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## EARLY MOBILIZATION OF PATIENTS WITH SUBARACHNOID HAEMORRHAGE: A NATIONAL SURVEY OF FRENCH INTENSIVE CARE UNITS

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**Objective:** To describe French intensive care unit practices regarding the mobilization of patients with subarachnoid haemorrhage.

**Design:** A cross-sectional nationwide survey study.

**Subjects:** Intensivists and physiotherapists or nurses from French intensive care units managing patients with subarachnoid haemorrhage.

**Methods:** An online questionnaire survey was distributed through the Neurocritical Care and Neuro Anesthesiology French Speaking Society.

**Results:** The response rate was 89%. Of these, 90% did not have a mobilization protocol for patients with subarachnoid haemorrhage. Sixteen percent of departments prohibited all forms of motor physiotherapy for a predefined period. Nineteen percent systematically prohibited out-of-bed mobilization, regardless of the severity of subarachnoid haemorrhage and in the absence of any complication, for a predefined period. The main factors that would delay or interrupt physiotherapy prescription were intracranial hypertension (79%), currently treated vasospasm (59%), and suspicion of vasospasm (44%). Ninety-one percent of the centres identified at least one complication that could be associated with standing upright. These mainly included decreased cerebral perfusion (71%), dislodged external ventricular or lumbar derivations (68%), and haemodynamic instability (65%).

**Conclusion:** Mobilization of patients with subarachnoid haemorrhage is heterogeneous among French neuro-intensive care units and several barriers preclude improvement of mobilization practices. Interventional studies assessing mobilization practices, as well as education and training of staff, are crucial to ensure the proper management of patients with subarachnoid haemorrhage and to improve outcomes.

**Key words:** early ambulation; physical therapy modalities; subarachnoid haemorrhage; surveys and questionnaires.

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Early mobilization in critically ill patients is a subject of increasing interest as it appears to be

### LAY ABSTRACT

No recommendations concerning the mobilization of patients with subarachnoid haemorrhage have been published to date. This survey examined mobilization practices of French intensive care units managing patients with subarachnoid haemorrhage. The study found that 90% of departments did not have a mobilization protocol for patients with subarachnoid haemorrhage and, consequently, the study found that practices were highly heterogeneous. It was also noted that there were concerns that early mobilization could be deleterious for these patients. Further studies are needed to determine the optimal modalities and timing of mobilization for these patients.

associated with improved outcomes (1–3). However, the best timing and modalities for mobilization remain uncertain, as studies investigating very early mobilization have shown a potential increase in adverse events in general intensive care unit (ICU) patients (4), and an association with a poorer functional prognosis in stroke patients (5).

To date, very few studies and only 1 randomized controlled trial have investigated the early mobilization of patients admitted to the ICU with subarachnoid haemorrhage (SAH) (6–11). Patients with SAH are often excluded from studies investigating early mobilization in patients with acute neurological injuries, as SAH is believed to differ greatly from other strokes (5). Indeed, several complications may worsen SAH patients' outcomes, including cerebral vasospasm and delayed cerebral ischaemia (12), and their prevention often motivates prescription of bedrest. Guidelines published in 2023 for SAH management now suggest that implementing a mobilization protocol is reasonable (13). However, this is a moderate recommendation (class 2a) as no RCTs have been conducted in this specific setting. Consequently, the most efficient and safe way to mobilize patients with SAH has not been determined to date.

This lack of data in the literature promotes heterogeneity in practice. To date, no study has examined French mobilization practices for patients with SAH admitted to ICU. The French healthcare system is composed of closed ICUs, with specialized ICU physicians, while physiotherapists have general physiotherapy degrees, with or without postgraduate critical care training. Physiotherapy and mobilization are performed on a medical prescription.

In France, the range of incidence of SAH varies between 3 and 8/100,000 inhabitants. Overall mortality is approximately 40%, 70% of which occurs within the first week (14). Patients with SAH are admitted to 1 of 35 centres with neurosurgery, interventional neuro-radiology, and neuro-intensive care departments. Our previous study reported a median (interquartile range) length of stay in the ICU of 15 (13–20) days (15). Regarding severity, our cohort had a median World Federation of Neurological Societies (WFNS) grade of 1 (1–3) and a median Fisher grade of 4 (4–4) (15).

The objectives of this study were to describe current practices in France and their determinants, and to identify the barriers associated with the implementation of early mobilization.

## METHODS

The study was reported in accordance with the CROSS checklist (A Consensus-Based Checklist for Reporting of Survey Studies) (16).

### Survey development

A cross-sectional survey by means of an online questionnaire was developed by a physiotherapist and a senior intensivist with in-depth knowledge and clinical experience of patients with SAH (AF and BGC).

