Title

TPMD Tongue Pressure Measurement in Post-Stroke Dysphagia

Rationale

- Post-stroke dysphagia is common and increases the risk of pneumonia, malnutrition, and mortality[1].
- Reduced tongue strength is a key factor in impaired bolus propulsion and residue [2] [3].
- TPMD provides a simple, quantitative measurement of tongue pressure, complementing clinical and instrumental assessments [3,4].

Key clinical evidence

- **Pneumonia prediction in acute stroke**
  - 220 acute stroke patients; max tongue pressure < 21.6 kPa predicted pneumonia (HR 7.95).
  - Improvement in tongue pressure over 2 weeks associated with fewer pneumonias [2] .
- **Correlation with VFSS findings**
  - 346 stroke patients; tongue pressure correlated with oral and pharyngeal residue on VFSS.
  - Combining clinical scales, tongue pressure and RSST improved screening performance [3].
- **Dysarthria and oral function**
  - 82 first-ever stroke patients; lower tongue pressure (cut-off ~28 kPa) associated with dysarthria and specific lesion locations [5].
- **Outcome associations (systematic review)**
  - Lower tongue strength linked to slower swallowing recovery, higher pneumonia rates, worse survival; strength is modifiable by training and nutrition [1].

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[1] Nagano 2022
[2] Nakamori 2016
[3] Nakamori 2024
[4] Utanohara 2008
[5] Nakamori 2025

How to use TPMD in stroke care (within intended purpose)

- **Baseline assessment**
    - Measure max tongue pressure in patients at risk of dysphagia (acute/subacute stroke).
    - Interpret against age/sex reference ranges and literature cut-offs (~20–22 kPa) as risk indicators, not diagnostic absolutes [2, 4, 6]
- **Follow-up during rehabilitation**
    - Repeat measurements every 1–2 weeks to monitor changes in tongue strength.
    - Consider trends together with swallowing scales, diet texture, and complications [1].
- **Multimodal approach**
    - Always combine TPMD results with clinical examination, bedside swallow tests, and, when indicated, VFSS/FEES [3].

Indicative reference and risk values (TPMD)

Context	Parameter	Indicative value (kPa)	Note
Healthy adults (20–79 y)	Max TP	≈ 30–50	Age- and sex-dependent [4]
Acute stroke – pneumonia risk	Max TP cut-off	≈ 21.6	Lower values associated with higher pneumonia risk [2]
Sarcopenic dysphagia	Max TP cut-off	≈ 20	Proposed criterion in Japanese position paper [6]

Measures with TPMD

Core message

TPMD does **not** diagnose or treat dysphagia on its own. It **measures** tongue pressure objectively and can help identify high-risk stroke patients and monitor functional recovery when integrated into a multimodal assessment pathway.

[6] Fujishima 2019