



Overcoming Aphonia in Head and Neck Surgery Patients with VoRA

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Abstract

Objectives: Our primary objective is to survey patients who have experienced postoperative aphonia after major head neck surgery to understand questions and phrases that were necessary for them to communicate with their healthcare provider. Our secondary objective is to create an application used on an Amazon Fire HD tablet that will allow aphonic patients to interface with their healthcare providers.

Methods: Survey study of patients in 2019 who had undergone a head or neck surgery resulting in aphonia and who were treated within the Department of Otolaryngology at Louisiana State University Health Sciences Center. Patient demographics and phrases for effective communication were recorded and analyzed. An application for Android Fire HD tablet was then developed using the survey results to vocalize the phrases.

Results: Six patients who were surveyed were included. The causes for aphonia included laryngectomy (n = 4, 67%), squamous cell carcinoma excision (n = 1, 17%), and an unspecified vocal cord procedure (n = 1, 17%). The most commonly requested phrases were "pain medication" (n = 2, 33%) and "discharge date" (n = 2, 33%), followed by "food," "restroom," "thank you," and terms to communicate with friends and family. A prototype application was created for use on an Android Fire HD tablet with 12 phrases associated with image icons available in English and Spanish.

Conclusions: Patient anxiety is heightened in the post-operative period when communication with providers is limited due to aphonia. Technology-based solutions can help ameliorate this barrier to optimal patient care. Further studies will demonstrate the effectiveness of the application in the patient care setting.

Keywords: Aphonia; Voice Restoration; Tracheostoma; Laryngectomy

Introduction

There are multiple procedures performed within the spectrum of otolaryngology that may necessitate a temporary or permanent tracheostoma. The tracheostoma renders the patient aphonic for

varying periods of time. The immediate postoperative period, especially after a major head neck surgery, is a sensitive time where the patient often feels helpless and restricted. While tracheostomy can be necessary for treatment of airway pathology and its impact

on a patient’s physical health is positive, mental health worsens following this procedure [1]. Recognition of this impact on patient psychosocial outcomes has led to many studies regarding long-term quality of life, but the importance of its effect on communication and functioning in the immediate post-operative period while still in the hospital is often overlooked. The loss of voice not only increases patient anxiety, but can affect the patient-provider relationship, overall patient experience and clinical outcome. A top barrier to timely discharge is patient readiness [2]. Without effective patient-provider communication, patients lack understanding of their treatment course or tracheostomy care, daily goals, and discharge plans, making them hesitant to discharge. Delayed discharge subsequently can put patients at risk for hospital-acquired infections and worsens the economic burden on the healthcare system. Lack of preparedness at discharge can not only impact overall patient satisfaction with care provided but also impact re-admission rates. Restoration of voice is ideal; not only is communication necessary for patient understanding and timely discharge, but the ability to communicate has been known to positively impact patient self-esteem and cheerfulness [3]. An assistive communication device that will vocalize critical phrases for patients at the touch of a button has the capability of relieving the aforementioned barriers to comprehensive healthcare.

Materials and Methods

This study was conducted at University Medical Center New Orleans (UMCNO), LA and within the Department of Otolaryngology Head and Neck Surgery Louisiana State University Health Sciences Center, New Orleans LA. An IRB exemption was obtained; no identifiable data was collected or solicited and survey results were used to shortlist the most common questions that voiced the concerns of aphonic patients in the early post-operative period. The survey questions were distributed to patients who had previously undergone major head or neck surgery resulting in aphonia at UMCNO. Demographic data collected included age at time of surgery and sex. Patients (greater than 18 years) who had undergone head or neck surgery resulting in temporary or permanent aphonia due to placement of a temporary or permanent tracheostoma were included. The type of surgical procedure was recorded. Patients were then asked to provide a list of common questions that they needed to ask their immediate healthcare provider (e.g. nurse or doctor) during their hospital stay after surgery; questions that

they would wanted to have asked most commonly if they were not aphonic after surgery. Responses garnered from the surveyed patients were used to create a list of most commonly asked questions and phrases. An Android application was then designed for use on personal tablet devices that plays an audio recording of the patient-recommended phrases and questions following the push of a customized button with icons that represent the content of the phrase or question, within the application (Figures 1-3). The application was developed in Kotlin Programming Language using Android Studio. Anticipating cultural differences, buttons were made available in two languages, English and Spanish. Voice output is in spoken English.

