



# NSW Speech Pathology Evidence Based Practice Interest Group

## Critically Appraised Topic (CAT)

**CLINICAL BOTTOM LINE:** Biofeedback of physiologic activity can be effective in altering physiologic parameters associated with speech production (for example, subglottal air pressure, excursion of the abdomen and ribcage, sound pressure level). These effects have been demonstrated in single cases or small groups of people with flaccid, spastic, mixed, and unspecified acquired dysarthria types. In general, the relationship between changes in specific physiologic variables and speech production or communicative participation has not been clearly established. The demonstrated effectiveness of biofeedback in altering physiologic variables justifies a conclusion that it has potential to impact speech production and communicative effectiveness and participation. Consideration should be given to the role of biofeedback in therapy where the patient demonstrates poor stimulability to the acquisition of a new motor skill. Further research is required.

**Background and Objectives:** Biofeedback involves presenting a physiological variable to a person in a format that will facilitate shaping of their behaviour eg levels of activity in respiratory muscles during speech breathing represented on a visual display or as an auditory signal. Dysarthria considered to be related to weakness, slowness, or incoordination of the muscles of respiration, phonation, articulation, and/or resonance (Singular's Pocket Dictionary of Speech-Language Pathology, 2000, Delmar Learning).

**Clinical Question [patient/problem, intervention, (comparison), outcome]:**

In patients with acquired dysarthria, does the use of biofeedback improve speech intelligibility?

**Search Terms/Systems:** **Search terms-** Dysarthria, speech impairment, speech pathology, speech therapy, biofeedback, treatment, sEMG, EMG. **Search engines-** Cinahl, Medline, PsychINFO, Comdisdome, AMED, Cochrane Library.

**Selection Criteria:** Treatment relevant to the remediation of acquired dysarthria, adult patients. Treatments utilising biofeedback as per the definition above.

**Results:**

22 papers were reviewed most of which represented less than Level IV evidence as per NHMRC criteria. Despite this, these papers were reviewed for trends in results.

3 studies were deemed appropriate for inclusion in the CAT.

Levels of evidence represented by these studies: Level II, III 3, Level III 2. Yorkston, Spencer and Duffy (2003) has been classified as Level II evidence as it was difficult to clearly determine its rating in relation to the NH&MRC evidence hierarchy.

Yorkston, Spencer and Duffy (2003) Clinical Bottom Line:

Biofeedback of physiologic activity can be effective in altering physiologic parameters associated with speech production (for example, subglottal air pressure, excursion of the abdomen and ribcage, sound pressure level). These effects have been demonstrated in single cases or small groups of people with flaccid, spastic, mixed, and unspecified acquired dysarthria types. In general, the relationship between changes in specific physiologic variables and speech production or communicative participation has not been clearly established.

## **Results cont..**

### Volin (1998) Clinical Bottom Line:

Findings suggest that biofeedback training should be considered for clients who demonstrate poor stimulability. However, biofeedback may be no more effective in establishing new motor behaviours than verbal feedback for clients who show fair to good stimulability. For those with excellent stimulability it appears that biofeedback may actually interfere with their development of skills. However, these are preliminary conclusions based on brief training intervals, a relatively simple nonspeech task and normal subjects. None of the above results or trends reached statistical significance on data analysis.

### Scott and Caird (1983) Clinical Bottom Line:

The use of a biofeedback device (Vocalite) did not result in improved speech intelligibility in Parkinson's. The use of this device could potentially be considered for those patients with prosodic abnormality but further research is required to determine whether it results in more significant improvements than speech therapy alone.

**Appraised By:**  
**Clinical Group: Adult Speech Motor Impairment Group**

**Date: February 2008**

**References:**

Scott, S., Caird, F.I. (1983). Speech therapy for Parkinson's Disease. *Journal of Neurology, neurosurgery and psychiatry*, 46, 140-144.

Volin, Robert A. (1998) A Relationship Between Stimulability and the Efficacy of Visual Biofeedback in the Training of a Respiratory Control Task. *American Journal of Speech-Language Pathology* Vol. 7 pg. 81

Yorkston, K.M., Spencer, K.A., Duffy, J.R. (2003). Behavioral Management of Respiratory / Phonatory Dysfunction From Dysarthria: A Systematic Review of the Evidence. *Journal of Medical Speech-Language Pathology*. Volume 14, Number 2, pp xiii-xxxviii

**Bibliography:**

Berry WR and Goshorn EL. Immediate visual feedback in the treatment of ataxic dysarthria: a case study. In Berry WR (editor) (1983) *Clinical dysarthria*. College-Hill Press Inc, San Diego CA

Caligiuri, M., Marry, T. (1983). In W. Berry (ed.). *Clinical Dysarthria*. San Diego, Ca: College-Hill Press.

Draizer, A. (1984). Clinical EMG feedback in motor speech disorders. *Archives of physical medicine and rehabilitation*, 66, 481-484.

Murdoch, B.E., Pitt, G., Theodoros, D.G., & Ward, E.C. (1999). Real-time continuous visual biofeedback in the treatment of speech breathing disorders following childhood traumatic brain injury: Report of one case. *Pediatric Rehabilitation*, 3 (01), 5-20.

McNamara, R.D. (1983). A conceptual holistic approach to dysarthria treatment. In W. Berry (ed.). *Clinical Dysarthria*. Austin, TX: Pro-ed.

Rubrow, R.T., Rosenbek, J.C., Collins, M.J., Celesia, G. (1984). Reduction of hemifacial spasm and dysarthria following EMG feedback. *Journal of Speech and Hearing Disorders*, 49, 26-33.

Stringer, A.Y. (1996) Treatment of motor aprosodia with pitch biofeedback and expression modelling. *Brain Injury*. Vol 10. 8. pg 583-590.

Thompson-Ward E, Murdoch B, Stokes P. 1997 Biofeedback Rehabilitation of Speech Breathing for an Individual with Dysarthria *Journal of Medical Speech Language Pathology* Vol 5, 4 pp277-288.