

Case Report

The Lidcombe Program via webcam: a case study

Sabine Van Eerdenbrugh^{1*}, John Van Borsel²¹Sabine Van Eerdenbrugh, Speech-Language Therapy, Thomas More College of Applied Sciences, Belgium²Van Borsel, John, Speech-Language Therapy, University of Ghent, Belgium***Corresponding author**

Sabine Van Eerdenbrugh, Sint-Andriesstraat 2, 2000 Antwerp, Belgium, Tel: 0032 3 432 4040; Email: sabine.vaneerdenbrugh@thomasmore.be

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The Lidcombe Program is a treatment for early stuttering. It has been thoroughly investigated in its standard, clinical format. An Australian randomized controlled trial that compared the clinical and a webcam format of the Lidcombe Program resulted in similar outcome. The webcam format of the Lidcombe Program is to our knowledge not yet investigated in other trials. With this case study we wanted to assess the viability of the Lidcombe Program via webcam outside of Australia, in our Belgian context.

F. was a 3-year-and-4-month-old boy who stuttered for four months at the time of treatment commencement. The intake session was a physical session. The treatment sessions were delivered via webcam. Severity ratings after 9 and 18 months were the primary outcome; number of treatment sessions and number of weeks to complete Stage 1 were the secondary outcome.

F. started with a mean severity rating of 2.6 pre-treatment. The stuttering decreased to 0.6 at 9 months post-treatment (x2) and 0 at 18 months after treatment. He needed 33 weeks to complete Stage 1. The number of sessions to complete Stage 1 was 18. This outcome was below the mean results from the webcam group of the trial of Bridgman et al. The number of weeks was above the median number of weeks of the Bridgman et al. trial, but the number of treatment sessions was lower because after three webcam sessions with a weekly interval, sessions were planned with a fortnightly interval.

Keywords

- Stuttering
- Preschool child
- Webcam
- The Lidcombe Program
- Case study

ABBREVIATIONS

%SS: Percentage Syllables Stuttered; SR: Severity Rating

INTRODUCTION

Stuttering or stammering is characterized by the World Health Organization WHO, [1] as: Speech that is characterized by frequent repetition or prolongation of sounds or syllables or words, or by frequent hesitations or pauses that disrupt the rhythmic flow of speech. It should be classified as a disorder only if its severity is such as to markedly disturb the fluency of speech.

Developmental stuttering typically appears in children at preschool age, most frequently between 25 and 42 months [2]. In their longitudinal community cohort, Reilly et al. [10] reported a cumulative incidence at 4 years of 11.2%, which is higher than previously reported incidences of about 8% [3]. Different research methods account for the variation in incidence numbers.

The majority of preschool children recover from stuttering. Some of them without intervention (called natural or spontaneous recovery) and some of them with intervention. Some factors can predict the possibility of recovery for a number of children. For example, being a boy or having a family member

who stutters indicates a lower chance on recovery [4]. Sugathan and Maruthy [5] found four factors that are statistically related to stuttering recovery at one year post-onset: phonological abilities, articulatory rate, change in the pattern of disfluencies and the trend in stuttering severity in the year after stuttering onset. Singer et al. [6] found that a less optimal attention span was related to stuttering recovery. In a longitudinal community cohort study in Australia [2], predictors for recovery included gender, stuttering incidence in the family, language skills, temperament, quality of life of the child and non-verbal cognition. The predictive power of these factors, however, is limited to a part of stuttering children. So in the clinic, a speech-language therapist (SLT) will take them into consideration, but knows that they are non-conclusive for taking a decision about starting treatment or not. Yairi and Ambrose [4] found that 74% of children recover naturally from stuttering within four years post-onset. It must be noted, however, that they provided parents with "a brief, unbiased review of several factors frequently cited as potentially beneficial for children who stutter, such as slow speech, not interrupting and avoiding negative consequences of the child's speech" [4]. In the first 19 months post-onset, only a small number of children, reported around 6%, recover from stuttering [4,7]. Knowing that only a minority of children recover within the first

19 months post-onset and knowing that preschool children who stutter have more difficulty in emotional, social and behavioral development and a lower well-being [8,9], justifies the decision to treat preschool children for stuttering timely after onset and not to wait for multiple years for naturally recovery to occur.

Recovery from stuttering with intervention is reported in several randomized controlled trials in which the control group received temporarily no treatment [10] or received the available evidence-based treatment, the Lidcombe Program [11]. More research is necessary, but studies so far indicate that stuttering can be controlled with treatment in most preschool children. Systematic reviews conclude that most studies in preschool children have been conducted with the Lidcombe Program[12-14].

