# Nursing Interventions and Assessments for Aneurysmal Subarachnoid Hemorrhage Patients: A Mixed Methods Study Involving Practicing Nurses

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## ABSTRACT

Aneurysmal subarachnoid hemorrhage (aSAH) caused by a ruptured aneurysm is a devastating event that can lead to severe disability or death. Although published guidelines on the management of aSAH exist, research is limited regarding the role of nursing in the care of aSAH patients. The purpose of this study was to describe the interventions and assessments that nurses provide while caring for aSAH patients in the critical care setting. A mixed methods design was utilized for this study. Individual interview sessions with 10 neurocritical care nurses were completed and transcribed verbatim. The transcripts were analyzed and categorized using a predetermined code list based on a theoretical framework derived from the work of McNett and Giankis. The predetermined code list included four areas: (a) neurophysiological, (b) psychosocial, (c) injury prevention, and (d) maintaining therapeutic milieu. Frequencies were also computed based on an investigator-developed questionnaire to identify the most common interventions and assessments. The qualitative data supported the four main areas in the predetermined code list. The neurophysiological theme focused on blood pressure management and detailed neurological exams. The psychosocial theme addressed education, support, and communication. The injury prevention theme involved repositioning and reorienting/distracting the patients. The theme of maintaining a therapeutic milieu focused on decreasing the patients' stimulation. An additional theme emerged and was labeled, "Giving the Patient a Chance." Quantitative data revealed that neurophysiological and psychosocial interventions were most frequent. Nurses are responsible for the complex care of aSAH patients and their families and must implement a variety of nursing interventions and assessments. Further research is needed to identify the impact of these interventions and assessments on the outcome of aSAH patients while in the critical care setting.

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Neurocritical care nurses are required to provide detailed monitoring, assessment, and interventions to stroke patients to prevent potential complications that may affect patient outcomes (Barker, 2009; Levine, 2008; Seder & Mayer, 2009). Of the 780,000 strokes that occur each year, 23,400 of them are aneurysmal subarachnoid hemorrhage (aSAH) (Summers et al., 2009). Although the American Heart Association (AHA) and the American Association of Neuroscience Nurses (AANN) have published guidelines on the management of aSAH, little is known about the role of nursing in the care of aSAH patients or on how these guidelines relate to nursing practice (AANN, 2009; Bederson et al., 2009).

The purpose of this study was to describe interventions and assessments that nurses performed while caring for an aSAH patient. The study focused on the neurophysiological interventions and assessments nurses are required to do as well as the psychosocial, injury prevention, and therapeutic milieu interventions they perform.

## Background

Cerebral aneurysms are weakened, bulging spots on the wall of cerebral arteries (Buckley & Hickey, 2009).

Sacular, or berry, aneurysms are the most common type and generally form in the vessels located within the Circle of Willis (AANN, 2009). Ruptured cerebral aneurysms and the subsequent accumulation of blood in the subarachnoid space, known as aSAHs, are medical emergencies that can have devastating effects on patients and their families (Levine, 2008; Seder & Mayer, 2009). The etiology of aneurysms is not completely understood. Congenital, extrinsic, and genetic factors have been identified as possible causes. The most notable symptom of an aSAH is an explosive headache, considered as the ''worst headache of my life'' (Buckley & Hickey, 2009). Cerebral angiography is considered the gold standard for diagnosis of aSAH (Bederson et al., 2009). The treatment of choice after an aSAH is a surgery to secure the aneurysm to prevent rebleeding (Buckley & Hickey, 2009). The prognosis for aSAH patients remains poor, with mortality rates as high as 45% and a significant morbidity among survivors (Bederson et al., 2009; Levine, 2008; Seder & Mayer, 2009). Of those patients who survive the initial rupture, nearly 50% die from complications of vasospasm (Kassell et al., 1981).

After the initial rupture and securement of an aneurysm, monitoring and treating complications from the aSAH becomes of utmost importance. Nurses have an integral role in this complex care of aSAH patients. Not only do nurses provide assessments and interventions to monitor and treat complications of the aSAH, but they also provide psychosocial support to patients and their families during this difficult period (Barker, 2009; Levine, 2008; Seder & Mayer, 2009). There is lack of research detailing the assessments and interventions nurses provide for aSAH patients in the critical care setting.

