Post-stroke lateropulsion terminology : pushing for agreement amongst experts

Pushing for agreement among experts: post-stroke lateropulsion terminology

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Pushing for agreement: post-stroke lateropulsion terminology

Dear Editor,

More than half of people with stroke who require rehabilitation are affected by a phenomenon which is variably called ‘lateropulsion’, ‘pusher syndrome’ or ‘pusher behaviour’[1]. The phenomenon involves active pushing of the body across the midline toward the more affected side, and / or actively resisting weight shift toward the less affected side[1-3]. This phenomenon is associated with poorer rehabilitation outcomes and a need for longer rehabilitation length of stay[4, 5]. However, no published agreement on terminology to describe the phenomenon, and no standard guidelines for rehabilitation of the problem currently exist; meaning that people affected after stroke may be disadvantaged due to the lack of a consistent approach to rehabilitation, and failure of health policy to accommodate the rehabilitation needs of the population[6].

Variation in terminology among tools[7-9] used to define and assess the condition has contributed to the current lack of understanding of its mechanism and characteristics[2]. Lack of agreement on terminology, and the defining features of the condition, present obstacles in understanding prevalence, accurately comparing research results, reaching consensus on use of measurement tools, agreeing upon a consistent approach to rehabilitation, and translating research to clinical practice. Clinicians and researchers need such consensus to facilitate agreement on the most effective approach to rehabilitation. Research evidence is limited and no best-practice guidelines for rehabilitation of the condition currently exist. Best-practice recommendations that are agreed by an expert panel will guide clinicians globally in providing best-practice care. Improved access to best practice rehabilitation, measurement of care standards, and cost-effective service delivery will ultimately improve outcomes for people with this condition post-stroke.

Commencing in April 2021, a collaboration of 20 international clinical and scientific rehabilitation experts in the condition undertook a Delphi Panel process[10] that aimed to

describe clinical practice recommendations for physical rehabilitation of the phenomenon. Panel selection criteria included:

- First or senior author of a published journal article (English language) reporting on rehabilitation of lateropulsion (2010-2020), identified by Medline and CINAHL database searches in May 2020, using the terms, 'lateropulsion or contraversive pushing' AND 'stroke or cerebrovascular accident or CVA' AND 'rehabilitation or therapy or treatment or intervention';
- Scale for Lateropulsion (SCALA)[11] development expert panel member; and/or
- Presented at 'Symposium on Human Perception of Verticality: Lateropulsion and Retropulsion in Neurological Disorders' in May 2019.

Those who were unable to complete the survey and communicate about the process in English; published on rehabilitation of lateral medullary syndrome only; or presented only on retropulsion at 'Symposium on Human Perception of Verticality: Lateropulsion and Retropulsion in Neurological Disorders' conference were excluded from participation. To reduce the risk of selection bias, a maximum of two panel members representing a single institution would be included.

Of 39 potential panel members identified and contacted, 23 provided consent to participate. As three participants represented the same institution (two participants elected to complete the responses together, under the name of one panel member), 22 participants were included. One participant withdrew prior to commencement of the process. Round One surveys were distributed to 21 experts. Twenty participants completed all four rounds of the process.

The panel strived to reach consensus on the preferred term to describe the phenomenon. *A priori* consensus was defined as ≥75% agreement; 50-74% agreement was described as 'some agreement'. The panel also identified priorities for future research.

The process was conducted in English and consisted of four survey rounds via the Qualtrics XM program[12] and two optional Zoom meetings. The panel represented 10 countries (Australia, Belgium, Brazil, Canada, France, Germany, Italy, Japan, United Kingdom and United States) and consisted of Physiotherapists (n=12), Medical Doctors / Neurologists / Rehabilitation Physicians (n=4), Kinesiologists / Movement Scientists (N=2), and Neuropsychologists (N=2).