The Lidcombe Program is a behavioral program for preschool children who stutter [15,16]. The program consists of *Stage 1*, in which (near) zero levels of stuttering are obtained, and *Stage 2*, in which the (near) zero levels of stuttering are maintained. In Stage 1, parent(s) and child visit the SLT weekly for a (initially) one hour visit. During that visit, it is mainly the parent(s) that is guided by the SLT in [1] identifying and evaluating the stuttering, [2] organizing the practice conversations which are daily implemented at home by the parent(s) and [3] providing verbal contingencies. These verbal contingencies are mainly verbal encouragements that are provided for the stutter-free speech of the child. To keep track of the stuttering development, a severity rating scale is used. This 10-point scale starts at 0 (*for no stuttering*) and increases to 9 (*for extremely severe stuttering*). Parents are asked to record a score for the child's stuttering each day. The scores register the development of the stuttering and allow parents and SLT to 'understand' the stuttering behavior. It also enhances treatment planning. In summary, the stuttering severity ratings are indispensable in the program. Parents also implement a 10-minute practice conversation each day at home. Initially, when parent(s) and child are still learning about stuttering, these practice conversations can be quite structured. The main goal of the practice conversations is to give the child the chance to practice stutter-free speech. Hence, a situation to obtain stutter-free speech is created based on the needs of the child at that moment. Once parent(s) and child feel more comfortable and the stuttering is decreasing, the practice conversations mirror everyday conversations between parent(s) and child. It is vital that parents demonstrate in the clinic session with the SLT how they implement these practice conversations at home with their child. The SLT guides parents in the organization of the practice conversations for example with the choice of activity, the location and the time of the day. Organizing the daily practice conversations in a way that they are effective is a difficult task and parent(s) need decent guidance in this. Parents also provide verbal contingencies for the child's speech outside the practice conversations after some time in the treatment process. Initially they only provide verbal contingencies during the practice conversations and only for stutter-free speech. When the child responds well to them and when the stuttering decreases, verbal contingencies are occasionally also provided for stuttering, and also before outside of the practice conversations. The SLT guides the parent(s) with the types, the frequency and the timing of the verbal contingencies.

When Stage 1 criteria are met, The Lidcombe Program proceeds to Stage 2. The criteria for Stage 2 are: [1] only daily stuttering severity ratings of 0 and 1 for three consecutive weeks with mostly 0, [2] stuttering severity ratings of 0 or 1 during the clinic sessions for three consecutive weeks. The SLT has the option to record % Stuttered Syllables (%SS) for the conversations with the child during the clinic sessions. %SS is measured by dividing the number of syllables that are stuttered by the total number of syllables [17]. The clinic sessions during Stage 2 are scheduled with intervals of 2 weeks, 2 weeks, 4 weeks, 4 weeks, 8 weeks, 8 weeks and 16 weeks when the speech contains (near) zero levels of stuttering. During Stage 2, it is necessary that parents know what to do in case the stuttering returns, as stuttering is known to be a relapse-prone disorder. If the stuttering returns, additional visits may be necessary.

There is ample evidence for the effect of the treatment and the positive psycho-social relationship between parent and child after completing the Lidcombe Program. The efficaciousness and effectiveness of the Lidcombe Program have been repeatedly shown in Phase III studies (including randomized control trials [10,11] and a Phase IV study translational study [18]. Jones et al. [10] conducted a randomized control trial with 54 children, in which 29 children received the Lidcombe Program after randomization and 25 received the Lidcombe Program nine months after randomization (the control group). This study revealed that the children who received the Lidcombe Program were seven times more likely to achieve (near) zero levels of stuttering nine months after randomization than the children who did not receive treatment for that period of time. The children from this study were contacted again five years after randomization [19]. Most children (80%) maintained their (near) zero levels of stuttering.

The Lidcombe Program manual recommends weekly clinic sessions. A recent study [20] looked at alternatives for weekly clinic visits. The preschool children who stutter and their parent came to the clinic twice weekly (N = 6), weekly (N = 7) and fortnightly (N = 8) for Lidcombe Program delivery. Ten more children were intended to receive treatment but dropped out or were withdrawn from the mainly they did not complete Stage 1 within 6 months. The twice weekly group needed a median of 29 clinic sessions over a period of 20 weeks. The weekly group needed a median of 23 clinic sessions over a period of 23 weeks. The fortnightly group needed a median of 13 clinic sessions over a period of 24 weeks. No significant differences were observed between the mean %SS in each group at 9 months post-treatment. The high drop-out was mainly situated in the twice weekly group and suggests that not all families benefitted from more than weekly visits. The results from this study also indicate that delivering the Lidcombe Program with fortnightly clinic sessions succeeded in achieving similar treatment outcomes at a lower cost for the patient and the health system. More research is necessary to confirm these findings.