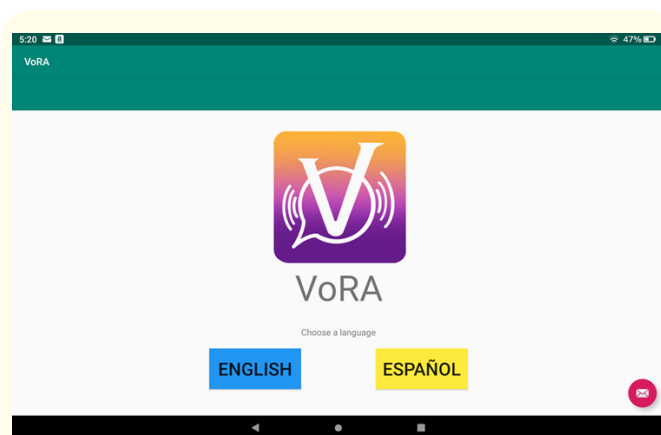


Figure 1

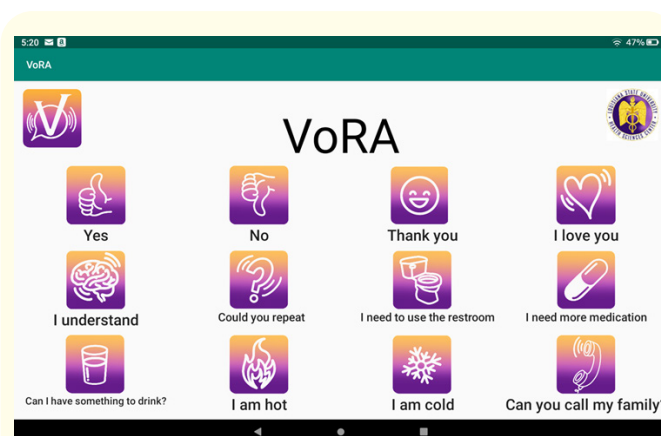


Figure 2

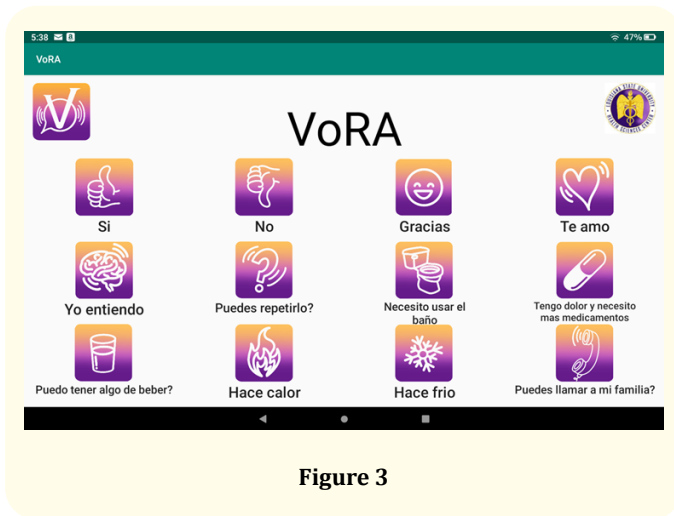


Figure 3

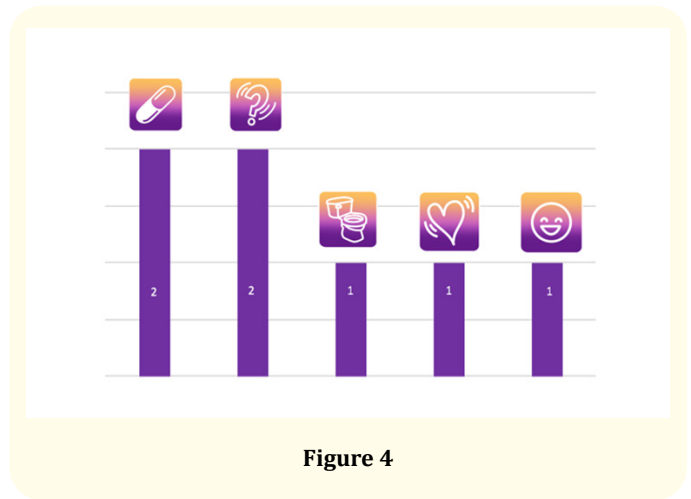
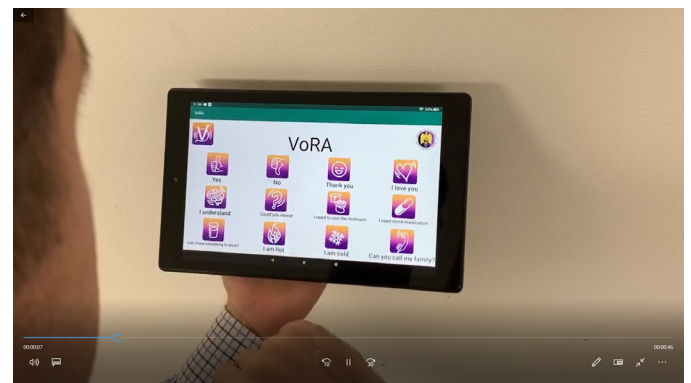


