Advancing Graduate Education in
Alaryngeal Speech Rehabilitation:
Project AL

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The purpose of this article is to present an innovative student project that was developed for a graduate-level course in medical speech-language pathology. The goal of the course is to prepare future speech-language pathologists to meet the challenges faced in various medical settings (i.e., acute, subacute, long-term care, rehabilitation, etc.). As our scope of practice related to medically based disorders (e.g., stroke, traumatic brain injury, laryngeal cancer, Parkinson’s disease, etc.) has expanded substantially in recent years (Johnson & Jacobson, 2007), this course was designed to provide students with a solid foundation in the knowledge base and skills needed to function effectively in medical settings.

Throughout the semester, the roles, responsibilities, and essential skills of speech-language pathologists employed in medical settings are presented via lectures, discussions, demonstrations, videos, CD-ROMs, and in-class activities. Topics covered include medical settings and personnel, the physical examination, neuroimaging studies, speech-language assessment, medical documentation, tracheostomy and ventilator-dependent clients, and head/neck cancer. In the realm of head/neck cancer, one of the learning outcomes is for each student to demonstrate proficiency in the use of an artificial larynx (AL) by completing assigned activities and giving an oral presentation (see Appendix A). Toward that end, each student is provided with an AL for a portion of the semester and he or she is required to complete various practice activities assigned by the instructor. At the end of this training period, each student gives an oral presentation in class demonstrating his or her proficiency with the AL and evaluating his or her experiences as an “AL user.”

Graduate Course

Prior to beginning Project AL, the students receive at least 4 hr of in-class training on laryngeal cancer and the primary alaryngeal speech options (i.e., AL, esophageal speech, and tracheoesophageal

ABSTRACT: Purpose: The purpose of this article is to discuss in detail an innovative student project that was developed for a graduate-level course in medical speech-language pathology.

Method: Each student was provided with an artificial larynx (AL) for 1–2 weeks and completed various practice activities. Students then gave oral presentations demonstrating AL proficiency and discussing their experiences as an AL user.

Conclusion: Overall, most students report enjoying the project and learning a great deal, especially regarding developing a sense of empathy toward laryngectomees.

KEY WORDS: laryngectomee, electrolarynx, artificial larynx, students, medical
puncture). Special emphasis is placed on the use of the AL, particularly the transcervical type, in order to adequately prepare students to complete their project later in the semester. This emphasis is also important because the AL is a commonly used alaryngeal speech option, either as the speaker’s primary mode of communication or as a “backup” for clients who are using one of the other two options.

Following a brief overview, a history of ALs, and comparison of several different commercially available models, speech therapy with the AL is covered in depth. Specific issues discussed and demonstrated in class include placement (“sweet spot”), getting an adequate seal, stoma noise, articulation, conversational speech, and coordination of movements. These skills are explained and demonstrated by the instructor, who then trains each student individually on at least one skill during class. In addition, students are encouraged to gain additional practice with the instructor’s electrolarynges, either after class or during office hours.

Location of the sweet spot is demonstrated by producing a sustained vowel while placing the AL on various spots on the neck and cheek. Personally, my sweet spot is near the thyroid lamina, slightly lateral and inferior to the thyroid notch. However, the optimal placement of the AL can vary significantly among speakers, particularly among those who have actually had a total laryngectomy. Some laryngectomees, especially those who have undergone radiation treatment, may experience maximum loudness and resonance with the AL placed on the cheek rather than on the neck (Stemple, Glaze, & Gerdeman Klaben, 2000). This is because radiation treatment often results in the tissue of the neck becoming tough and fibrous. Although most students are able to consistently find their sweet spot by the end of the semester, this is the AL skill that students most frequently request help with prior to giving their presentation.

Next, to help the students learn to acquire a good seal between the AL and their skin, the instructor first demonstrates by placing the head of the unit against the palm of the hand. This is the easiest way to teach students to acquire a seal without sound leakage, and they should be encouraged to use this method when training their future clients. A good seal is vital for sound quality and intelligibility when communicating with an AL, and it is definitely a skill that takes some practice. Pressing the head of the AL too hard against the neck may result in a softer, somewhat “muted” sound; pressing too lightly will result in an audible “buzzing” sound from the unit (Stemple et al., 2000).

