

# Reliability of GRBAS evaluation of voice quality in children who have a history of airway reconstruction surgery and how this compares to parental report of voice-related quality of life

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## Introduction

Voice evaluation includes laryngoscopy, perceptual judgement of voice quality, evaluation of respiratory function, acoustic analysis of the voice signal and patient reported subjective impact of voice on quality of life. This is recommended in adults (Dejonkere et al 2001) and children (Cohen et al 2012). Perceptual evaluation of voice often follows the CAPE-V (ASHA 2002) or GRBAS (Hirano 1981). Children requiring laryngotracheal reconstruction (LTR) surgery tend to have this procedure during infancy, where subglottic stenosis forms following intubation in medically fragile or premature infants. Clinicians require reliable measures, particularly where there is a degree of subjectivity. Aspects of the CAPE-V show a high degree of reliability in rating of severity, pitch, breathiness and roughness (Kival et al 2007, Kelchner et al 2008). UK clinicians favour the GRBAS though there is little published information about reliability in a paediatric population. Comparison of clinician perceptual evaluation with patient report shows weak agreement in adults (Karnell et al 2006) reinforcing the need for both measurements. The extent to which the same is the case in children needs further exploration.

## Aims

1. To evaluate the inter/intra-rater reliability of the GRBAS in evaluating voice quality in children with LTR.
2. To compare parent reported subjective impact of voice quality with clinician rated perceptual evaluation.

## Method

Voice samples were collected from children who had previously had LTR patients. Recordings were made in a sound-proofed audiology room. Four trained raters rated GRBAS on a sustained vowel and six sentences designed to elicit different laryngeal behaviours. Parents were asked to complete the Paediatric Voice Related Quality of Life questionnaire (Bosely et al 2006). Inter and intra-rater reliability of the GRBAS ratings were measured using intraclass correlation coefficients. Spearman's correlation coefficients were used to compare the individual mean. Grade rating with the PVRQoL total, physical functioning and socio-emotional scores.

## Results

There was a high degree of intra-rater reliability across all GRBAS measurements (ICC = 0.902). Inter-rater reliability was high for Grade (ICC = 0.838), Roughness (ICC = 0.822), Breathiness (ICC = 0.836), Asthenia (ICC = 0.729) and Strain (ICC = 0.729).

There was a weak correlation between PVRQoL scores and mean Grade rating for sustained vowel, but a significant negative correlation (ranging between  $P < 0.01$  and  $0.05$ ) between PVRQoL physical function score and mean Grade for the spoken sentences.

## Conclusions

There is evidence of reliability in GRBAS ratings in this population and elements of the correlation between mean Grade and PVRQoL physical function scores is of interest in contributing information about these two different measures of voice quality.

## Contribution to new knowledge / Implications for practice/ Impact

To date few studies have been published of these measures with this population and these voice measures contribute one part to the overall assessment protocol. While the study is small in size this is relative to the overall caseload. Parents of these children have long term concerns for the health and wellbeing of their children and any means of defining voice quality difficulties and expectation is valuable.

## Three key learning outcomes

1. Speech and language therapists working with voice in the UK regularly use the GRBAS procedure for evaluating voice quality. This study demonstrates its reliability in a unique paediatric population.
2. There appears to be no connection between clinician perceptual evaluation of voice quality in a sustained vowel and parental report of voice related quality of life, supporting the need for discrete ways of evaluating voice quality.
3. There appears to be some connection between clinician perceptual evaluation of voice quality of connected sentences and parental report of voice related quality of life which merits further research.

## Brief outline of submission (50 words)

This paper describes the two approaches to defining voice quality in children who have had laryngotracheal reconstruction surgery. The inter/intra-rater reliability of clinician rating using the GRBAS scale is reported along with a comparison between clinician and parent report of voice related quality of life.

Three key words

Voice-quality

Paediatric

Reliability

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