UNIVERSITY OF COPENHAGEN
FACULTY OF HUMANITIES

Line Dahl Jørgensen, MA, SLP, PhD scholar

Who needs intervention?

A phonological screening tool for young children with cleft palate

Introduction

Children with cleft palate +/- cleft lip (CP) are at risk of speech and language delay. It is essential to identify children with delays as early as possible in order to offer appropriate intervention. Conversely, it is also important to avoid unnecessary intervention which both adds to the burden of care for the family and socioeconomic cost.

Although there is a strong relationship between early sounds and syllable shapes and later speech and language skills in children without CP (Olswang et al. 1998), the picture is less clear for children with CP. Nevertheless, postsurgery, number of: oral consonants, different oral consonants, true consonants, oral stops, velar consonants, and number and frequency of alveolar stops have been found to predict later speech and language proficiency (Chapman and Willadsen 2011; Klintö et al. 2014).

In young children, there is a close link between phonology and vocabulary, and a summary of existing studies suggest that until age 2;6, the developing phonological system affects lexical acquisition to a greater degree than vice versa (Stoel-Gammon 2011). For children with CP, there is some evidence to suggest that as a group, these children have delayed vocabulary development, compared to children without CP. It is speculated that this may be due to phonological constraints (for a summary, see Hardin-Jones and Chapman 2013).

Traditionally, early speech production has been evaluated by phonetic transcription of the child's utterances occurring during spontaneous interaction between child and caregiver. This is a time-consuming and thus expensive procedure. Ramsdell and colleagues (2012) found that real-time listening is a valid way of estimating a child's consonant repertoire when compared to both caregiver report and phonetic transcription of consonant inventory. In this procedure, parents' way of listening to their child's speech is simulated in order to assess functional phonological categories in control of the child rather than exact phonetic inventory.

As part of a larger intervention study of toddlers with CP, this study aims at developing and evaluating a screening tool for these children in order to determine who need early intervention. Based on a real-time listening procedure, children are assigned to a +/- need for intervention condition based on their use of phonological categories known as early predictors of later speech and language difficulties in children with CP and one productive vocabulary measure (CDI, Fenson et al. 2007). To determine the external validity of this procedure, it is compared to experienced SLPs' clinical judgment of whether or not a given child needs early intervention.

Method

Participants
21 children with operated CP between ages 17 and 24 months.

Procedures
Prior to the first recording session, all caregivers completed the CDI.

The children were video recorded for 2 x 45 minutes in the clinic during play with a caregiver on two separate days. All video recordings were separated into two video files of equal length.

Three trained raters listened to the recordings without interruptions and simultaneously registered syllables produced by the child using a software program. Mean number of syllables evaluated per child was 527 syllables (range: 231-662 syllables). Immediately hereafter, the raters reported consonants and syllable shapes produced with enough saliency to be remembered by the rater.

Finally, the video recordings were evaluated by SLPs with years of experience working in cleft clinics who were asked to give their clinical opinion on each child's need for early intervention.

Child	Oral consonants	True consonants	Oral stops	Alveolar stops	CDI score below 10th percentile
1	P	P	P	P	NO
2	P	P	P	P	NO
3	P	P	P	P	NO
4	P	P	P	P	NO
5	P	P	P	P	NO
6	P	P	P	P	NO
7	P	P	P	P	NO
8	P	P	P	P	NO
9	P	P	P	P	NO
10	P	P	P	P	YES
11	P	P	P	A	NO
12	P	P	P	A	NO
13	P	P	P	A	NO
14	P	P	P	A	YES
15	P	P	P	A	YES
16	P	P	A	A	NO
17	P	P	A	A	NO
18	P	P	A	A	YES
19	P	P	A	A	YES
20	P	P	A	A	YES
21	P	P	A	A	YES

P = PRESENCE, A = ABSENCE

Table 2

Since the real-time listening procedure does not allow judgment of absolute numbers and frequencies of consonants produced, children were assigned to the "need for intervention" condition if they met at least one of the inclusion criteria (see ***table 1***).

1. Absence of oral consonants,
2. absence of true consonants,
3. absence of oral stops,
4. absence of alveolar stops,
5. a CDI score at or below the 10th percentile.

Table 1

Results

Inter rater agreement (ICC single measures, absolute agreement) excellent on: number of syllables **(ICC .984, p<.000)**; number of different consonants (glottal stops excluded) **(ICC .838, p<.000)**, consonant inventory (glottal stops excluded, aspirated and unaspirated stops collapsed) **(ICC .757, p<.000)**, number of different true consonants **(ICC .857, p<.000)**, number of different oral consonants **(ICC .901, p<.000)**, and number of different stops **(ICC .912, p<.000)**. Complete agreement was found on presence or absence of oral consonants and true consonants. There was agreement on presence or absence of alveolar stops in 18/21 cases, and on presence or absence of alveolar stops in 18/21 cases. Disagreement was solved by letting majority rule. SLPs agreed perfectly on need for intervention.

Table 2 shows which children met the inclusion criteria for the "need for intervention" condition based on the screening procedure (marked in red).