Another important element to consider for training is stoma noise. As students are not laryngectomees, they are obviously unable to produce stoma noise. Nevertheless, the instructor should emphasize the importance of training clients to eliminate or reduce such noise. This is demonstrated by mouthing, rather than whispering, several words without employing the AL. The instructor then continues this while incorporating the AL; students are encouraged to use this strategy with future clients who may be having trouble preventing stoma noise. Clinicians often find that asking a laryngectomee to whisper or speak more loudly results in increased stoma noise (Stemple et al., 2000). Students, like many clients, may have difficulty “unlearning” their typical respiratory pattern during speech. Obviously, coordinating respiration with phonation is not necessary for communicating with an electrolarynx, and is actually undesirable. The trick is to continue the normal rest breathing pattern of inhalation and exhalation while simply mouthing the words.

To help train articulation skills, students are instructed to overarticulate slightly while using a somewhat slower speech rate, but without producing excessive oral movements. Many clinicians find that teaching clients to do this helps to open the vocal tract so as to improve resonance of the electronic signal generated by the AL. While covering the topic of articulation in class, it is important to devote some time to the problem of voiced/voiceless distinctions, which many AL users find troublesome, at least initially (Ferrand, 2012). As it is obviously impossible for an electrolarynx to produce a voiceless sound, students are encouraged to take advantage of the one prosodic feature that AL users are able to manipulate directly, namely, duration. For example, English has an allophonic rule whereby a vowel has a slightly longer duration when followed by a voiced stop than when followed by its voiceless cognate (Ladefoged, 2006). Therefore, an AL user can manipulate vowel duration (easily accomplished with an AL) in order to more easily distinguish between voiced and voiceless consonants. For example, an AL user would sustain the vowel in the word bag longer than he or she would in the word back.

Likewise, the problem of producing the phoneme /h/ is given considerable attention in class. Again, students are strongly encouraged to manipulate duration in order to give the impression of a voiceless sound in initial position. For example, because the word heart has a slightly longer duration than the word art (due to the additional phoneme), the AL user can simply hold the button on the AL slightly longer on the former word. In the context of a sentence (e.g., “You have a lot of heart”), one can make the distinction more discernible by lifting the finger off of the button quickly after producing the word of;
this simulates the period of voicelessness that normally occurs during production of an /h/. By contrast, students are encouraged to practice not pausing after the word of during production of the sentence “You have a lot of art.” As the final consonant in of is voiced, this tactic helps create the impression of two consecutive voiced phonemes. Obviously, the impact of these temporal manipulations on intelligibility is limited; the clinician should also encourage clients to use the context of the conversation to aid the listener in comprehending the message.

The next AL skill addressed in this class is transitioning from single syllables to conversational speech. It is crucial to train a laryngectomé to begin using the AL in conversation as early as in the rehabilitation process as possible. In fact, AL use is often established during the presurgical counseling session with the client so they have a method of communication immediately following surgery. Students are encouraged to use their practice sessions to transition from syllables to shorter sentences to longer sentences and, finally, to conversational speech. Intelligibility and proper phrasing should always be paramount, with the AL user consciously lifting the finger off of the button at linguistically appropriate loci (i.e., clauses, phrases, sentences). Many clients have difficulty doing so initially, as they are no longer obliged to pause in order to breathe before resuming conversation. Sometimes, reading sentences with slash marks placed between phrases by the clinician helps laryngectomés acquire proper phrasing. In addition, coordinating on/off timing of the AL with removal of the unit from one’s neck is important to prevent excessive buzzing during conversation. Students frequently report that this is one of the most difficult AL skills for them to develop.

The last major AL skill addressed in class prior to having students begin the project is the coordination of movements. Most clinicians teach their clients who use electroarynges to remove them from their necks when they are not speaking. Many students, like many clients, need to be reminded to do this, as it is easy to habitually leave the unit near the neck during conversation. However, placement of the unit on the neck just prior to speaking serves as a visual signal to conversational partners that the client has something to say (Stemple et al., 2000).

