

Head Position in the Early Phase of Acute Ischemic Stroke: An International Survey of Current Practice

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Background: Evidence to recommend a specific head position for patients in the early phase of acute ischemic stroke (AIS) is scarce. The aim of this study was to assess current head position practice for AIS patients among physicians from hospitals in different countries. *Methods:* A cross-sectional survey research design was used; physicians who are part of a stroke research network were invited to participate by e-mail. Descriptive statistics were used. *Results:* An invitation to participate was delivered to 298 doctors from 16 countries and 42.9% completed all survey questions. Participant responses were evenly divided in sitting up and lying flat position as the most usual at their hospital: 52.8% (95% confidence interval [CI], 43.7-61.0) of respondents preferred sitting up, whereas 47.2% (95% CI, 38.2-55.5) preferred lying flat; 53.9% (95% CI, 45.3-62.5) of participants answered that no written protocol specifying the indicated head position for stroke patients was available at their hospital or department, and 71% (95% CI, 63.2-78.9) recognized being uncertain about the best position for AIS patients. *Conclusions:* Common practice differs between physicians, and there is a lack of consensus about the best strategy regarding head position for AIS patients in many countries. An opportunity exists for a randomized trial to resolve this uncertainty and develop evidence-based consensus protocols to improve patient management and outcomes. **Key Words:** Brain ischemia—cerebral hemorrhage—data collection—head position stroke—survey.

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Most of the current treatment strategies for acute ischemic stroke (AIS) are aimed at improving brain perfusion and decreasing injury from ischemia, as well as

preventing medical complications of being bedridden.¹ Recanalization and reperfusion therapies to salvage the ischemic penumbra have shown to be efficacious in improving outcomes at 3 months when administered in time.² Improving blood flow through collateral arteries and leptomeningeal recruitment is another strategy and has been attempted in several interventional trials, aiming at increasing mean arterial blood pressure or increasing blood volume by vasodilatation; however, none so far have demonstrated efficacy.^{3,4} Nevertheless, the simplest method to augment cerebral blood flow to the ischemic penumbra could be placing the patient in a “lying flat” rather than “sitting up” position,⁵ but an association with clinical outcome improvement is still lacking.

Accordingly, the ideal head position policy for patients with AIS is still unknown, and any potential benefit on the brain may be offset by a delay in early mobilization and increased hazard of aspiration pneumonia or

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exacerbation of cardiac failure in vulnerable patients.⁶ Limited available data do not allow a specific head position guideline or recommendations to aid clinical decision making.⁷⁻⁹ Nonetheless, a beneficial effect of lying flat head position in the initial hours of AIS could be expected, and a possible better outcome for intracerebral hemorrhage (ICH) patients in a sitting up position.

Along with the uncertainty regarding the best positioning policy and the lack of evidence in clinical guidelines recommendations, to our knowledge there is no information about what is the current practice regarding head position in patients with AIS. This study aimed at assessing current head position practice patterns for AIS patients among physicians from hospitals in different countries.

Participants and Methods

Survey Design and Study Population

A cross-sectional survey of stroke physicians was conducted using a self-administered questionnaire. The survey was constructed and reported in accordance with the published recommendations of the Journal of Medical Internet Research.¹⁰ This study was performed following the Australian National Statement on Ethical Conduct in Human Research,¹¹ and ethical approval was obtained from the Human Research Ethics Committee from the University of Sydney.

The sample consisted of all physicians who are part of the George Institute for Global Health stroke research network and are participating in the international, multicenter trial for enhanced control of hypertension and thrombolysis stroke study (ENCHANTED).¹² The UK investigators were excluded because a concurrent similar study was taking place in this region. Stroke physicians known by the authors were personally invited to participate as well.

