



# NSW Speech Pathology Evidence Based Practice Interest Group

## Critically Appraised Paper (CAP)

### CLINICAL BOTTOM LINE:

Bedside swallowing assessment and pulse oximetry, whether used alone or in combination, showed inadequate sensitivity, specificity and predictive values to detect aspiration in stroke patients, compared with videofluoroscopy, which remains the 'gold standard'. However, the limitations of this study should be taken into account when interpreting these results.

**Clinical Question [patient/problem, intervention, (comparison), outcome]:** In patients with neurogenic dysphagia, is pulse oximetry a reliable assessment tool in identifying episodes of aspiration?

### Citation:

Ramsey, D.J.C., Smithard, D.G., & Kalra, L. (2006). *Can Pulse Oximetry or a Bedside Swallowing Assessment Be Used to Detect Aspiration After Stroke?* *Stroke*, 37 (12), 2984-2988.

**Design/Method:** Comparative study without a control group

### Participants:

- 189 patients, mean age 70.9 yrs
- 60.8% were male
- Subjects were recruited from consecutive acute stroke patients, over the age of 18, who were admitted to 1 of 2 acute care hospitals.
- Diagnosis of a stroke was confirmed with CT or MRI.
- Exclusion criteria included stroke onset more than five days before assessment, reduced level of consciousness, intolerance of the contrast agent, disseminated malignancy, prior dysphagia, and other neurological diseases/local pathology affecting the swallow or inability to consent. Patients were also excluded if they required continuous oxygen therapy.
- Median baseline Barthel score (measuring stroke severity) at the time of assessment was 11/20.
- Strokes due to intracerebral haemorrhage made up 10.58% of the experimental group, 9.52% of the subjects had cardioembolic strokes, 44.97% had small vessel occlusions and 28.57% had ischemic strokes.

### Experimental Group:

- Swallowing was assessed via modified Bedside Swallowing Assessment (BSA) and measurements of blood oxygen saturation levels were taken simultaneously with BSA.
- Oromotor function and swallow function was evaluated in the BSA. The patients were given radio-opaque contrast in the BSA as opposed to water and then given a chest x-ray following to detect evidence of barium in the lungs. Patients were categorized into 'safe', 'unsafe' and 'silent aspiration' groups.
- Pulse oximetry was taken for 1 minute prior to and 10 minutes from the start of the BSA (using finger probe on unaffected upper limb). Baseline O2 levels were taken for 1 minute prior to, and 10 minutes during, the BSA to allow for delayed aspiration and recovery period. The greatest fall/change in O2 saturation during 2 time periods was calculated as the difference between the lowest saturation and the mean baseline saturation after taking out extreme values due to movement artefact. Desaturation levels of 2% and 5% were measured.

- Videofluoroscopy (MBS) was undertaken in 54 participants (28.6% of study group). They were given different consistencies of food/fluid containing barium, and their swallow was imaged on a lateral projection. Participants were scored according to their most unsafe swallows and grouped into 4 categories – safe, penetration, silent aspiration and overt aspiration.

#### Results:

- 27.6% of patients who were considered **safe** on modified BSA, desaturated by more than 2% during swallowing. 32.9% of patients considered to be **unsafe** on modified BSA showed desaturation. Thus, no significant association was found between the modified BSA score and desaturation.
- The presence of an unsafe swallow at bedside was not significantly associated with an unsafe swallow (penetration/aspiration) on videofluoroscopy, and none of the patients who showed silent aspiration on videofluoroscopy were identified as silent aspirators at bedside.
- There was no association between penetration/aspiration on MBS, and desaturation by >2% or >5% on BSA.
- Pulse oximetry was less accurate in detecting aspiration than a bedside assessment, except when desaturation of greater than 5% was seen.
- Both modified BSA and pulse oximetry during swallowing showed low sensitivity, specificity and predictive values for the detection of aspiration risk in acute stroke patients compared with videofluoroscopy.
- Combining bedside assessment and pulse oximetry improved the sensitivity value but not the specificity and predictive values.

#### Comments on Design:

##### Strengths

- Use of blinding was strength of the study. The assessors were blinded to the findings of other assessments to prevent results from being influenced by bias.
- BSA and pulse oximetry were done simultaneously and saturations were monitored over a 10-minute period to avoid missing late desaturation.
- Good description of the inclusion and exclusion criteria for the study.
- Use of statistics to determine the significance of the results.
- Study evaluated desaturation at both 2% and 5% level and assessed maximum rather than a mean desaturation to improve predictive yield.

##### Limitations

- There was a high rate of noninclusion in the study due to the need for informed consent and how well patients were able to comply with BSA procedures. This created a bias towards including patients who had had mild to moderate strokes.
- Simultaneous pulse oximetry and MBS were not undertaken, therefore the timing of aspiration and any desaturation could not be compared accurately. Comparing the BSA and pulse oximetry with MBS is difficult, given that the efficacy of BSA and pulse oximetry remains questionable.

**Level of Evidence (NH&MRC): 3.3**

**Appraised By** Adult Swallowing EBP Group

**Date:** August 2009