### *Theoretical Framework*

To describe the interventions and assessments nurses perform, qualitative data from open-ended questions were coded using a predetermined code list derived from a framework by McNett and Gianakis (2010). Although McNett and Gianakis studied traumatic brain injury (TBI) patients, aSAH patients have similar interventions and assessments. McNett and Gianakis categorized nursing interventions for critically ill TBI patients into four areas: (a) neurophysiological, (b) psychosocial, (c) injury prevention, and (d) maintaining therapeutic milieu.

### *Literature Review*

There are many serious complications that need to be assessed and treated by the nurse caring for aSAH patients, such as cerebral vasospasm, electrolyte imbalances, increased intracranial pressures (ICPs), and seizures (AANN, 2009). However, there is limited research on interventions and assessments provided by nurses during the acute phase of care for aSAH patients. The most relevant literature is AHA's guidelines for the management of aSAH patients (Bederson et al., 2009) as well as AANN's (2009) clinical practice guidelines for the care of the patient with aSAH, which include detailed descriptions of the best practices for the care of aSAH patients; however, it is not known if these guidelines are followed by nurses.

> The existing literature related to the care of patients with aSAH does not typically examine the nurse's perspective of care for this patient population; as a result, their concerns may be critical in enhancing the quality of care and could drive future evidence-based practice.

Most existing literature does not delve into the nurse's perspective of caring for an aSAH patient. It is possible that interventions and assessments found in the guidelines are missed or not known by nurses. Difficulties and concerns in the critical care unit from the nurse's perspective will be crucial in discovering ways to enhance efficient care and drive future nursing research to provide evidence needed for practice.

## Methods

Approval from the university institutional review board and verbal informed consent from participants were obtained before data collection. A mixed methods design was conducted using face-to-face interviews with 10 nurses from the neurocritical care unit (NCCU) at a large Midwestern hospital. A single investigator was responsible for data collection. With permission from the NCCU manager, 10 nurses with at least 3 months of neurocritical care experience were interviewed. To recruit participants, flyers that gave an overview of the study and the investigator's contact information were placed in each nurse's mailbox. Nurses who were interested in learning more about the study contacted the investigator, who screened the nurses for eligibility based upon the nurses' neurocritical care experience. Those who were eligible were interviewed in a private room separate from the work area during the nurses' nonworking hours.

Interview sessions were audio-recorded and transcribed verbatim into written form. Names and

**TABLE 1. Individual Nursing Interview Questions**

- Please think about an aneurysmal subarachnoid hemorrhage patient that you recently took care of who was severely impaired, yet to your knowledge, still survived to be able to be transferred out of neurocritical care. Tell me what it was like caring for this patient.
- Tell me about the types of interventions/assessments that you carried out.
- Which interventions/assessments do you think led to positive outcomes? Please explain.
- Which interventions/assessments do you think led to negative outcomes? Please explain.
- Which interventions/assessments do you think did not make a difference either way (positive or negative)? Please explain.
- Which interventions/assessments do you think did not need to be done?
- Which interventions/assessments do you think should have been done?
- What concerns do you have about providing care for this type of patient?
- What kinds of psychosocial interventions did you provide for the patient and/or the family (i.e., education, listening, etc.)?
- What advice would you give to other nurses taking care of this type of patient?

identifying information were omitted from the written transcripts. Transcripts were double-checked with the audio recordings for accuracy. Open-ended questions were used to guide the interviews (Table 1). After the open-ended questions, a checklist consisting of common assessments and interventions was used for further data collection. The checklist was derived from McNett and Gianakis (2010) and further edited and verified by an experienced NCCU clinical nurse specialist. The checklist provided a comprehensive list of nursing interventions and assessments performed, which allowed comparison of results with those obtained by McNett and Gianakis (2010). Demographic information was collected from each nurse for data analysis.

## Analysis

Consistent with recommendations from Sandelowski's (1995b) data reduction framework and from Miles and Huberman (1994), a predetermined code list derived from McNett and Gianakis (2010) served as an initial guide for data analysis. Qualitative data analyses were conducted using Pope and Mays' (1999) method of analysis with open-ended responses, all of which were recorded and systematically reviewed with first-level coding to identify recurrent themes.