Figure 4

Results and Discussion

Six patients completed surveys, all males. Ages at time of surgery ranged from 50 to 72. Four of six patients underwent laryngectomy, one underwent an excision of a cancer, and one had a procedure for vocal cord pathology. Two patients (33%) reported wanting to ask about pain medication. Two patients (33%) wanted to ask about discharge date. Other reported topics included food, the restroom, saying “thank you,” and being able to communicate with friends and family (Figure 4). A prototype of the application was created, incorporating the desires of the surveyed patients. This prototype includes 12 phrases for the initial phase of the program, “yes,” “no,” “thank you,” “I love you,” “I understand,” “could you repeat that?” “I need to use the restroom,” “I am in pain and need more medication,” “Can I have something to drink?” “I am hot,” “I am cold,” and “Can you call my family?” The app is featured on an Amazon Fire HD tablet, where the phrases appear as picture buttons that the patient can click; the device vocalizes the phrase aloud (Video 1).

Currently, the phrases are available on the device in English and Spanish. Limited communication options currently exist for head and neck cancer patients who are aphonic in the hospital in the immediate post-operative period. Patients often depend solely on the use of hand and head motions or pen and paper, and occasionally some have access to a dry erase board. Body language alone provides patients with no opportunity to ask questions, clarify understanding of their medical management, or describe their pain level. Many of our patients lack sufficient literacy to be able to effectively



communicate through reading and/or writing. It is estimated that 26% of adults in the greater New Orleans area are functionally illiterate.

The use of pen and paper or dry erase board is limited to patients who are literate, and even then it is not timely and relies on patient effort. When the purpose of the survey was explained to patients, all expressed the need for improved communication in the post-operative period and said that it was difficult to express their concerns at that time. One specific theme that resonated among multiple patients surveyed was that of requesting pain medication. Inadequate pain control is often a barrier to discharge, and up to 35% of patients undergoing laryngectomy are sub-optimally treated for pain post-operatively [4]. Patients additionally desired discussion of discharge date with their providers. Open communication is crucial between the patient and his/her provider about

realistic discharge goals. VoRA creates an opportunity and alternative avenue for patients to communicate; the ability to click on an icon that represents the question may be valuable to patients with low literacy. The 12 pre-formed phrases serve as a starting point in the application's first iteration; these phrases were chosen based on patient responses and will be expanded upon with further survey results and real world feedback. Each phrase is associated with an image icon that the patient can click, therefore ability to read is not a prerequisite for use. Once the icon is clicked, the Android Fire HD speaks the phrase aloud. The application has the 12 phrases in English and Spanish; the device phonates aloud in English for both so that that the provider understands what the patient wants to say. Additional languages will be added to the application as it is incorporated into direct patient care. With patient feedback, supplemental phrases will be introduced as well, and patients will have the option to customize their own statements and questions.

Conclusion

Technology-based solutions can help ameliorate patient anxiety and create a medium for communications for patients who may be aphonic around the post-operative or acute care settings due to temporary or permanent tracheostomy. Our study demonstrates that there is a need for improved means of communication in post-operative, newly aphonic patients. Further studies need to be done to put our technology into clinical practice and validate its effectiveness in relieving patient anxiety, improving communication and creating a better patient experience.

Conflict of Interest

No financial interest or any conflict of interest exists.

Bibliography

1. Hashmi NK, *et al.* "Quality of life and self-image in patients undergoing tracheostomy". *Laryngoscope* 120 (2020): S196.
2. Ragavan MV, *et al.* "Barriers to timely discharge from the general medicine service at an academic teaching hospital". *Postgraduate Medical Journal* 93 (2017): 528-533.
3. Amy L Freeman-Sanderson, *et al.* "Quality of life improves with return of voice in tracheostomy patients in intensive care: An observational study". *Journal of Critical Care* 33 (2016): 186-191.

4. Orgill R, *et al.* "Acute Pain Management Following Laryngectomy". *Archives of Otolaryngology - Head and Neck Surgery* 128.7 (2002): 829-832.

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