Computer-Based Speech And Language Therapy for Dysarthria Rehabilitation

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PROBLEM

Around 50 million stroke and TBI survivors have dysarthria worldwide. Such communication difficulties are linked with depression, social withdrawal, loss of work and poor quality of life.

CLINICAL GUIDELINES

The National Stroke guidance recommends at least 45 minutes/day of speech and language therapy for as long as it is necessary.

GAP

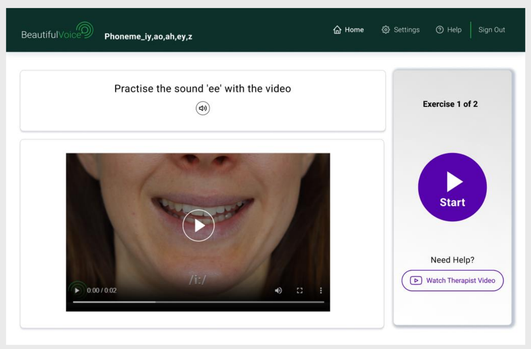
The UK Stroke Audit reports that current therapy provision is on average under 10 minutes/day and usually for 8-12 weeks only. Nonetheless, speech and language therapists are overworked and with overwhelming caseload.

SOLUTION

Technology can enhance therapy by offering time-saving tools and advanced analytical capabilities for therapists, while also empowering patients through engaging and effective home-based training for greater self-management.

BEAUTIFUL VOICE – SPEECH AND LANGUAGE THERAPY DELIVERY SOLUTION

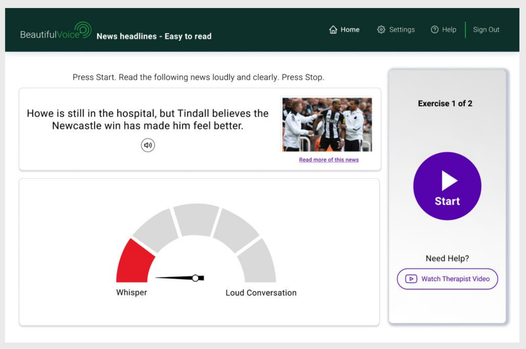
A.



Detailed video demonstration

Phoneme and word articulation demonstrations improve the quality of practice at home

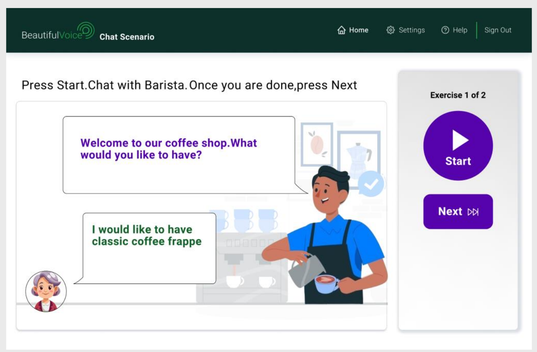
B.



Personalized exercises

Exercises incorporate target phoneme, real-time feedback and topics of interest for greater therapy adherence

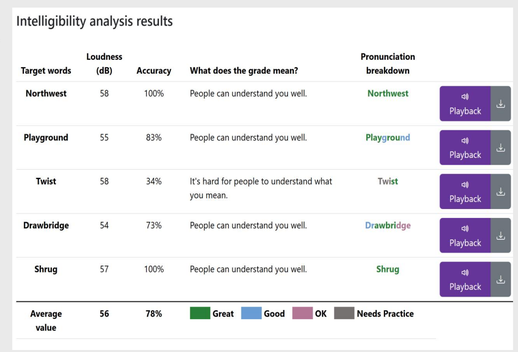
C.



Functional exercises with AI

Situational unscripted talking exercises to build confidence and generalization of therapy

D.



Automatic analysis & feedback

Intelligibility, speech and DDK rate analysis, supporting therapists to track/demonstrate patient progress and automate case notes.

