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*Corresponding author: Claire Mitchell, Division of Neuroscience and Experimental Psychology, Faculty of Biology Medicine and Health, School of Biological Sciences, Ellen Wilkinson Building, University of Manchester MAHSC, Manchester, UK
E-mail: claire.mitchell@manchester.ac.uk

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Udo Schumacher, University Medical Center Hamburg-Eppendorf, UK

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PHYSIOLOGY & REHABILITATION | RESEARCH ARTICLE

If we build it, will they use it? Phase I observational evaluation of ReaDySpeech, an online therapy programme for people with dysarthria after stroke

Claire Mitchell^{1*}, Audrey Bowen¹, Sarah Tyson² and Paul Conroy¹

Abstract: *Purpose:* To explore the acceptability of using ReaDySpeech, an online speech therapy programme for people with dysarthria after stroke, within usual clinical practice. This early clinical testing underpins future research evaluation of ReaDySpeech. *Methods:* A prospective, observational design involving interviews with speech and language therapists with experience of using ReaDySpeech. This included the usability of ReaDySpeech, therapists' training/support needs, ease of recruitment of therapist and patient participants, ReaDySpeech technical issues and therapy content. Therapists also provided feedback from the patient participants. *Results:* Six therapists working in hospital and community-based settings used ReaDySpeech with five patients (12–28 weeks post-stroke, four female, mean age 71 years). Therapists found it was easy to use, training/support was sufficient and they reported positive feedback from participants. Areas to address involved patients' access to Wi-Fi, ease of navigation, content improvements and difficulties recruiting people more than 12 weeks post-stroke as most patients had already been discharged. *Conclusions:* ReaDySpeech was acceptable and generally feasible to use in clinical practice. This early phase research testing has been essential to improve navigation within the therapy software and content. ReaDySpeech can now be further evaluated with a phase two feasibility trial with earlier recruitment following stroke.

ABOUT THE AUTHORS

Claire Mitchell is a Speech and Language Therapists and an NIHR Doctoral Research Fellow based at the University of Manchester, Manchester Academic Health Science Centre. Stroke research is an area of strength and a research priority for the University of Manchester. The early development work reported in this paper and the findings of acceptability in a clinical context has meant the next stage of evaluation could be carried out. Claire Mitchell is currently chief investigator of the "ReaDySpeech for people with dysarthria after stroke: a feasibility study" which is a randomised controlled trial being carried out as a multi-centre trial in the North West of England. The primary objective is to assess the feasibility of delivering the ReaDySpeech intervention to evaluate whether a larger randomised controlled efficacy trial is possible.

PUBLIC INTEREST STATEMENT

The use of technology needs to be considered and evaluated as part of speech therapy rehabilitation in order to improve the quality, intensity and duration of treatment for people with dysarthria (unclear speech) after stroke. This study describes a novel technology, ReaDySpeech an online computer programme, and the early development work that has been undertaken to find out if it is fit for purpose in a clinical context. This work will enable us to identify any barriers to using ReaDySpeech clinically before larger more costly studies are carried out. This work has arisen from patient feedback identified in clinical practice and addressed through patient and therapist input which should be a key component when developing new technology. ReaDySpeech was found to be generally acceptable to therapists and patients in clinical practice and can now be evaluated further in a feasibility trial.

Subjects: Allied Health; Rehabilitation Medicine; Assistive Technology; Communication Disorders