## Trustworthiness

Trustworthiness of the qualitative data was determined by analyzing the criteria of credibility, reliability, and confirmability (Davies & Dodd, 2002; Frankel, 1999; Lincoln & Guba, 1985). Credibility was established through data collection and analysis of the interview transcripts as well as by data saturation. Reliability was achieved by the investigator reviewing the transcripts and coding the themes. Themes were confirmed through an audit trail of two neuroscience clinical nurse specialists and an experienced neuroscience researcher. Each expert was asked to rate how well each quote represented each theme. The rating was completed using a Likert-type scale, with 0 being *not at all representative* to 4 being *extremely representative*. The average ratings from the three experts were calculated, and quotes with the highest average ratings were highlighted in the findings. Confirmability was shown through voluntary participation of nurses and the various perceptions and beliefs of interviewed nurses.

## Sample

According to Sandelowski (1995a), an adequate sample size is one in which comprehensive analysis and new understanding of an experience is achieved. Because of the in-depth qualitative approach, informational redundancy was achieved after interviewing 10 nurses. Of the 10 participating nurses, all were Caucasian and Bachelor of Science in Nursing-prepared female and had been registered nurses (RNs) for an average of 12.9 years (range, 2–47 years). One was a certified critical care RN, and three were certified neuroscience RNs. Almost all (90%) worked during day shift. The mean age was 35.8 years (age range, 24–67 years).

The nurses were asked to recall an aSAH patient they had cared for who, under their perception, was severely impaired but survived transfer out of the NCCU. Most patients described were men (60%), with mean age of 50.6 years (age range, 30–66 years). The patients' average Glasgow Coma Scale score was 9 (range, 3–14). Most patients had comorbidities including smoking (70%) and hypertension (60%; Table 2).

**TABLE 2. Patient Comorbidities**

| Comorbidities | % | *n* |
|---|---|---|
| Smoking | 70 | 7 |
| Hypertension | 60 | 6 |
| Diabetes mellitus | 30 | 3 |
| Hyperlipidemia | 20 | 2 |
| Myocardial infarction | 10 | 1 |
| Coronary artery bypass surgery | 10 | 1 |
| Chronic obstructive pulmonary disorder | 10 | 1 |
| Atrial fibrillation | 10 | 1 |
| Obesity | 10 | 1 |
| Drug abuse | 10 | 1 |
| Heart disease | 10 | 1 |
| Neurological impairment | 10 | 1 |

## Quantitative Data

Results from the checklist portion are provided in Table 3. All nurses indicated that they were responsible for monitoring blood pressure, oxygen saturation, and temperature, which is consistent with findings from the study of McNett and Gianakis (2010) on TBI patients. Nurses in this study as well as in that of McNett and Gianakis noted responsibility for patient and family education and support as well as collaboration with members of the healthcare team. All of the nurses stated that they were accountable for repositioning patients every 2 hours as well as limiting the amount of stimuli, which is also consistent with the findings of McNett and Gianakis.

## Qualitative Data

Analysis of qualitative data supported the four categories of interventions and assessments from the predetermined code list. An additional theme emerged during data analysis: Giving the Patient a Chance.

### Neurophysiological

From the qualitative data, the most important neurophysiological parameters monitored were blood pressure (90% of nurses' responses) and neurological status (100%). According to the nurses, it was imperative to keep patients well hydrated (hypervolemia) and their systolic blood pressures sufficiently high (induced hypertension). As one nurse stated:

> He [My patient] was definitely a person that would…neurologically improve when his blood pressure was up. We were driving his systolic above 180. When [his blood pressure] dropped he was just lethargic, just would look at you, lights were on but nobody was home, would not interact or engage. The higher his blood pressure would become he was talking, interacting with his family.

All nurses interviewed commented on the need for extreme detail with neurological assessments, as two nurses stated:

> 1. Your neuro assessment has to be spot on and you have to make sure you're doing that every hour and if there's something not right, do a neuro assessment.

> 2. I think that attention to detail [in neuro checks] cannot be brushed over…. If they're in that [vaso]spasm window you need to watch them and not to take it for granted. You just have to have one go bad on you one time to scare you into daylight.

The patient's head-to-toe assessment (e.g., pulmonary status, bowel function, proper nutrition, and skin assessments) was also deemed vital to monitor and was noted by 80% of the participants.

### Psychosocial

Psychosocial interventions and assessments revolved around support (50%), education (90%), and communication (60%). Many focused on patients' families, as opposed to patients themselves. Families were devastated by the sudden impact the aneurysm rupture had on the patients and on their lives.

> I think one of the hardest things, especially to get across to family, is just that support thing of…[the patient is] perfectly fine and [then] they have the worst headache of their life and their life is changed forever. I think it's important for the nurses to know how much support the families need.