METHODS

11 Participants

With Dysarthria, Mean age 58, **3 years** mean onset

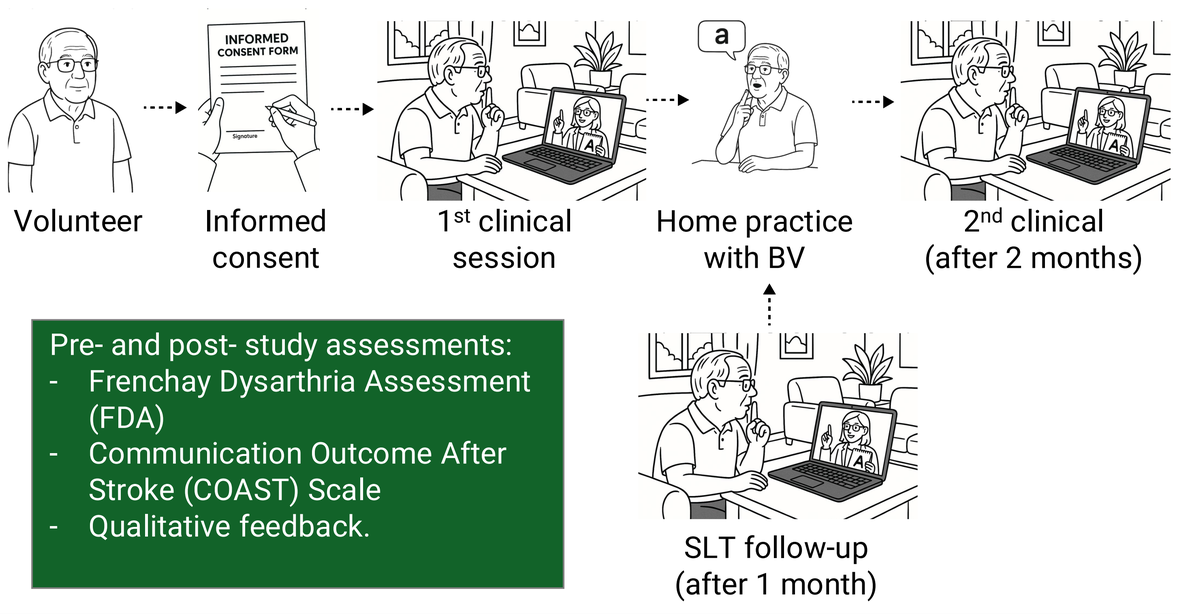
Stroke Survivors

TBI

2 months home study. Unsupervised use of the platform at their own home

STUDY FLOW

3 Supervised Remote Sessions with SLTs (start, middle and end) for exercise assignment, adjustment and review. Pre- and post- assessments performed on speech quality and PROMs

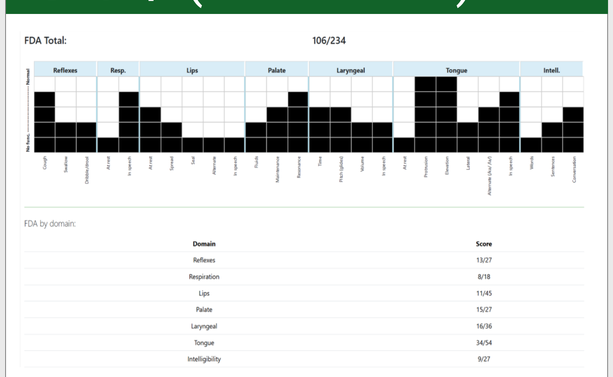


Pre- and post- study assessments:
- Frenchay Dysarthria Assessment (FDA)
- Communication Outcome After Stroke (COAST) Scale
- Qualitative feedback.

METRIC IMPROVEMENTS

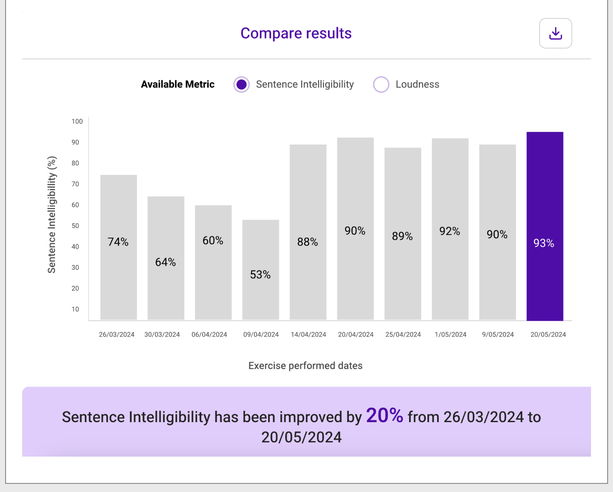
Frenchay Dysarthria Assessment

8% ↑ (140 → 151)



FDA Intelligibility Subset

15%↑ (16.32 → 18.82)



Communication Outcome After Stroke Scale

7% ↑

(74 → 79)

- Both FDA and COAST assessments demonstrated significant improvement in communication ability ($p<0.05$).
- This is particularly remarkable for a population with a mean onset of 3 years.
- The intelligibility subset from the FDA showed an average 15% improvement. This is expected as exercises in the platform were focused on improving articulation.
- Users reported that exercise gamification and personalization, combined with rewards and practice reminders drove to greater therapy adherence.

QUOTES

"As stroke survivor it is difficult to see your improvement […] it helps me understand my progress"

B, Stroke survivor

"I really like that I can do my exercises here and the therapist can see what I did and give feedback"

J, TBI survivor

"I practice every morning with the news on the app. It became a routine. It's more fun than some boring phrases"

J, Stroke survivor

CONCLUSION

The study shows that Beautiful Voice can contribute to dysarthria rehabilitation, showing both functional and impairment-based measurable gains. Future analysis will be conducted demonstrating that patient improvement measured through the platform correlated to the FDA assessments for the intelligibility subset.

[1] National Institute for Health and Care Excellence. (2013). Stroke rehabilitation in adults Clinical guideline [CG162] https://www.nice.org.uk/guidance/cg162

[2] Mitchell, C., Gittins, M., Tyson, S., Vail, A., Conroy, P., Paley, L., & Bowen, A. (2021). Prevalence of aphasia and dysarthria among inpatient stroke survivors: describing the population, therapy provision and outcomes on discharge. Aphasiology, 35(7), 950-960. https://doi.org/10.1080/02687038.2020.1759772

[3] Mitchell, C., Bowen, A., Tyson, S., & Conroy, P. (2017). A feasibility randomized controlled trial of ReaDySpeech for people with Dysarthria after stroke. Clinical Rehabilitation, 32(8), 1037–1046. https://doi.org/10.1177/0269215517748453

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