

Evidence Summary - Childhood Apraxia of Speech – January 2020

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This document is a free summary of the current evidence on assessment, diagnosis and treatment of Childhood Apraxia of Speech (CAS; aka Dyspraxia). Please seek advice from your speech pathologist. **This evidence summary is only valid until December 2021.**

Background

Childhood Apraxia of Speech is a severe permanent and lifelong disorder of speech motor programming and planning which is present from birth and does not naturally resolve. In recent years, substantial progress has been made in improving speech pathology treatment for CAS but there remains a large number of older children, adolescents and adults who have severe limitations to all aspects of their lives due to ineffective and/or insufficient treatment in earlier years. Recent advances in treatment efficacy in preschool and primary years should reduce this extended prevalence tail over time however there is emerging evidence that a significant burden of psychosocial, educational, economic and communication deficits remains across the lifespan with resultant restrictions on participation and daily life.

Most people with CAS have an idiopathic diagnosis (unknown cause) however CAS can co-occur with all other developmental conditions including other communication disorders. In recent years, a spate of genetic micro duplications and deletions have been reported in syndromic presentations of CAS and there is a particularly prominent familiar presentation associated with severe CAS with dysarthria and language impairment associated with a particular FoxP2 genotype. CAS has increased frequency in children and adults with galactosaemia, epilepsy, or Down Syndrome but has no increased prevalence in children with autism above the population prevalence of approximately 1 in 1000 children.

CAS may occur as an isolated disorder or may present in combination with other speech, language, literacy and developmental disorders.

Assessment

Diagnosis of CAS requires skilled assessment by a **suitably qualified and experienced speech pathologist**. Best practice in assessment depends on the child's age, severity and comorbidities.

Suggested Assessment protocols

Younger or more severe speech impairment	Older or milder speech impairment
Single word speech sound inventory – word list does not have to be standardised but should include at least 50 common words appropriate for age and cultural background with a range of sounds, syllables and word shapes.	Single word test using at least 30 polysyllabic words appropriate for age, language, accent and culture and including weak onset word structures
Oral musculature structural and functional evaluation	Oral musculature structural and functional evaluation
Diagnostic evaluation of motor speech skills (DEMSS) or TOCS+ or Nuffield Dyspraxia Programme – 3 rd edition assessment	Speech diadochokinesis tasks (e.g. 'peteke')
Hearing assessment prior to speech pathology assessment	Sample of connected speech including polysyllabic words (words of 3 or more syllables)
	Measure of inconsistency such as DEAP, SRT or repeated productions from the single word test used.

Diagnosis of CAS requires that a child at a minimum meets all three ASHA (2007) consensus-based features of CAS:

1. *Inconsistency across words and syllables*
2. *Lengthened and disrupted coarticulatory transitions.*
3. *Inappropriate prosody.*

Additionally, for a diagnosis of CAS to be accurate, children need to have a clear intent to communicate regardless of age or severity.

Severity of CAS has not been formally defined within the literature however clinicians may use the following factors in determining severity:

1. Intelligibility – children with more severe CAS will struggle to be intelligible even to immediate family.
2. Speech inventory (number of sounds and syllable structures) in comparison to other people of the same chronological or language age.
3. Number of features of CAS present and severity of features. These lists of features come from two sources (ASHA, 2007 and Shriberg, Potter and Strand, 2010).
4. In older children, adolescents and adults: Difficulty saying new or longer words, avoiding speaking tasks such as using the phone, social isolation or reduced quality of life.

Treatment

Until 2015 there were no randomised control trials in treatment of CAS. Murray, McCabe and Ballard (2015) reported an RCT comparing the Nuffield Dyspraxia Programme (3rd ed; NDP3) with Rapid Syllable Transition Treatment (ReST). Both treatments were effective in changing the speech of children aged 4-12 with CAS. NDP3 had better immediate effect and ReST had better long term effect. Both treatments are therefore currently recommended when delivered as per the RCT (ie 4 days per week for 3 weeks @ 1 hour per day). These two are gold standard at this stage although work is underway on RCTs evaluating other CAS treatments.

Three systematic reviews have been conducted in the past 5 years. The first two (Murray, McCabe & Ballard, 2014 and Maas, Gildersleeve-Neumann, Jakielski & Stoeckel 2014) examined a broad range of treatment evidence for a range of quality measures. Murray et al recommended clinicians use

1. **Rapid Syllable Transition Treatment (ReST)**
2. **NDP3**
3. **Dynamic Temporal and Tactile Cueing (DTTC)**
4. **Integrated Phonological Awareness (IPA)**

From this list, ReST and IPA are suitable for less severe and/or older children. DTTC and NDP3 are more suitable for younger and/or more severe children. Resources and training for ReST, IPA and DTTC are freely available on the internet and NDP3 is a kit which can be purchased from the UK.

Maas and colleagues (2014) examined the treatment research to determine likely treatment approach and dose. They reported that on average effective treatment requires 2-6 sessions per week for an undescribed maximum (more than 1 year). In addition to the treatments listed above, Maas (2014) also included:

5. **Ultrasound biofeedback**

This is more suitable for primary school aged children and older with milder speech issues. Ultrasound biofeedback is beyond the scope of many clinicians due to costs of equipment.

In the most recent systematic review, Morgan, Murray, and Liégeois (2018) in the Cochrane Database reported that only ReST and NDP3 had RCT level evidence and called for more treatment research. They noted that there is now also single case experimental design evidence that ReST can be effective when delivered by telehealth 4 days per week and when provided twice per week face-to-face. In both of these service delivery options, the long term effect appears to be poorer than face-to face 4 days per week.

Effective treatment for children with CAS and comorbid speech disorders needs to take into account both evidence for CAS treatment and for dysarthria treatment. For example, a child with dysarthria and CAS may benefit from DTTC which has evidence of efficacy with both disorders.

Other treatments have less well developed evidence and should be undertaken with caution as they have not yet been shown to be effective in multiple studies of children who clearly had CAS.

Treatment Intensity

The CAS treatment evidence shows that therapy 4 times a week in blocks of 12-15 sessions followed by a 4-6 week break from therapy is optimal (Murray et al, 2015). All studies to date have showed that the greater the treatment intensity the more effective the therapy and the more efficient the progress (e.g. Edeal and Gildersleeve-Neumann, 2012). A minimum of two sessions a week has been shown to work clinically (e.g. Namasivayam et al, 2015; Thomas et al, 2014). Session length ideally should be 45-60 minutes but will depend on both the child and the treatment selected.

Group Therapy

There is no evidence for any group treatment being trialled in any level of research with any person with CAS since 1960. Group treatment is not recommended for any CAS feature and there is no theoretically sound reason for it to be trialled. People with CAS may benefit from evidence-based group therapy interventions for their co-morbid conditions but again there is no research evidence for such treatments in people with CAS who have comorbid conditions.

Therapy by people who are not Speech Pathologists.

There is very limited evidence that therapy for CAS can be provided by anyone other than a speech pathologist. In all but three studies, speech pathologists have provided therapy. Two studies (Thomas et al 2017; Lim 2020) have trialled parent delivered therapy with limited success and it is not currently recommended. One study (Lim et al, 2019) trained teacher's aides providing DTTC therapy which was moderately successful.

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