The survey was tested by 5 intensivists and 4 physiotherapists, all of whom manage patients with SAH. Minor adjustments were made to improve clarity before sending the questionnaire.

The questionnaire comprised 18 items addressing the practices of mobilization of patients with aneurysmal SAH with few additional questions regarding the general organization of the ICU (Appendix S1). Mobilization was defined as all passive or active physiotherapy techniques, motor stimulation or installation at the edge of the bed, verticalization, transfer and installation in a chair, ambulation, and use of a cycle ergometer.

### Population

The target population was the 35 French neuro-ICUs admitting patients with SAH on the list drawn up by the French Neuroradiology Society. Responses from intensive care units in which there was no physiotherapy provision were excluded, as were responses from foreign ICUs. The centres were asked to pair up an intensivist and a physiotherapist or nurse to answer the questionnaire. Responses were based on the responders' clinical experience and beliefs.

### Ethical considerations

Informed consent was assumed if responders completed and submitted their completed survey online. No patient data were collected. The names of the centres were used to estimate the response rate and to identify possible duplicates, but were removed when the data were analysed.

### Survey administration

The questionnaire was designed via Google™ forms and distributed with the help of the Neurocritical Care and Neuro

Anesthesiology French Speaking Society (ANARLF) through mailing campaigns and social networks. The survey was accessible online from February 2022 to June 2022. A general reminder was sent in April 2022, followed by individual reminders by telephone and/or e-mail in May 2022.

### Statistical analysis

Data were analysed using descriptive statistics, reported as a number and percentages.

## RESULTS

A total of 48 responses were collected. ICUs that did not take on patients with SAH ( $n=2$ ) were excluded. When multiple responses were received from the same centre, the first response was analysed ( $n=8$ ). Responses from foreign or unidentifiable centres ( $n=7$ ) were excluded. The study analysed responses from 31 ICUs out of the 35 targeted; a response rate of 89%.

The characteristics of respondents are shown in Table I. Most ICUs treated on average 50–100 patients with SAH annually (17/31, 55%). The most frequent patient/physiotherapist ratio was 5–10 patients (15/31, 48%) or 11–15 patients (11/31, 35%) for 1 physiotherapist. In most ICUs, patients deemed medically stable generally received 1 daily physiotherapy session (20/31, 65%).

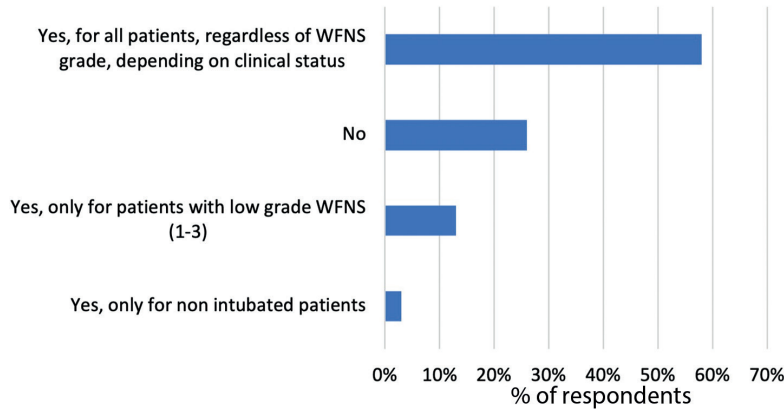
Ninety percent of the departments surveyed (28/31) did not have a written mobilization protocol for patients with aneurysmal SAH. Sixteen percent (5/31) of departments prohibited all forms of motor physiotherapy for a predefined period (apart from the time needed for the aneurysm repair). Criteria delimiting this phase varied by services. Nineteen percent (6/31) of services systematically prohibited out-of-bed mobilization, regardless of SAH severity, and apart from any complication, for a 2–10-day period, and/or throughout the phase at risk of vasospasm. Sixteen percent (5/31)

**Table I.** Characteristics of intensive care units surveyed ( $n=31$ )

	Answer	$n$ (%)
Number of beds	< 10	0 (0)
	10–20	17 (55)
	> 20	14 (45)
Number of SAH patients admitted each year	< 50	4 (13)
	50–100	17 (55)
	> 100	10 (32)
Patient/PT ratio	< 5 patients for 1 PT	0 (0)
	5–10 patients for 1 PT	15 (48)
	11–15 patients for 1 PT	11 (35)
	16–20 patients for 1 PT	2 (6)
	More than 20 patients for 1 PT	2 (6)
	Not defined	1 (3)
Frequency of physical therapy sessions	Less than once a week	2 (6)
	Every 2 days	1 (3)
	Once a day	20 (65)
	Twice a day	7 (23)
	1–2 per day	1 (3)

PT: physiotherapist; SAH: subarachnoid haemorrhage.

