart Neuroscience, MicroTransponder, and Toyama. Vanessa Juth, Michelle Chan, and E. Alison Holman have no conflicts of interest.

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