The Lidcombe Program is most often applied in its standard, clinic-based format. Webcam delivery is also possible and seems to yield similar results. In a study by Bridgman et al. [21], 49 Australian preschool children were randomized into a group who received the clinic-based format (N = 24) and a group

who received the webcam format (N = 25). Results from this trial indicate no difference between %SS at nine months post-treatment and the number of treatment sessions to complete Stage 1. All parents reported that webcam delivery was non-invasive and they would do this again if needed [22]. Nearly all (85%) agreed that attending sessions was easier and 81% reported that webcam quality was sufficient. They described webcam delivery as convenient, comfortable and as a more natural option for their child.

Studies with the Lidcombe Program in the standard clinical format have repeatedly been replicated in other countries than its originating country Australia with successful results [11,23]. To our knowledge, studies with the Lidcombe Program in webcam delivery have not yet been replicated. We therefore wanted to know whether a webcam delivery of the Lidcombe Program would be feasible in Belgium. As we merely wanted an indication whether the Lidcombe Program could be delivered via webcam in the Belgian context, it was not deemed necessary to conduct an extensive randomized controlled trial, and a case study design was opted for. In the past, both authors applied the same procedure to the clinic-based format of the Lidcombe Program [24]. With this article, we want to answer the research question: Is webcam delivery of the Lidcombe Program viable in Belgium too?

CASE PRESENTATION

This study was approved by the Ethic Committee of the University of Ghent, Belgium. The administered research design was a prospective case study. The CARE-checklist [25] was used for writing this case report.

The participant was F., a 3-year-and-4-month-old boy at the time of treatment commencement. Stuttering onset was sudden, a week before F.'s 3rd birthday. The stuttering consisted mainly of repetitions at the beginning of sentences. These were frequently produced but without tension. The stuttering was more severe towards the end of the week. There was no known family history of stuttering.

F. had tubes in his eardrum which were removed a few months before his 3rd birthday. He is the youngest of a family with two parents, a mother and a father, and with an older brother and sister (each 2 years apart). F. started preschool Six months before his 3rd birthday for 4.5 days a week, according to the normal preschool schedule in Belgium (half a day on Wednesdays). His speech contained incidental instances of incompletely developed phonology (cluster reduction of clusters with /r/), indicating a gradual breakthrough of the developed speech. This process was adequate for his age.

Soon after stuttering onset, F.'s family contacted the first author (SLT) for advice. The SLT planned a physical intake session with the parents and child and provided basic information about stuttering close to onset. The parents were sufficiently reassured and the child's behavior was not alarming at that point in time. Therefore, the SLT suggested to first actively monitor the stuttering behavior for a few weeks. The SLT explained the 10-point severity rating scale and asked the parents to record severity ratings for a few weeks. Every 4 weeks the SLT contacted F.'s mum to talk about the stuttering development. The frequency

of the stuttering moments was stable for several weeks, but after four months, F.'s speech started to contain occasional prolongations and blocks as well. At that point, the SLT and F.'s parents decided that it was better to commence treatment.

The Lidcombe Program was delivered according to the then available Lidcombe Program guide [26] but with the necessary modifications to allow webcam delivery. For example, the agreements used by Bridgman et al. [22] were accepted by the parent(s): siblings are not present during the first sessions; parent(s) and child are ready for the session (been to the toilet, being dressed, ...); parent(s) have the severity ratings and activities for practice conversations by hand; the parents' mobile telephone(s) are turned off; parent(s) are attending the session with their child. Three sessions were scheduled with a weekly interval, but then it was not possible for the parent(s) to further schedule sessions with a weekly interval. From then onwards, the sessions were scheduled with a fortnightly interval. The measures for the case study were limited to severity ratings, as prescribed by the Lidcombe Program guide. The conversations between the child and the SLT during the webcam sessions were a short (15 minute) and selective moment with the child and did not represent the child's speech of the days in between webcam sessions. Therefore, a mean of the daily severity ratings per week was used as measure in this study. Agreement between severity rating of the parent and SLT was established at the beginning of each webcam session. The SLT confirmed that the parent, who registered the daily severity rating, attributed them accurately.

Both parents were trained in using the severity ratings scale and both parents were trained in providing the verbal contingencies. However, F.'s mum was the leading parent throughout the treatment process. One webcam session, at the beginning of the treatment process, occurred with F.'s dad. As it was difficult to organize sessions with him present, only F.'s mum attended the webcam sessions after that.