Round One

In the first round of the process (May 2021), panel members provided the term/s that should be used to describe the phenomenon of active pushing of the body across the midline toward the more affected side, and/or actively resisting weight shift toward the less affected side. Ten terms were provided by panel members, along with reasoning behind their chosen term/s, where reasoning was provided (Supplementary File). Results of each round are presented in Table 1.

Round Two

In the second round (July 2021), panellists ranked the ten terms suggested in Round One, in order of suitability (1 = most suitable, 10 = least suitable).

Round Three

The top five terms selected from Round Two were again presented for ranking in order of suitability in the third round (September 2021). Scales used in previous literature to define and assess lateropulsion (The Burke Lateropulsion Scale[8], Four Point Pusher Score[7] and Scale for Contraversive Pushing[9]) were presented to participants for reference.

Round Four

The top three terms identified in Round Three were again presented for ranking in order of suitability in the final round (November 2021). At this time, Dai and Perennou[2] had just

published a Letter to the Editor, outlining the history of this condition and the terminology commonly used. This publication was provided to panel members for reference.

In this final survey round, participants were also asked to note the defining features of the condition, under their preferred term. Those who selected ‘lateropulsion with pusher behaviour’ as the preferred term were asked to describe the defining features of both ‘lateropulsion’ and ‘pusher behaviour’.

Descriptions of defining features of both ‘lateropulsion’ and ‘pusher / pushing behaviour’ did not differ, providing evidence that participants were all naming the same phenomenon. Among those who preferred the term ‘lateropulsion with pusher behaviour’ (n=4), all participants described ‘lateropulsion’ as referring to lateral body tilt and ‘pusher behaviour’ as active resistance to passive correction toward the midline, with use of the limbs to resist. This is the same phenomenon that was described by those who selected only ‘lateropulsion’ or only ‘pusher / pushing behaviour’.

A clear consensus (≥75%) regarding preferred terminology was not reached. However, there was some agreement (50-74%) that ‘lateropulsion’ was the preferred term to describe the phenomenon of active pushing of the body across the midline toward the more affected side, and/or actively resisting weight shift toward the less affected side.

PLEASE INSERT TABLE 1 ABOUT HERE

Priorities for Future Research

In Round One, panel members were asked to nominate their perceived priorities for research into the understanding of lateropulsion, and 28 future research priorities were identified. In Round Two these were reduced to the top 10 priorities, and Round Three

further condensed the list to the top five priorities, which were ranked by importance in Round Four (Table 2).

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Better understanding of this prevalent[1] condition, and the associated poor outcomes[4, 5], could lead to improved management, which may enhance patient outcomes after stroke and increase efficiency of healthcare resource utilisation. In planning future trials to investigate outcomes associated with lateropulsion and targeted interventions, there is an urgent need for the scientific and clinical communities to agree on the defining features and terminology used to describe the condition.

The phenomenon being considered was described as, 'active pushing of the body across the midline toward the more affected side, and / or actively resisting weight shift toward the less affected side'. This description was retained throughout the process and consensus (≥75% agreement) that this was an appropriate description of the phenomenon was reached. Discussion occurred throughout the process regarding the phrases 'weight shift', 'weight bearing', and 'weight acceptance' in the description of lateropulsion. There was consensus among participants that both 'weight shift' and 'weight acceptance' are appropriate terms and may be used, but that in this context, 'weight bearing' should not be used, as people with lateropulsion still bear a load through their less affected limbs, while they resist weight acceptance or weight shift onto that less affected side.

Some participants preferred to delineate 'lateropulsion' and 'pushing behaviour'; with 'lateropulsion' describing a tilt, and 'pushing behaviour' describing the active push that results in the tilt. Some discussion amongst the group suggested that a passive lateral tilt may be described as such, whereas active tilts may be described as 'lateropulsion'. The lack

of agreement regarding active versus passive features of the condition likely presented a barrier to consensus.