Instrument

A literature search did not reveal any validated questionnaire for our survey content, and thus we developed a survey in accordance with the methods advocated by Burns et al.¹³ Items for the survey were generated by an expert panel until no new items emerged. The items were then pre- and pilot-tested on 4 stroke neurologists who provided input on survey flow, ease-to-use, question clarity/content, and time to completion, and survey questions were removed or modified in accordance with feedback. The final questionnaire included 20 questions and was available in English, Spanish, and Chinese. The questions were related to the characteristics of the hospital, usual head position for patients with AIS at the hospital, their preferred positioning indication for AIS patients, and whether a local guideline or policy related to head position existed. Physicians were asked to give their level

of certainty regarding the best position in AIS patients and state their concerns about lying flat position. Demographic characteristics were also recorded. All these questions were closed, and the participants were asked to choose only 1 alternative or all that applied depending on the question using radio buttons.

Two formats of the questionnaire were available: online version powered by SurveyMonkey (SurveyMonkey Inc, Palo Alto, CA, www.surveymonkey.com) and a spreadsheet to be completed and returned by e-mail. The participant was free to choose either of them. The online version was accessible with a direct Web address and had open access to everyone having the survey Web address. It consisted in 3 screen pages with 5 to 8 items per screen. The spreadsheet could be filled in its digital format and returned by e-mail or printed, completed, and returned by fax.

A completeness check was not available before submission of the answers, but both formats had a request to please answer all the questions. Respondents were able to review and change their answers before submitting. Multiple entries from the same individual could not be prevented, but the information requested like e-mail address allowed us to detect it if present.

Procedure

Participants were e-mailed a letter explaining the aims of the survey, completion instructions, and time and that participation would be anonymous and voluntary. A reminder e-mail letter was sent 3 weeks after the initial invitation to participants who had not responded. No incentives were offered.

Data Analysis

The online format using SurveyMonkey allowed data collection and downloading to a spreadsheet. All the answers received on this format or on the spreadsheet were included in a final spreadsheet report by the project system developer. This constituted the database that was analyzed with SPSS for MAC (version 21, 2012; SPSS Inc., Chicago, IL). The response rate was calculated with the number who should have received the survey divided by participants who sent back the completed survey. Descriptive statistics were used to summarize responses. Statistical significance was prespecified at the 5% level.

Results

An invitation to participate was initially sent to 316 doctors from 16 different countries, but 18 alerts that the e-mail could not be delivered were received. From the 298 participants who should have received the invitation, 128 (42.9%) completed all survey questions. Only completed questionnaires were analyzed. [Figure 1](#) shows

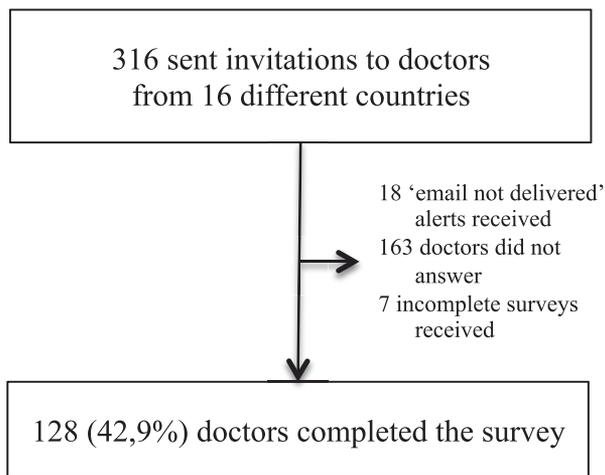


Figure 1. Participant flow diagram.

the participant flow diagram. No view rate of the online format was available.

Most of the participants (91.4%; 95% confidence interval [CI], 86.5-96.3) were neurologists, and 78.9% (95% CI, 71.8-86.0) worked in academic medical centers. Demographic and hospital characteristics are depicted in Table 1.

Questions and Responses

Usual or Most Common Head Position for AIS Patients at Your Hospital

Participant responses were evenly divided in sitting up and lying flat position as the most usual at their hospital: 52.8% (95% CI, 43.7-61.0) participants answered sitting up, whereas 47.2% (95% CI, 38.2-55.5) lying flat. Participants were asked to choose the position they would prefer for a series of different clinical scenarios. The answers are in Table 2.