Nurses noted that the patient's neurosurgeon was often too busy to talk with the family, leaving nurses as the link between the neurosurgeon's plan and the family's expectations.

> A lot of teaching, a lot of teaching, just…helping them know what to expect. For the patient not so much, because really a lot of times they don't… know what's going on anyway. Teaching and just reassurance and talking to them because the doctors don't really talk to them unless they really have to.

**TABLE 3.** Quantitative Data From Nurses' Interviews

| "Last Patient Cared for" Information | % | *n* |
|---|---|---|
| **Neurophysiological interventions and assessments** | | |
| Parameters measured: | | |
| Blood pressure | 100 | 10 |
| Heart rate | 100 | 10 |
| Oxygen saturation | 100 | 10 |
| Respiratory rate | 100 | 10 |
| Temperature | 100 | 10 |
| Neurological status | 100 | 10 |
| Intake and output | 100 | 10 |
| Arterial blood gases | 100 | 10 |
| Head CT/MRI | 100 | 10 |
| Head of bed/neck positioning | 100 | 10 |
| Monitor labs | 90 | 9 |
| Monitor central venous pressure | 80 | 8 |
| Monitor pulmonary wedge pressure | 50 | 5 |
| Monitor external ventricular drain output | 50 | 5 |
| Monitor cerebral perfusion pressure | 40 | 4 |
| Monitor intracranial pressure | 40 | 4 |
| Administer blood products | 0 | 0 |
| Medications administered: | | |
| Pain medication | 90 | 9 |
| Nimodipine (Nimotop) | 90 | 9 |
| Antiepileptics | 80 | 8 |
| Mannitol (Osmitrol)/3% NaCl | 50 | 5 |
| Cisatracurium besylate (Nimbex)/pentobarbital (Nembutal) | 30 | 3 |
| Aminocaproic acid (Amicar) | 10 | 1 |
| **Psychosocial interventions** | | |
| Patient/family education | 100 | 10 |
| Collaboration with physicians | 100 | 10 |
| Collaboration with respiratory therapists | 100 | 10 |
| Collaboration with other healthcare team members | 100 | 10 |
| Provide support to patient/patient's family | 100 | 10 |
| **Injury prevention interventions** | | |
| Turn every 2 hours/repositioning | 100 | 10 |
| Monitor restraint use | 80 | 8 |
| Reorient patient | 80 | 8 |
| Fall precautions | 50 | 5 |
| Seizure precautions | 50 | 5 |
| **Maintaining therapeutic milieu** | | |
| Limit amount of light | 90 | 9 |
| Limit amount of noise | 80 | 8 |
| Limit amount of stimuli | 80 | 8 |
| Limit number of visitors | 70 | 7 |
| Cluster nursing activities | 70 | 7 |

Communication (60%) and experience level of nurses and physicians (20%) were found to be important within the psychosocial theme. Communication between physician services (e.g., neurosurgery and intensive care) was found to be less than desirable. Nurses felt responsible for being the liaison between the different disciplines.

> I think that [intensive care unit doctors] and neurosurgery don't communicate at all. I feel like also we have a lot of new inexperienced nurses and I think that's a problem especially with the lack of communication between the doctors. If you have an experienced nurse they can probably help to coordinate and communicate stuff but I think that if you're not [experienced] then it's really difficult for you to do that sort of thing.

### *Injury Prevention*

Nurses implemented a variety of measures to help prevent further injury. Pulmonary status was regularly monitored with emphasis placed on turning patients frequently and keeping the patients' head of the bed elevated. This was only mentioned by two nurses during the qualitative interviews. The patients' positioning was also significant for intracranial pressure (ICP) monitoring. To combat spikes in patients' ICPs, the nurses repositioned their patients so their heads and bodies remained midline.

> Trying to keep [the patient] turned as much as possible, so that his oxygenation didn't worsen over time. I think…the whole positioning thing, too, is important, especially if you've got somebody with ICP problems, keeping them midline and keeping their head straight…[and] decreasing stimulation.

Reorienting and distracting patients to prevent fall injuries were also mentioned by two separate nurses.

### *Maintaining Therapeutic Milieu*

Therapeutic milieu is described as intangible interventions provided to patients that take into consideration the special needs of the patients (McNett & Gianakis, 2010). Again, only two nurses cited these interventions during the qualitative interviews. Interventions included keeping the patient's room temperature cool and decreasing stimulation to decrease the patient's fever and intense headaches and to promote rest.