Keywords: stroke; technology; dysarthria; rehabilitation; acceptance

1. Introduction

Dysarthria following stroke results in impaired intelligibility of speech from the neurologic damage that causes speech musculature to be slow, weak, imprecise and/or poorly coordinated (Yorkston, 1996). This can negatively affect an individual's sense of identity, self-image, social participation and psychological well-being (Brady, Clark, Dickson, Paton, & Barbour, 2011; Dickson, Barbour, Brady, Clark, & Paton, 2008; Tilling et al., 2001). Research into treatment of post-stroke dysarthria is limited; no high quality trials were identified in a Cochrane review (Sellars, Hughes, & Langhorne, 2005). Research into motor learning after stroke indicates that although increased intensity and duration of treatment may improve recovery the increase in therapist time would be costly for health service providers (Langhorne, Coupar, & Pollock, 2009). The use of electronic technology (or e-rehabilitation) may be a way to increase the dose of dysarthria treatment without increasing the therapist demand and is being explored for wider stroke rehabilitation (Lindqvist & Borell, 2012; Mawson et al., 2014). Recent studies have suggested that using technology increased the amount of therapy received by patients and may benefit patients (Lemoncello, Sohlberg, Fickas, Albin, & Harn, 2011; Palmer, Enderby, & Hawley, 2007; Palmer et al., 2012). It is also important to ensure patients have the opportunity to access high quality independent practice so they can make that choice if they wish, to support patient centred intervention.

This report details early work to assess the acceptability of using a novel computerised rehabilitation programme for people with dysarthria following stroke. The original idea for the technology (called ReaDySpeech) was suggested to the author (CM) by patients with post stroke dysarthria. They commented that generic, paper exercises which are part of standard care in the UK were not particularly easy or motivating to use and asked if these could be computer based. This suggestion coupled with the need for greater intensity, repetition and functional activities led to the development of ReaDySpeech which has the potential to use technology to improve the quantity and quality of therapy and ultimately, the outcomes for stroke survivors. Extensive searches indicated that there were no complete commercial computer-based programmes specifically for dysarthria. Thus "ReaDySpeech", an online programme that could be tailored for individuals by a speech and language therapist was developed by the first author (2014) in collaboration with speech and language therapists and stroke survivors with dysarthria. The content was based on best practice guidelines (Taylor-Goh, 2005) including exercises for facial and oral muscles and strategies for increasing intelligibility. We now report this initial proof-of-concept work to explore acceptability of ReaDySpeech and whether it should progress to further evaluation of efficacy as outlined by the MRC Framework for the Development and Evaluation of RCTs for Complex Interventions to Improve Health (Anderson, 2008; Campbell et al., 2000). If we found ReaDySpeech acceptable for clinical use we would then proceed to a feasibility randomised controlled trial, which if feasible would allow us to proceed to a larger trial of efficacy in the future.

1.1. Aims

The main objective is to find out if ReaDySpeech is acceptable to use during every-day clinical practice. The other objectives are to: establish if it is possible to recruit NHS therapists to carry out the testing, identify and recruit patients with dysarthria more than 12 weeks post stroke.

2. The Intervention

ReaDySpeech is a dysarthria programme that aims to rehabilitate speech at impairment and activity level. It includes exercises to improve articulation; breathing; intonation; facial expression; rate of speech; and range of movement, strength and speed of the oro-motor musculature. It is intended that it will be suitable for people in the acute and chronic stages of recovery. It is anticipated that ReaDySpeech can be used in a variety of ways: as part of face to face therapy with a speech and

language therapist or a therapy assistant practitioner, or the person with dysarthria can use it independently outside of the therapy sessions, with or without the support of family or carers. ReaDySpeech is set up and amended by the treating therapist according to the patients' level of difficulty and rate of progress. The therapist selects clinically relevant exercises and negotiates agreed intensity and duration of use with the patient, adherence to which is monitored by the software programme. The patient is then able to access these exercises online, on any Wi-Fi enabled device (smart phone, tablet computer, lap top computer, personal computer). In this study, participating therapists used ReaDySpeech with people who met the inclusion criteria (details below) alongside "usual" care for up to 10 weeks. The "usual" care intervention was not specified and was provided by the treating therapist as they deemed appropriate. No specifications about the intensity of ReaDySpeech care were made and this was decided according to the therapists' clinical judgement.

3. Methods

3.1. Ethical approval

Ethics approval for the study was obtained from the UK NHS research ethics committee (REC reference number: 14/SC/1320) and research permissions gained from NHS Trusts.