Department/Hospital Written Protocol That Specifies the Head Position of Stroke Patients

More than half (53.9% [95% CI, 45.3-62.5]) participants replied that no written protocol specifying the preferred head position for stroke patients was available at their hospital or department, whereas 35.1% (95% CI, 26.9-46.4) stated a commonly used protocol was available and 9.4% (95% CI, 4.3-14.4) answered that although there was a protocol it was not used regularly.

Are You Certain about the Best Position of the Patient's Head in AIS?

Most participants (71% [95% CI, 63.2-78.9]) recognized being uncertain about the best position for AIS patients. The clinical scenarios where they would have concerns with lying flat patients after AIS can be found in Table 2. Finally, almost all participants (96.1% [95% CI,

Table 1. Demographics and characteristics of participating physicians

Characteristic	n	%
Age-groups		
<30 y	6	4.7
30-39 y	38	29.7
40-49 y	45	35.2
50-59 y	19	14.8
60-69 y	10	7.8
Male	91	71.1
Neurologist	117	91.4
Public hospital	84	65.6
Academic hospital	101	78.9
Stroke unit available	81	63.3
Average number of beds (SD)	595	512.6
Average number of stroke patients admitted previous month (SD)	42	30.5
Average number of patients who were treated with rtPA during the previous month (SD)	4	4.4
Country		
Argentina	22	17.2
Australia	3	2.3
Brazil	17	13.3
Chile	29	22.7
China	23	18.0
Colombia	4	3.1
Honduras	1	.8
Japan	1	.8
Korea	2	1.6
Mexico	1	.8
Peru	8	6.3
Singapore	3	2.3
South Africa	1	.8
Spain	7	5.5
Sweden	1	.8
USA	4	3.1
Venezuela	1	.8

Abbreviations: rtPA, recombinant tissue type plasminogen activator; SD, standard deviation.

92.7-99.5]) would be willing to recruit AIS patients, and 83.6% (95% CI, 77.2-90.0) would enter ICH patients in a clinical trial to address these issues.

Discussion

Our findings suggest that common practice differs between physicians surveyed, and there is a lack of consensus about the best strategy regarding head position for AIS patients. Moreover, most physicians caring for stroke patients are uncertain of the best head position in the acute management of these patients and one third had no positioning preference for any specific patient subsets. This is in agreement with the common absence of written protocols specifying the preferred head

Table 2. Key questions of the survey and corresponding answers

Survey questions	%	95% CI
What is the usual/most common head position for patients with AIS at your hospital?		
Sitting up	53	44-61
Lying flat	47	38-56
Does your department/hospital have a written protocol that specifies the head position for stroke patients?		
No protocol	54	45-63
Yes but used infrequently	9	4-14
Yes and used regularly	35	27-46
Are you certain about the best position of the patient's head in AIS?		
Sitting up	13	7-19
Lying flat	16	12-26
Uncertain	71	63-79
Do you apply a head position to specific types of patients?		
No	28	20-36
Lying flat for patients after a cerebral revascularization procedure (ie, intravenous or intra-arterial thrombolysis or mechanical clot retrieval)	39	31-48
Sitting up in ICH patients	45	37-54
Sitting up in large hemispheric AIS	41	32-49
Sitting up in patients receiving mechanical ventilation	27	20-35
Which types of patients do/would have concerns about lying flat after AIS?		
Dysphagia	51	42-60
Heart failure	45	36-54
Comatose	39	31-48
Pneumonia	34	26-42
Drowsiness	33	25-41
Would you be willing to enter patients with stroke in a trial of head position?		
AIS patients	96	93-100
ICH patients	84	77-90

Abbreviations: AIS, acute ischemic stroke; CI, confidence interval; ICH, intracerebral hemorrhage.