### *Giving Patients a Chance*

When asked what advice they would provide other nurses, 60% of the participating nurses discussed the need to do everything medically possible for aSAH patients to give them a chance. The emerged theme of ''Giving Patients a Chance'' was woven throughout these nurses' interviews.

> I think it's important for [the nurses] to know that just because a patient comes in and they're really sick doesn't mean that they're not going to get better and that sometimes it takes a long time…. A lot of times they get better and it ends up you think it's not worthwhile [caring for] them but I think it ends up [being] worthwhile… to give them a chance.

## Discussion

The nurses focused heavily on neurophysiological aspects of caring for aSAH patients. Most interventions and assessments dealt with blood pressure monitoring, neurological assessments, induced hypertension, and hypervolemia. The importance of the role of nursing in monitoring these parameters was consistent with previous research (AANN, 2009; Hedlund, Ronne-Engstrom, Ekselius, & Carlsson, 2008; Suadoni, 2009) as well as with McNett and Gianakis (2010).

One finding during data analysis was the intricate overlapping of neurophysiological factors to decrease the effects of vasospasm. Vasospasm is a narrowing in the arterial wall after an aSAH due, most likely, to the breakdown of the surrounding subarachnoid blood. This constriction can reduce cerebral blood flow and cause infarction (Diringer et al., 2011; Weir, Macdonald, & Stoodley, 1999). Vasospasm occurs in 30%–70% of aSAH patients between 3 and 14 days after the hemorrhage. Fifteen percent to 20% will die from cerebral vasospasm, despite aggressive therapy (Bederson et al., 2009). To treat vasospasm, induced hypertension and hypervolemia (also known as Triple-H therapy) are frequently utilized.

Nurses performed balancing acts to keep all parameters within the desired ranges. For instance, the nurses related cases where the systolic blood pressure played a key role in patients' neurological status; the higher the systolic blood pressure, the more alert the patient. Nurses also balanced induced hypertension and hypervolemia with potentially fluid-overloading the lungs, which is consistent with other literature (AANN, 2009; Diringer et al., 2011; Smeltzer, Bare, Hinkle, & Cheever, 2009). Although AHA's guidelines for the management of aSAH patients emphasizes the importance of monitoring these components, the nurse's role is not discussed (Bederson et al., 2009). On the other hand, Summers and colleagues recently published an AHA scientific statement providing a comprehensive overview of nursing care for the ischemic stroke patient (Summers et al., 2009).

Recommendations for nurses regarding the neurophysiological management of stroke patients emphasized the importance of blood pressure monitoring and detailed neurological assessments (AANN, 2009; Summers et al., 2009). The AANN indicated that neurological examinations need to be completed hourly or more frequently if the patient has vasospasm.

The interviewed nurses cited the need for communication between the disciplines as very important, especially when discussing the neurophysiological components of care for the aSAH patients. The frustration and safety concerns related to lack of communication between disciplines have been cited numerous times (Alvarez & Coiera, 2006; Haig, Sutton, & Whittington, 2006; Phipps & Thomas, 2007). Consistent with Summers et al.'s recommendations, there is a need for better communication among healthcare providers in caring for stroke patients (Summers et al., 2009).

The experience level of new nurses and physicians was noted by the interviewed nurses as a concern. Many nurses believed that inexperienced nurses and residents (physicians in training) should not be allowed to care for this type of complex patient. The concern about lack of experience of the healthcare staff and quality of patient care has been noted in multiple studies (Kanai-Pak, Aiken, Sloane, & Poghosyan, 2008; Nash, 2009).

Nurses described more psychosocial support for the patients' family members than for the patients. Generally, patients were too sick to participate in their care. The importance of education for the patients' family, given the patients' acuity level, was supported by AANN (2009). Emotional support and education for patients' families were the two most important interventions described within this category, which is consistent with previous research (Hedlund et al., 2008; Marks & Daggett, 2006; McNett & Gianakis, 2010). Although emotional support and education for the patients' families were not mentioned in AHA's guidelines for the management of aSAH patients (Bederson et al., 2009), they were emphasized in AANN's guidelines for the care of aSAH patients, and Summers et al.'s (2009) scientific statement focused on nursing care of the ischemic stroke patient. Congruent with the checklist, all nurses described providing family education, support, and collaboration.

