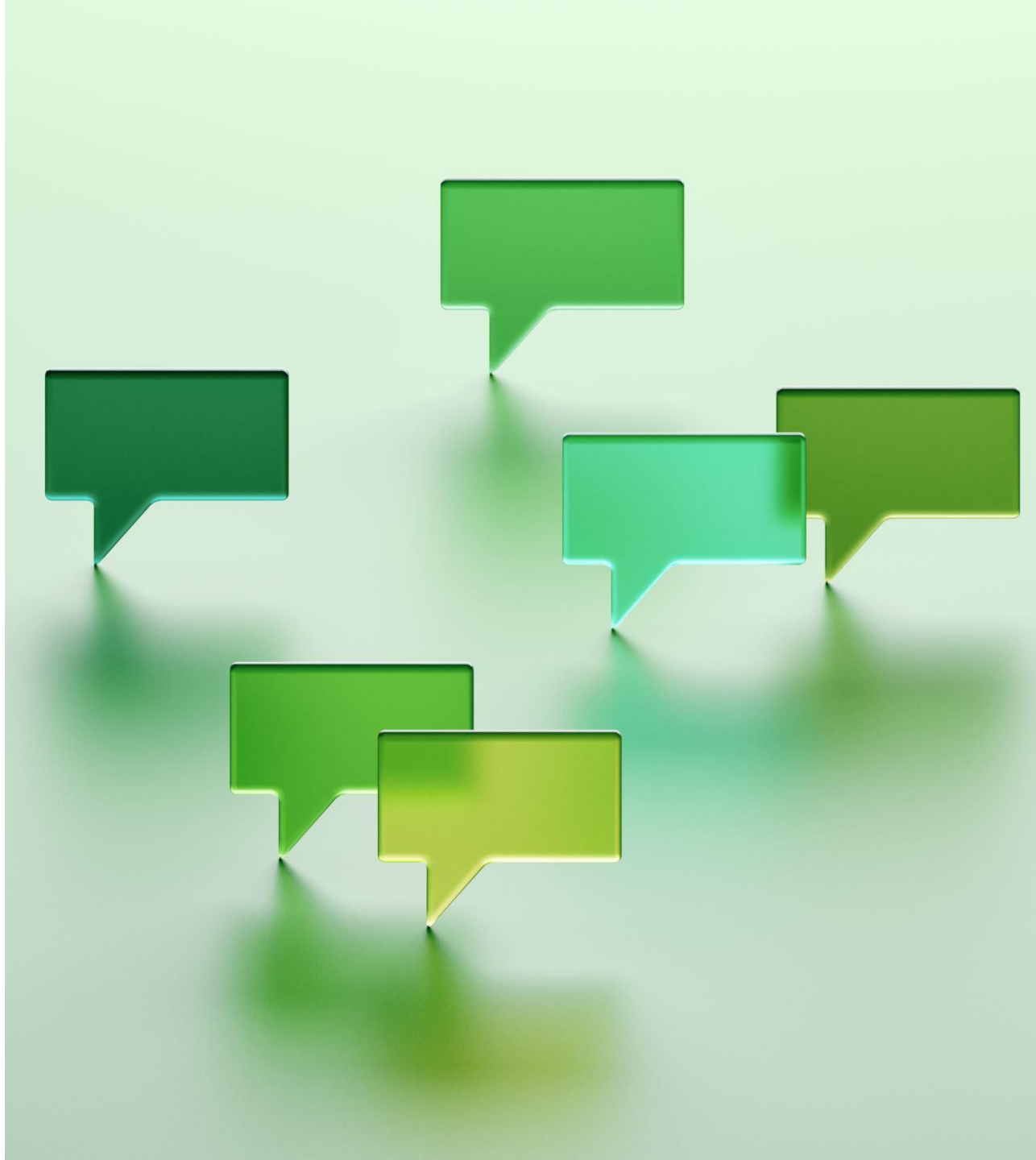
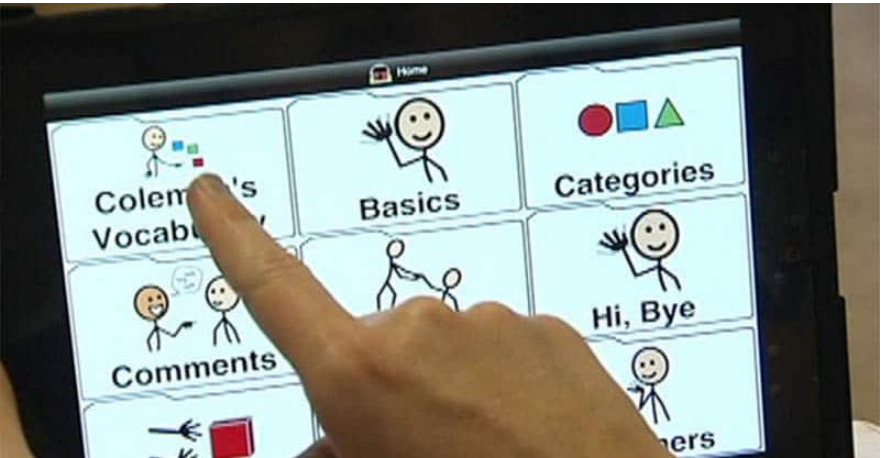
A speech recognition application as a communication aid for acute & critical care patients with tracheostomies