Is sitting out of bed allowed within the first 5 days of securing the aneurysm ?



**Fig. 1.** Sitting out of bed in a chair within the first 5 days after securing the aneurysm. WFNS: World Federation of Neurological Societies.

of services proscribed out-of-bed mobilization based on other criteria.

Fifty-eight percent (18/31) of services authorized chair installation within the first 5 days after aneurysm repair if allowed by clinical status, regardless of the WFNS grade. Twenty-six percent (8/31) of services systematically prohibited chair installation, whereas 13% (4/31) allowed it only for low-grade WFNS patients (Fig. 1). In 62% of services (16/26), there was no predefined maximum duration for chair-sitting sessions.

The main factors that would delay or interrupt motor physiotherapy prescription were intracranial hypertension (27/31, 79%), currently treated vasospasm (20/31, 59%), suspicion of vasospasm (15/31, 44%), and the patient who cannot tolerate external ventricular derivation (EVD) clamping during mobilization (11/31, 32%).

Ninety-one percent (28/31) of the centres identified at least 1 complication that could be associated with standing upright. These mainly included decreased cerebral perfusion (24/31, 71%), dislodged external ventricular or lumbar derivations (23/31, 68%), and

haemodynamic instability (22/31, 65%) (Fig. 2).

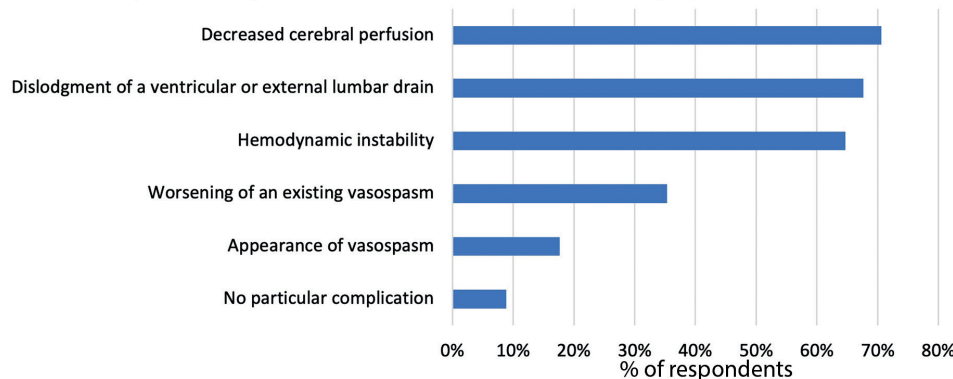
**DISCUSSION**

This study showed that early mobilization of patients with SAH was not standardized in French ICUs; 90% of services did not have an early mobilization protocol, and early mobilization is therefore largely heterogeneous. A recent survey by Hernandez et al. (17) found a similar result with 93% of respondents not having a mobility protocol for patients with SAH.

Patients with SAH, while brain injured, differ greatly from other types of

strokes whether ischaemic or intracerebral haematoma. Stroke trials are therefore not transposable. This study set out new data about practices in this specific setting and exposed non-evidence-based barriers limiting patient mobilization. Similarly to the results of the current study, in the survey conducted by Hernandez et al. (17), physical therapists were more cautious and reduced the level of mobilization when patients had high-grade SAH or were intubated. While several observational studies assessing the safety of mobilization protocols did not report any mobilization-related EVD dislodgement (18), it remained a major concern for most respondents. The same concern was found in the European survey conducted by Hossain et al., in which the presence of EVD was associated with a restriction of mobilization (19). Regarding haemodynamic concerns, several studies have shown very few mobilization-related hypotensive events and no significant increase in intracranial pressure (18). The observational character of these studies may not provide sufficient evidence to reassure clinicians and may therefore contribute to the continuation of conservative practices. Conversely, few services have determined a

What complications do you think could be associated with the standing of patients admitted for SAH?



**Fig. 2.** Complications associated with the standing of patients with subarachnoid haemorrhage (SAH).

maximum duration for chair installation. The AVERT study, which tested very early mobilization in stroke, showed that an increased duration of out-of-bed activities was detrimental, whereas an increased frequency was favourable (5).

In conclusion, the current study showed that mobilization of patients with SAH is heterogeneous among French neuro-ICUs, and that several barriers precluded the improvement of mobilization practices. Implementation and evaluation of EM protocols through interventional studies, as well as education and training of staff, is crucial to ensure proper mobilization of patients with SAH and to improve outcomes.

### ACKNOWLEDGEMENTS

Informed consent was assumed if physiotherapists completed and submitted their completed survey online.

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