Injury prevention interventions performed included distraction, redirection, and positioning the patients. All interviewed nurses responded that they repositioned the patients every 2 hours during the quantitative checklist; however, only two nurses cited this intervention during the interviews. Positioning the patient to decrease ICP, promote respiratory functioning, and prevent skin breakdown is noted in Summers et al. (2009). The importance of monitoring pulmonary status has been cited by AANN (2009) to prevent atelectasis and pneumonia via the use of nursing interventions such as repositioning the patient every 2 hours, hourly monitoring of breath sounds, suctioning as needed, and deep breathing exercises.

Interestingly, falls and seizures are cited as problems with brain-injured patients (McNett & Gianakis, 2010); however, nurses only noted falls and seizures in the checklist. Although nurses did not directly state that they were concerned about the falls, they did describe nursing interventions to keep the patients from falling, such as redirection and distraction. The importance of nurses implementing fall precautions is cited in Summers et al. (2009). Seizures were not discussed during interviews; however, the need to confirm that antiseizure medications were ordered for their patients was noted. Seizure prophylaxis is recommended in the immediate post hemorrhagic period by several guidelines (AANN, 2009; Bederson et al., 2009; Diringer et al., 2011; Summers et al., 2009).

Maintaining a therapeutic milieu included keeping the room quiet and cool to prevent spikes in ICPs as well as decreasing stimulation. Interventions utilized to decrease stimulation, such as limiting the amount of visitors, light, and noise and clustering nursing activities, were cited by 70%–90% of the participants during the checklist portion. However, decreasing stimulation was discussed by only two nurses during the open-ended interviews. While in the NCCU, neurological assessments are generally completed hourly. This type of monitoring is not conducive to rest, so it is imperative that, while nurses are not in the room, the patient have a restful environment. The idea of maintaining a therapeutic milieu was not found in AHA's guidelines for the management of aSAH patients in Bederson et al. (2009); however, it was cited in AANN's (2009) clinical practice guidelines and Summers et al. (2009).

The additional theme that emerged was ''Giving the Patient a Chance.'' This was the only theme dealing with nurses' thoughts about whether their efforts are worthwhile. No literature was found on this theme specific to the aSAH population, although Villanueva (1999) cited ''giving the patient a chance'' as a key priority in caring for unresponsive patients. Although aSAH patients are very sick, 20%–30% of them do recover, although nurses are often unaware of patients' recovery after they leave the NCCU (The Brain Aneurysm Foundation, 2011). It is essential for nurses' well-being that they are updated on positive patient outcomes of those they have cared for (Villanueva, 1999). Johnson and Bakas (2011) noted that feedback on positive patient outcomes may facilitate guideline implementation in the emergency department. Providing information on positive patient

outcomes to enhance nurses' well-being was not noted in AANN's (2009) clinical practice guidelines, AHA's guidelines for the management of aSAH patients in Bederson et al. (2009), or Summers et al. (2009).

The guidelines for the management of aSAH patients by AHA address interventions and assessments for neurophysiological parameters; however, the role of the nurse is not mentioned (Bederson et al., 2009). Because the guidelines focus on the role of neurologists, issues regarding the psychosocial needs of patients and their families as well as the importance of maintaining a therapeutic milieu, preventing further injury, and giving patients a chance were not addressed. Summers et al. (2009) addressed the roles of multiple disciplines, including the role of nurses in the care of stroke patients; whereas AANN's (2009) clinical practice guidelines gave a very comprehensive overview of the nurse's roles and responsibilities while caring for the aSAH patient. A statement on multidisciplinary care, specific to the care of aSAH patients, might enhance guideline implementations from the entire healthcare team.

## Limitations

A possible limitation of this study was that all interviewed nurses were Caucasian women, with almost all working the day shift. In addition, a small convenience sample was used from within one institution. Because findings were based on nurses' recollections of the care they provided to a specific aSAH patient, findings may not have represented actual interventions and assessments provided for all patients. Despite these limitations, this study provides preliminary evidence of assessments and interventions that nurses commonly provide to aSAH patients. Further research in this area is needed.

## Conclusion

Nurses provide essential interventions and assessments to critically ill aSAH patients. Interventions and assessments were found in five main areas: neurophysiological care, psychosocial needs of patients and their families, injury prevention, maintaining a therapeutic milieu, and giving these challenging patients a chance. The interventions and assessments identified in this study provide a useful guide for future research. Determining which interventions and assessments have the most impact on aSAH patient outcomes is an area that has the potential to build evidence-based practice in the critical care setting.

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