Carla McClintock, PhD RN

Western Health & Social Care Trust, Derry N.I

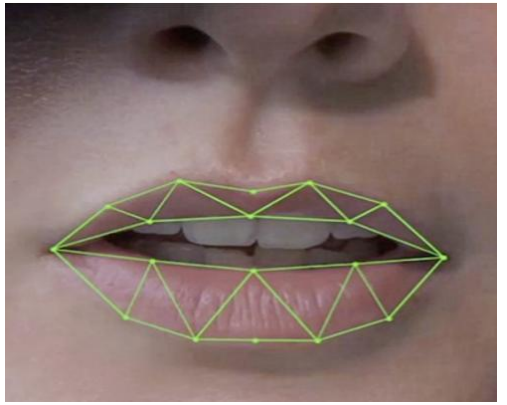




The problem

- ~14,000 UK patients undergo a tracheostomy annually.
- Voicelessness- major source of morbidity.
- Current communication strategies have limitations.

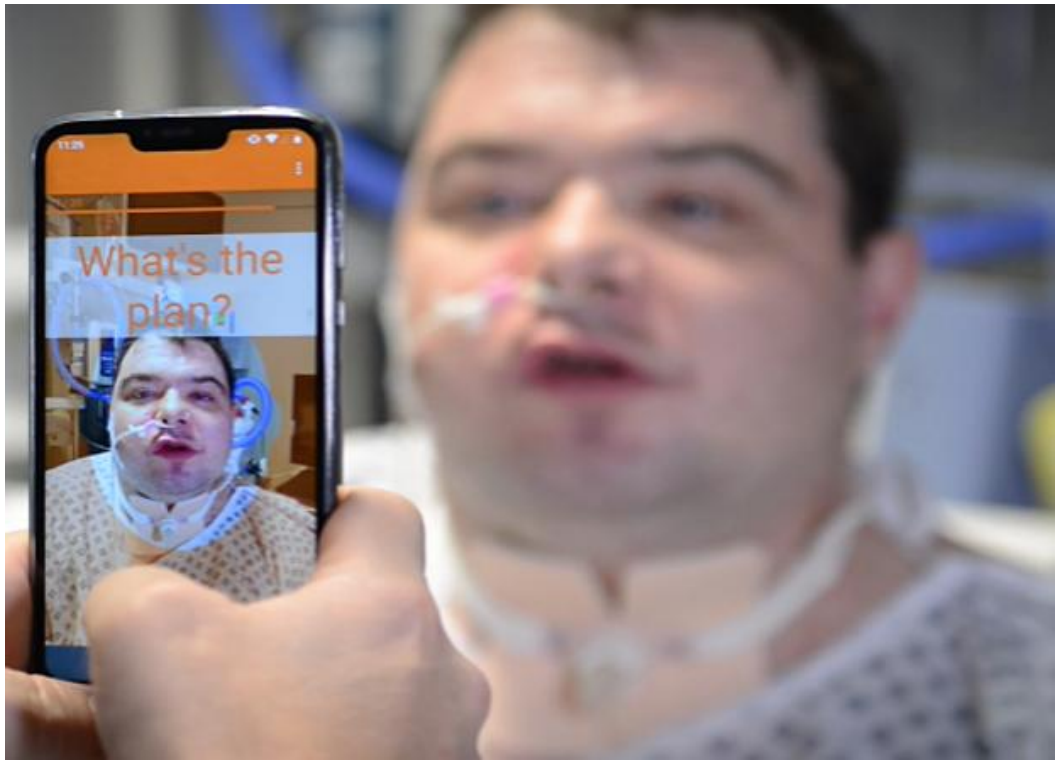
The solution?