3.2. Two groups of participants

- (1) *Group 1: Qualified speech and language therapists (of any grade) who worked with people with stroke, in acute care, rehabilitation or community settings in the four participating stroke services were eligible to participate. We aimed to recruit a minimum of four therapists, across the sites so one per site, with each expected to recruit one or two patients over a five month recruitment period.*
- (2) *Group 2: Patients with post-stroke dysarthria, who were known to participating speech therapy services, more than 12 weeks post-stroke (no upper time limit), willing and able to undertake and benefit from dysarthria therapy (in therapists' opinion), medically stable and able to give informed consent were recruited. The exclusion criteria for people with dysarthria were any co-existing neurological condition, needing a translator to participate in therapy, significant hearing, physical, cognitive, language or visual problems that would prevent using ReaDySpeech. Therapists kept a log of patients who were ineligible and why, and those who were eligible but declined to participate and why.*

3.3. Procedure

A prospective, observational design was used to interview the participating speech and language therapists. Therapists who consented to participate were given training and support about the study and in how to deliver therapy using ReaDySpeech. An instruction booklet for ReaDySpeech and face to face training were provided. Therapists then used ReaDySpeech with recruited patients, as described above, as part of usual care. They would set up each patient with access to ReaDySpeech, selecting the specific exercises that were needed and either go through these with them as part of their therapy session or ask them to go through the programme independently. Therapists were able to borrow a tablet computer if needed or would use the patient's own device.

On completion of the intervention period the first author interviewed therapists face to face, using a semi-structured questionnaire containing open and closed questions, and recorded the responses in writing. The open questions asked for comments e.g. "please comment on ease of use" and the closed questions offered a rating scale: very easy to use, easy to use, not sure either way, not particularly easy to use, not at all easy to use. The questions covered four key areas: (i) ease of use of ReaDySpeech and therapists' training and support needs; (ii) patients' views as communicated to therapists; (iii) technical issues related to use in various settings; (iv) the content of ReaDySpeech, strengths and/or weaknesses of the programme and how it could be improved.

The data analysis plan was to summarise the quantitative and qualitative data, drawing out practical suggestions for developments to the ReaDySpeech programme and to finalise the design of a subsequent phase II feasibility randomised controlled trial.

4. Results

Eight speech and language therapists were recruited, six of whom identified and recruited suitable patients from three sites. Two therapists from a fourth site were unable to recruit patients, due to a lack of Wi-Fi at a rehabilitation centre, and could therefore not continue further with the project. The six included therapists were female with a mean of 11.5 years clinical experience.

Ten eligible patients with dysarthria were identified, five of whom participated. Three declined (two because they disliked computers and one because they feared it might delay discharge from in-patient care) and two could not participate because they did not have access to Wi-Fi in a rehabilitation facility. Four of the five participating patients were male, with a mean age of 71 years (61–76 years) and mean time post stroke of 16 weeks (12–28 weeks). All had dysarthria in the absence of aphasia (language impairment). All five participants had suffered an ischaemic stroke; one was lacunar; one was in the posterior circulation; two were in the anterior circulation and one location was unknown. Two participants were recruited from an in-patient rehabilitation unit from one site; two were recruited in their own homes from the community-based service of a second site and the fifth was recruited from the in-patient rehabilitation unit of the third site.

The training to use ReaDySpeech was rated as “thorough” by five therapists, with one rating of “unsure”. They highlighted that training needed to be flexible to be appropriate for a range of therapists’ ability to use technology. All six therapists reported that they accessed support via email or phone call and found this sufficient. They rated ReaDySpeech as “easy” or “very easy” to use in terms of selecting the relevant exercises and setting up individual programmes for patients and their five patients were able to use ReaDySpeech with no reported difficulties. All the patient participants completed the intervention, with no drop-outs. Three of the five patients’ provided feedback to therapists including that it was “fine”, another patient “liked it” and reported it was better than “the other speech therapy” meaning the paper-based work used prior to involvement in the study. One patient commented that it was “easy to use” and liked the fact it was “more environmentally friendly” than the paper-based exercises. Therapists were also positive about using ReaDySpeech reporting that they felt it was “more motivating for patients” and “more interactive for patients” and “was more professional” than using paper exercises, as well as “easier than photocopying”.