position for stroke patients in their hospitals and the scarce evidence regarding the best positioning policy for patients during the early phase of AIS. The few available guidelines addressing this issue are mostly based on evidence related to prehospital position, in ventilated patients or who have experienced a head trauma.¹⁴⁻¹⁷ The lack of consensus between health professionals from different hospitals and countries has been previously reported,¹⁸ and discrepancies might be found even between different wards in the same hospital.¹⁹

Although there is no definitive evidence supporting a risk for AIS patients with the lying flat position, there are some ancillary fears in the health teams, which are reflected in the responses to the present survey. Concerns with the lying flat position in patients with dysphagia could be related to some observational and quasi-experimental studies that showed an association between the lying flat position and risk of pneumonia, but these were only in patients who were fed with nasogastric tubes or were mechanically ventilated.^{20,21} Authors of a recent study conclude that any recommendation to avoid lying flat position over concerns of pneumonia may be unjustified, as they found a very low frequency (4.5%-6%) of pneumonia from lying flat in AIS patients

after thrombolysis.²² Furthermore, "side-lying" and avoidance of feeding in these patients are likely to reduce aspiration pneumonia related to different head positions in nonventilated patients with acute stroke.^{23,24}

Furthermore, an increase in mean flow velocities (MFV) and cerebral perfusion pressure could be achieved after changing the position to lying flat.^{5,8,25} A recent pooled analysis has shown a significant increase in Transcranial Doppler-recorded MFV on the stroke-affected hemisphere but not on the contralateral side of patients with AIS who were positioned in a lying flat head position (at 0° or 15°) as compared with an upright (30°) head position.⁸ However, the relevance of changes in MFV to any improvement in clinical outcomes after AIS is uncertain at this time.^{26,27} This might explain why lying flat was preferred after a revascularization procedure (intravenous or intra-arterial thrombolysis or mechanical clot retrieval) by the surveyed physicians.

The rationale for preferring the sitting up position for patients with ICH and large hemispheric infarction could be related to the suspected association between intracranial pressure (ICP) and position of the head. A systematic review of observational studies indicates that lying flat is associated with a significant increase in ICP in patients

with brain injury.²⁸ However, there is little evidence of effects in stroke patients. A study in patients with large hemispheric cerebral infarction showed only minor changes in ICP with such head positioning.²⁹ Regarding ICH patients, the sitting up head position may have favorable effects on clinical outcomes by reducing elevated ICP.³⁰

To our knowledge, this is the first study reporting data on a survey sent to a large network of stroke-related physicians in different countries, regarding the issue of best head position for patients with AIS. We believe it provides a perspective of different positioning policies among different hospitals and countries. This information has been useful in the planning phase of collaborative international trials of head position in stroke patients, such as a phase 2 proof of concept Pilot Trial (HeadPoST Pilot [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT01706094) Identifier NCT01706094) and a phase 3 Cluster Randomized Trial (HeadPoST Main [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT02162017) Identifier: NCT02162017).

As our sample only included physicians from the stroke research network and participation rate was somewhat limited, these results might not be representative of the current practice in other centers and countries. However, these results do reflect the uncertainty regarding this practice and expose the current policy among doctors who could eventually participate in future trials of head positioning. A special effort was undertaken to deal with selection bias related to a low respondent rate. It has been reported that the response rate to e-mail surveys has been decreasing with time—this seems to be related to the loss of novelty of this type of surveys and the overload of online surveys and e-mails.³¹ Crucial strategies for e-mail surveys were implemented—these included using an instrument with a limited number of questions and performing follow-up of contacts.^{31,32} Moreover, we offered 2 alternative ways to answer the survey, by e-mail or online, facilitating the answering process.

Conclusion

There is a lack of consensus regarding practice patterns on the best position in patients with AIS. An opportunity exists for randomized trials to resolve this uncertainty and develop evidence-based consensus protocols to help clinical decision making in this field and improve patient outcomes.

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Supplementary Data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2015.03.023>.

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