Speech Recognition Application for the Voice Impaired

- Lipreading app

- 2 versions tested:
  - V1- predefined phrase list
  - V2- free speech



The goal

To test the **feasibility** & **acceptability** of SRAVI for adult acute & critical care patients with a tracheostomy, unable to communicate verbally.

Study design overview

Cohort Study

3 ICUs & 1 acute ward (N.I)

Feasibility of SRAVI (Accuracy & frequency of use)

- Adult patients; new tracheostomies; move lips; communicate in English

Qualitative Study

Acceptability of SRAVI:

- Interviews with patients, relatives & staff

3-month follow up

Patient outcomes:

- Anxiety & depression; PTSD, quality of life; cognitive status

Participants

Total no. of patients recruited: **31**

29 patients used SRAVI at least once

🎂 Median age:

61 yrs
(IQR: 48-67)

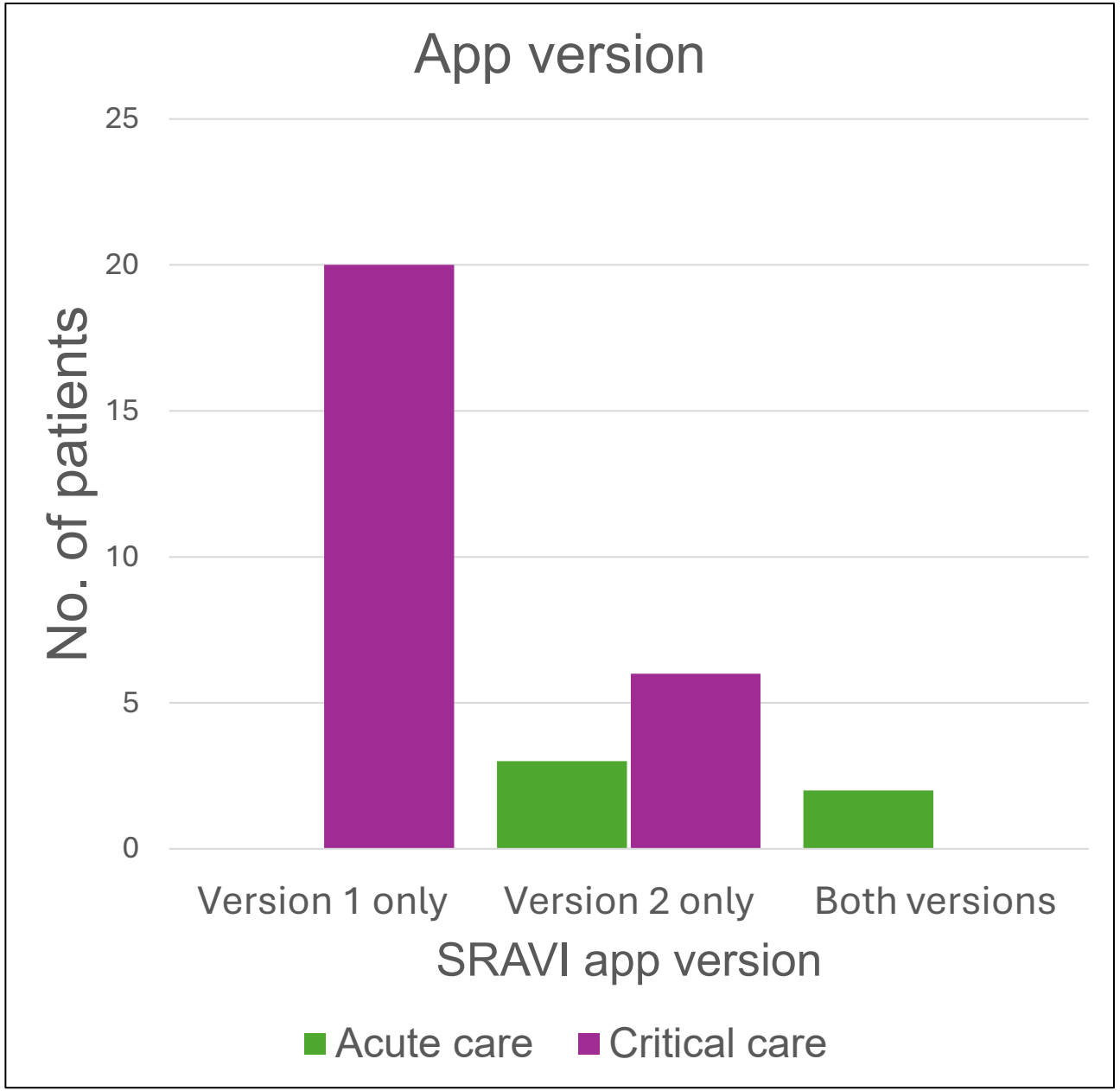
🚹 55% Male

🧠 Main admission reason: Neurological

🏥 26 (84%) from critical care

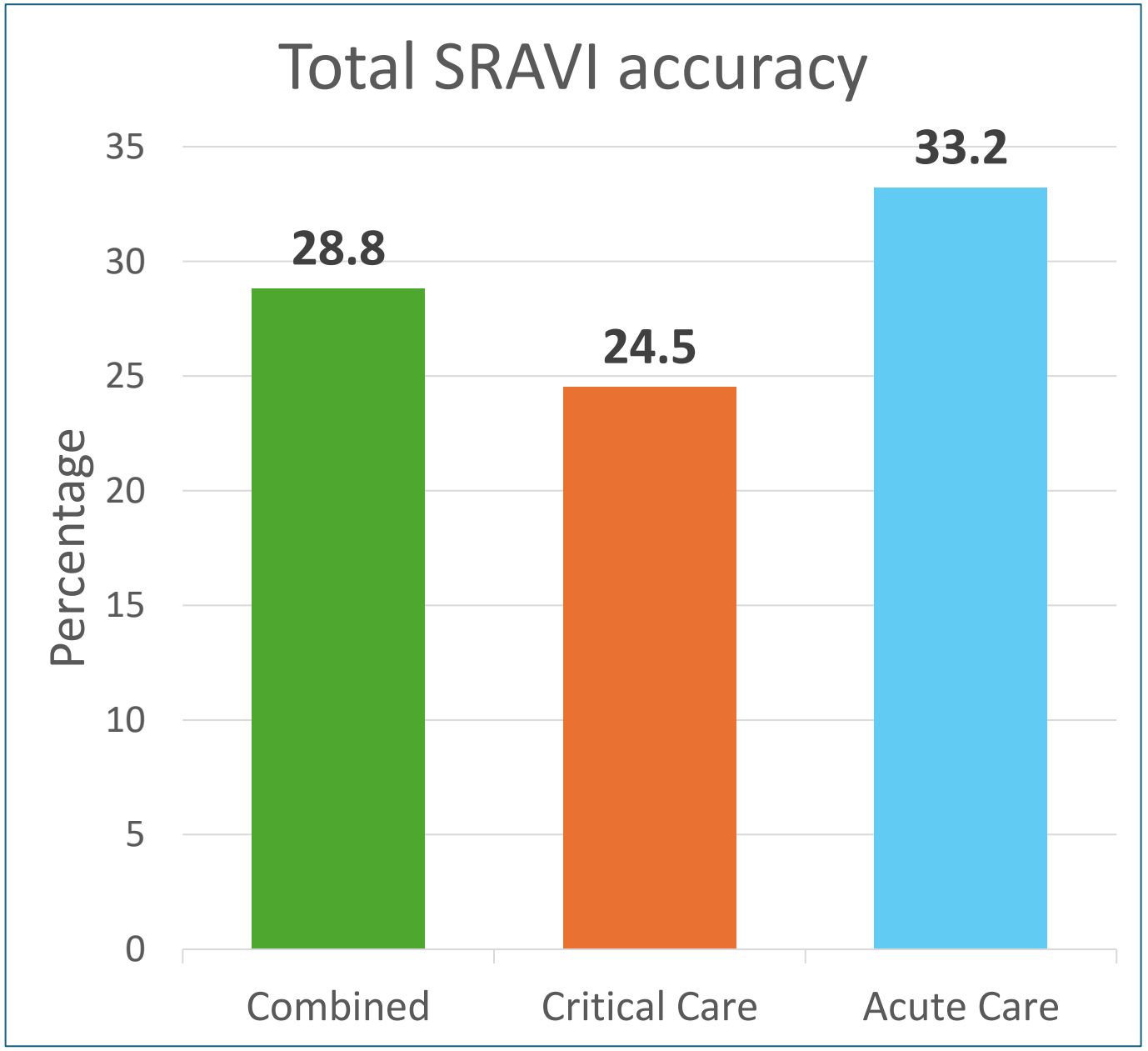
SRAVI usage

- Critical Care: **233** videos *(15-months)*
- Acute Care: **235** videos *(5-months)*



SRAVI accuracy

- V1: **22**%
  (pre-defined phrase list)
- V2: **35**%
  (free speech)



3-month follow-up outcomes

- **Quality of Life (EQ-5D-5L)**