Therapy was delivered equally in community and in-patient settings. The therapists also discussed how they had used the programme in different ways. At one site ReaDySpeech was used with a therapy assistant; at another, therapists used it during their therapy session; in the third site, ReaDySpeech was used by one patient independently and with another as part of their therapy session. Several suggestions about potential improvements were made, mostly regarding changes to ReaDySpeech’s functionality to improve navigation around the programme ($n = 15$ comments) or to enhance the content ($n = 11$). Technical difficulties were raised eight times and related to limited Wi-Fi access in clinical settings.

Therapists reported that identifying patients with dysarthria at more than 12 weeks post stroke was difficult as most patients had been discharged from speech and language therapy by this point. They felt the intervention could have been used with people earlier post-stroke. An additional four people with dysarthria were ineligible for this initial study because they were less than 12 weeks post-stroke.

5. Discussion

Ease of recruitment and a willingness of therapists to engage in testing out new technology indicates a future study is possible. This study found that while therapists were easily recruited, patients more than twelve weeks post stroke were harder to identify. Our subsequent studies will recruit people

earlier after stroke to more accurately reflect clinical practice and the population receiving dysarthria rehabilitation. The findings showed that ReaDySpeech was easy to use and the support and training sufficient according to the therapists. All patient participants were able to use ReaDySpeech with no difficulties reported to the therapists. This early clinical testing has provided further feedback and suggestions to improve the functionality and content of ReaDySpeech. This study did not specify how ReaDySpeech should be used, so the predominant use by the therapist or therapy assistants as part of face to face therapy provides some useful indicators for further evaluation.

This study wanted to establish, not just recruitment rate of patients, but willingness to participate in technology clinical testing. As most stroke patients are older and presumed to be less familiar with technology concerns had been raised in the initial development phases that this population may not wish to engage with technology testing. Two of the 10 eligible patients approached declined participation due to a dislike of computers. Although a very small sample this suggests that concerns about the willingness of patients following stroke to engage with technology testing may be exaggerated and do not mitigate against progressing development of ReaDySpeech.

The ease of use reported by therapists and patients indicated that this programme could go forward to further evaluation without the need for significant changes. However, suggested improvements have been incorporated for future evaluation. This included enhancing the “user manuals” with ongoing phone support and to consider developing demonstration videos.

6. Study limitations

The small numbers of participants mean that generalisability is limited and one cannot assume that the same results would be found if used in other rehabilitation units, more varied clinical context or with a wider range of participants. Furthermore the lack of a control group and a direct evaluation of patients’ views adds potential bias to the results. They do however give us the initial proof of concept that support our plans to progress to a larger phase II feasibility trial.

7. Interpretation

This study found that it was feasible to use ReaDySpeech in clinical practice and it was acceptable to patients and therapists. We were able to recruit therapists and eligible patients were willing to participate in testing rehabilitation regardless of age but the inclusion criteria for time post stroke would need to be earlier. Amendments have been made to ReaDySpeech to improve content and functioning, with training and support remaining flexible according to need. ReaDySpeech will continue to be used in whatever way is most suited to the patient according to clinical need.

8. Future directions

This study has shown the importance of early development work around a novel intervention and the methodology most suited to examining ReaDySpeech in more depth. It has provided the information needed to ensure a larger, more costly phase II feasibility trial is well designed. This testing phase now means that a phase II feasibility, randomised controlled trial comparing “usual care” with ReaDySpeech is warranted and this is currently underway.

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Competing Interests

The authors declare no competing interest.

Author details

Claire Mitchell¹

E-mail: claire.mitchell@manchester.ac.uk

Audrey Bowen¹

E-mail: audrey.bowen@manchester.ac.uk

Sarah Tyson²

E-mail: sarah.tyson@manchester.ac.uk

Paul Conroy¹

E-mail: paul.conroy@manchester.ac.uk

¹ Division of Neuroscience and Experimental Psychology, School of Biological Sciences, Faculty of Biology Medicine and Health, School of Biological Sciences, University of Manchester MAHSC, Manchester, UK.

² Division of Nursing, Midwifery & Social Work, University of Manchester, Manchester, UK.

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