Child	Alveolar stops	Oral stops	CDI score below 10th percentile	Need for intervention SCREENING	Need for intervention SLP
1	P	P	no	NO	NO
2	P	P	no	NO	NO
3	P	P	no	NO	NO
4	P	P	no	NO	NO
5	P	P	no	NO	NO
6	P	P	no	NO	NO
7	P	P	no	NO	NO
8	P	P	–	NO	NO
9	P	P	no	NO	NO
10	P	P	yes	YES	YES
11	A	P	no	YES	NO
12	A	P	no	YES	YES
13	A	P	no	YES	YES
14	A	P	yes	YES	YES
15	A	P	yes	YES	YES
16	A	A	no	YES	YES
17	A	A	no	YES	YES
18	A	A	yes	YES	YES
19	A	A	yes	YES	YES
20	A	A	yes	YES	YES
21	A	A	yes	YES	YES

P = PRESENCE, A = ABSENCE

Table 3

Table 3 shows which children met the inclusion criteria for the "need for intervention" condition based on both the screening procedure and the clinical judgment by SLPs (marked in red). As can be seen, there was only disagreement in one case. Since all children had oral and true consonants, these categories are not shown in this table.

Discussion

Excellent agreement among raters suggests that real-time listening can be used as a screening tool of speech in toddlers with CP. Since all children had both oral and true consonants, absence or presence of these categories is not a good predictor. Number of different consonants, different oral consonants, and different true consonants might yield better predictive value and are still possible to assess within the frame of real-time listening.

All SLPs decided that children with absence of oral stops, and children with a CDI score at or below the 10th percentile needed intervention. This was also true for all but one child with absence of alveolar stops.

The SLPs had no knowledge of the children's CDI scores, however, intervention was recommended for all children with a CDI score at or below the 10th percentile. Hence, the CDI might be a good predictor in the early lexicon of toddlers with CP, even though its predictive value is debatable in other clinical populations (Westerlund et al. 2006). Intervention was also recommended for four children with CDI scores above the 10th percentile. Interestingly, for two of these children, the SLPs noted that the need for intervention was specifically due to the child's phonology and not vocabulary.

Although the raters participating in this study had very high inter rater reliability scores, it cannot be assumed that these scores will apply to all raters. Hence, further evaluation of the screening tool is needed to confirm its applicability to clinical practice.

In conclusion, known early phonological predictors of later speech and language proficiency can be reliably assessed with a real-time listening procedure. Almost perfect agreement between the children selected for intervention with the screening procedure and the clinical opinion of experienced SLPs indicates that the screening procedure is a valid tool for identifying children with CP who need early intervention. Absence of oral stops, and possibly absence of alveolar stops as well as a CDI score of productive vocabulary at or below the 10th percentile seem to be good candidates for a screening tool. This will be further analyzed to look for possible interaction effects among these independent variables.

Acknowledgments

This research is supported by Augustinusfonden and TrygFonden.

References

Chapman, K. L. & Willadsen, E. (2011).
The development of speech in children with cleft palate.
In Lohmander, A. Howard, S. (eds.). Cleft Palate Speech. Assessment and Intervention (pp. 23–36). Wiley-Blackwell.

Fenson, L., Marchman, V. A., Thal, D. J., Dale, P. S., Reznick, J. S., & Bates, E. (2007).
MacArthur-Bates Communicative Development Inventories: User's guide and technical manual (2nd ed.).
Baltimore, MD: Brookes.

Hardin-Jones, M., & Chapman, K. L. (2013).
Early Lexical Characteristics of Toddlers With Cleft Lip and Palate.
The Cleft Palate-Craniofacial Journal, 131202081721000.
http://doi.org/10.1597/13-076

Klintö, K., Salameh, E.-K., Olsson, M., Flynn, T., Svensson, H., & Lohmander, A. (2014).
Phonology in Swedish-speaking 3-year-olds born with cleft lip and palate and the relationship with consonant production at 18 months: Phonology in 3-year-olds born with cleft palate.
International Journal of Language & Communication Disorders, 49(2), 240–254. doi:10.1111/1460-6984.12068

Olswang, L. B, Rodriguez, B. & Timler, G. (1998).
Recommending intervention for toddlers with specific language learning difficulties:
we may not know all the answers, but we know a lot.
American Journal of Speech Language Pathology, 7(1), 23–32.

Ramsdell, H. L., Oller, D. K., Buder, E. H., Ethington, C. A., & Chorna, L. (2012).
Identification of Prelinguistic Phonological Categories.
Journal of Speech Language and Hearing Research, 55(6), 1626. doi:10.1044/1092-4388(2012/11-0250)

Stoel-Gammon, C. (2011).
Relationships between lexical and phonological development in young children*. Journal of Child Language, 38(01), 1–34.
http://doi.org/10.1017/S0305000910000425

Westerlund, M., Berglund, E., & Eriksson, M. (2006).
Can severely language delayed 3-year-olds be identified at 18 months? Evaluation of a screening version of the MacArthur–Bates Communicative Development Inventories.
Journal of Speech, Language, and Hearing Research, 49(2), 237–247.