The possible role of stroke location in naming the phenomenon was not discussed, however publications by some panel members have reported differing prevalence of post-stroke lateropulsion in those with supratentorial and infratentorial lesions [1]. The failure to achieve consensus in this process may have been related to differing opinions regarding lateropulsion due to lesion location. This process focused on lateropulsion after stroke only. While the phenomenon may be noted in those with brain lesions due to causes other than stroke[13], terminology to describe the phenomenon in other causes of brain lesions was not specifically discussed in this process.

A strength of this Delphi process was the considerable and varied clinical and research expertise of the panel members in the field of lateropulsion. After the process commenced, there was no attrition of panel members; all twenty experts participated fully in all four rounds. Panel membership was limited to those who were able to participate in English, which may have resulted in exclusion of experts with other language backgrounds.

As part of the selection criteria, all panel members had conducted prior research in lateropulsion. As such, panel members had previously utilised a measurement scale and a term to describe the phenomenon. Bias toward the term used in prior work may have affected participants' preferences. Although the term 'lateropulsion' was selected as the preferred term (50% agreement) in Round Four, it was not clearly preferred in the prior rounds. The term recommended in the paper by Dai and Perennou[2], distributed with the Round Four survey, was 'lateropulsion'. This publication provided a summary of various terminology conventions for the condition over time, and was distributed to participants to ensure their awareness of the most recent literature. It is, however, possible that this recommendation influenced panel members' responses. It is recommended that future attempts at reaching consensus regarding terminology should consider lesion location,

active and passive features of the condition, and occurrence in people with brain lesions due to causes other than stroke.

In conclusion, although variation in terminology preference continues to exist, there was some agreement among this expert panel that ‘lateropulsion’ is the most suitable term to describe active pushing of the body across the midline toward the more affected side, and / or actively resisting weight shift toward the less affected side. The panel also set naming and defining lateropulsion as a top research priority, indicating the importance of a shared understanding that will facilitate research and patient management. Until further agreement or consensus is achieved, our recommendation is that the term ‘lateropulsion’ be used to describe this phenomenon in research and clinical practice. This process has shown that a push for consensus on terminology is still needed.

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Table 1. Participant ranking of the terms as presented in each Round.

Round Two			
Term	**Frequency of top ranking (n)**	**Frequency of appearance in top three (n)**	**Ranking mean ± SD**
Pusher / pushing behaviour	3	13	4.15 ± 2.82
Lateropulsion with pusher behaviour	4	9	4.5 ± 3.12
Active lateropulsion	2	5	4.95 ± 2.50
Contralesional lateropulsion	2	6	5.05 ± 2.65
Lateropulsion	5	8	5.1 ± 3.29
Contraversive pushing	2	5	5.35 ± 2.70
Contraversive lateropulsion	1	3	5.95 ± 2.42
Lateral pusher behaviour	1	7	6.05 ± 3.63
Pusher syndrome	0	4	6.8 ± 2.83
Lateropulsion after hemispheric lesion	0	0	7.55 ± 1.65
Round Three			
Lateropulsion with pusher behaviour	5	16	2.32 ± 1.16
Pusher / pushing behaviour	5	13	2.79 ± 1.44
Lateropulsion	4	10	3.16 ± 1.61
Active lateropulsion	3	10	3.32 ± 1.34
Contralesional lateropulsion	2	8	3.42 ± 1.39
Round Four			
Lateropulsion	10	-	1.8 ± 0.87
Lateropulsion with pusher behaviour	4	-	2.0 ± 0.65
Pusher Behaviour	6	-	2.16 ± 0.87

Table 2. The top five research priorities, as identified by this panel.

1	Agreeing upon a commonly accepted definition of lateropulsion
2	Identifying strategies to apply optimal and effective integration of proprioceptive, graviceptive, visual, tactile, and motor information to recalibrate the ego-centric reference-frame in space
3	Understanding etiology, pathophysiology, and underlying mechanisms of lateropulsion
4	Trials of specific interventions in defined patient cohorts
5	Validating a gold standard of assessment of lateropulsion such as the Scale for Lateropulsion (SCALA)[11]