  -100% reported at least one problem

- **Anxiety & Depression (HADS)**
  -54% anxiety | 46% depression

- **PTSD Symptoms (IES-R)**
  -54% reported PTSD symptoms

- **Cognitive Issues (MoCA-Blind)**
  -31% showed cognitive problems

59% of participants completed follow-up

Interviews

- 49 participants:
  - 35 staff
  - 9 patients
  - 5 relatives

- Questions derived from Theoretical Framework of Acceptability (Sekhon et al. 2017)

TFA Construct	Question
Affective Attitude	How did you feel about being offered SRAVI?
Burden	How easy/difficult was SRAVI?
Ethicality	How did you feel about using lip-reading tech?
Intervention Coherence	What did you think about SRAVI's ability to interpret mouthed words?
Opportunity Costs	Was it worthwhile using SRAVI?
Perceived Effectiveness	How well did SRAVI help you communicate?
Self-efficacy	How did you feel about using SRAVI?

Perceived effectiveness

- SRAVI often failed to accurately interpret communication.
- Recognised basic terms; struggled with complex communication.
- Some participants noted potential for better performance with certain patients.

- Factors affecting effectiveness:
  - Wi-Fi connectivity
  - Patient positioning
  - Weakness/cognitive status

Refining SRAVI

- Broaden phrase list
- Tailor to different dialects
- Smaller devices

Burden

3 factors shaped use:

- **Ease of use**: Generally intuitive for staff & relatives; ICU patients often needed help.
- **Time constraints**: Nurses spent extra time assisting ICU patients who couldn’t use it independently.
- **Emotional toll**: ICU patients felt distressed seeing themselves. Acute care patients used it independently without concern.

Other key findings

- **Staff split:** Loved it or doubted it *(Affective Attitude)*
- **Patients & families:** Excitement → scepticism → potential *(Affective Attitude)*
- **Ethical focus:** Care for elderly & delirious patients *(Ethicality)*
- **Understanding:** Mixed grasp of how app worked *(Intervention Coherence)*
- **Usage hurdles:** Speech issues & patient-specific limits *(Opportunity Costs)*
- **Learning curve:** Awkward at first *(Self-efficacy)*

SRAVI: Key takeaways

- **Needs improvement:** Better alignment with user needs
- **Positive vibe:** Most participants remained optimistic
- **Speech upgrade:** Preference for natural, flexible speech (V2)
- **Next steps:** Test free speech further in acute care

THANK YOU!

ANY QUESTIONS?

carla.mcclintock@westerntrust.hscni.net