The typical webcam visit contained [1] a conversation or game with F. and the SLT, with the help from the mum; [2] mum demonstrating how verbal contingencies were provided and how practice conversations were implemented with F. daily; [3] F. went playing downstairs with his siblings while the SLT registered the severity ratings and discussed progress of the stuttering and the treatment in general; [4] F. greeting (with a short conversation sometimes) the SLT.

Webcam sessions took 45 to 60 minutes in Stage 1 and 30 minutes in Stage 2. Activities for the initial conversation were picture books and then barrier games later on. With barrier games, the two parties have the same pictures or other resources. The two parties were F. and the SLT. Sometimes F. gave instructions to the SLT to put something on a scene or to choose pictures for a sequence. They then checked if the instructions were followed correctly. Other times, the SLT gave instructions and then asked F. to describe what he had put down (for example what the sequence was). In both cases, F. did most of the talking. Other activities were a 'Headband' game where for example F. put a picture in a bandana around his head and asked questions to guess what the item was. When the SLT put the picture in the bandana, she asked if F. could give some clues. Again, F. did most of the talking.

The mean severity ratings from the daily recording at home at pre-treatment, 9 and 18 months post-treatment were compared to the mean severity ratings reported in the webcam trial with the Lidcombe Program by Bridgman et al. [21]. Also the number of sessions and the number of weeks to complete Stage 1 were compared.

The mean severity ratings at pre-treatment, 9 and 18 months post-treatment are presented in (Tables 1,2).

DISCUSSION

Also, webcam visits were scheduled on a fortnightly basis and not on a weekly basis. The Lidcombe Program guideline was followed but the clinic sessions could not be scheduled on a weekly basis. After the first three weekly sessions, clinic sessions were scheduled fortnightly. Koushik et al. [20] showed that preschool children who stutter did not need longer treatment with fortnightly clinic sessions than those with weekly clinic sessions. They registered treatment duration between 15 and 46 weeks. F. needed 33 weeks to complete Stage 1, which is within the same range. It took F. longer than the median number of weeks in the study of Bridgman et al. [21] to complete Stage 1 but looking at the entire group, 40% of children in Bridgman’s webcam group [22] needed more than 33 weeks to complete Stage 1. From a translational study in Australia, that is, a study conducted in the daily practice of Australian SLTs, the reported range of weeks to complete Stage 1 was 4 to 25 with 25 not being the absolute limit as the study was not completed at the time of writing the study results [18] given the fortnightly scheduling of the webcam visits, he needed less visits than the mean number of visits in the study of Bridgman et al. [21].

A frequently used measure is %SS or severity rating at 9-months in treatment. It is important to realize that nine months in treatment is an arbitrary time point, which could sometimes coincide with a period of relapse. In F.’s case, the 9-months’ time point was a realistic representation of the treatment progress at that point in time. Six weeks later however, a relapse occurred and severity ratings were much higher again.

F.’s mum asked for a face-to-face visit during the first relapse. She needed confirmation and for her it was important that the

SLT saw F. for a longer period than the 15 minutes during the webcam session. The SLT organized a face-to-face visit. They only needed this once. It indicated the need for more than webcam support at difficult times during the treatment.

Despite being a case study, our results generate support for delivering the Lidcombe Program via webcam outside of Australia, in the Belgian context. The Bridgman et al. study [21] was a randomized controlled trial under controlled conditions. This case study reflects daily practice as it allowed modifications on the Lidcombe Program guideline for webcam delivery. Also, webcam visits were scheduled on a fortnightly basis and not on a weekly basis. This case study illustrated a rather longer treatment process of the Lidcombe Program with successful outcome. The fact that weekly webcam visits were not possible to maintain, reflects a frequently occurring challenge of the time constraints that parents encounter [27-29]. A case study also has its limitations. Obviously, results from a single case cannot be generalized without caution.

In conclusion, this study illustrates that webcam delivery of the Lidcombe Program is successful in a single case outside of Australia. This study was planned and implemented before the Covid-19 pandemic and may serve as an inspiration for SLTs for treatment delivery nowadays.

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Table 1: Mean severity ratings in this study and the webcam study of Bridgman.

Study	Mean SR pre-treatment (N = 25 in Bridgman et al.)	Mean SR 9 months post-treatment (N = 23 in Bridgman et al.)	Mean 18 months post-treatment (N = 16 in Bridgman et al.)
Bridgman	3.8 (2 - 9)	1.7 (1 - 5)	0.8 (°)
Case study	2.6	0.6	0

Table 2: Number of treatment sessions and weeks to complete Stage 1 compared to the Bridgman.

Study	Treatment sessions Stage 1 (N)	Weeks Stage 1 (N)
Bridgman	23.4 (9 - 46)	25 (12 - 56)
Case study	18	33

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