Project AL

Toward the end of the semester, after learning the basics of alaryngeal speech, the graduate students are ready to begin Project AL. Each student is provided with an AL to use for 1 or 2 weeks, during which time they are encouraged to practice speaking with the AL as often as possible in a variety of situations. In addition, students are required to complete practice sessions using specific activities that clinicians often use with their clients. Specifically, the practice sessions consist of two 30-min sessions using the AL with two different listeners. One listener must be a classmate from the course, and the second listener must be a familiar nonclassmate (e.g., friend, family member, etc.). Each session consists of practicing tasks from an alaryngeal speech diagnostic form that is provided by the instructor (see description below). During each practice session, the student’s listener provides a subjective score for each task performed by the student, in addition to written comments. However, students are encouraged to practice independently prior to each session with a listener.

The Laryngectomy Diagnostic Form (Artificial Larynx Version), which was developed at Louisiana State University, consists of sections for beginning, intermediate, and advanced AL users. The beginner section starts by assessing sweet spot placement. The examiner (or listener) records the number of times (out of 10) that the speaker can move the AL to the sweet spot from his or her lap during vowel production. Next, the type of phonation is assessed during nondifferentiated vowels (i.e., /i/), differentiated vowels (one of 10 different vowels produced imitatively), and consonant/vowel (CV) monosyllabic combinations. In the nondifferentiated CV syllable task, the speaker produces 10 repetitions of any CV combination. During the differentiated version of this task, the speaker produces 10 different CV combinations following the examiner. As with all of the tasks in this section, the examiner records the number of correct responses out of 10; there is also space in which to make written comments.

The next three tasks in the beginner section of the form assess the speaker’s ability to produce CVC monosyllabic words (e.g., sick), multisyllabic single words (e.g., carrot), and automated phrases in response to questions asked by the examiner (e.g., “How are you?”). Next, the cognate pairs task requires the speaker to produce five cognate pairs (e.g., “bull/pull”) while the examiner rates his or her intelligibility and word differentiation. Lastly, the on/off timing task requires the speaker to say his or her name 10 times while the examiner judges whether the speaker simultaneously initiates phonation and articulation and simultaneously terminates phonation and articulation.

In the intermediate section of the diagnostic form, the speaker is required to produce short sentences (i.e., five words or less), and the examiner rates their intelligibility. In the context-unknown sentence task, the examiner provides the speaker with
10 words (e.g., *mean*) and instructs him or her to generate a sentence using each word; the examiner must then interpret the sentence. In the context-known version of this task, the speaker repeats sentences that are produced by the examiner (e.g., “It's a windy day”) while the examiner rates the intelligibility of each sentence. These two tasks are then repeated, but this time the speaker is instructed to produce longer sentences (i.e., six or more words). Lastly, in the word-differentiation-in-sentences task, the examiner produces 10 sentences that contain blanks where several different words could be used (e.g., “Your ______ needs washing”). The speaker repeats the sentence with a word of his or her choice in the blank, and the examiner must interpret the word.

In the advanced section of the diagnostic form, the speaker engages in conversation with the examiner, who rates a variety of speech variables and distractors using a subjective rating scale (1 = rarely, 2 = sometimes, 3 = often, 4 = almost always). The speech variables rated include variable pitch used; meaningful stress; slow, natural rate; exaggerated articulation; acceptable volume; sentences consistently used; appropriate phrasing; and overall intelligibility. The distractors rated by the examiner are klunking, stoma noise, facial grimaces, neck movements, extraneous noises (AL buzzing, etc.), effortful speech, and pleasant overall demeanor.

**AL Device**

For purposes of training with an AL, the specific device provided to each student is the TruTone electrolarynx, which is manufactured by Griffin Laboratories. The manufacturer generously provides educators with “educational kits” to use for 1–2 weeks at a time. Each kit contains 20 TruTone devices, along with user manuals, intraoral adaptors, screwdrivers to adjust overall pitch and pitch range, and instructional DVDs (each student is allowed to keep his or her DVD). Many clients and clinicians find the TruTone to be a reliable, good-sounding, innovative, and affordable AL. Unique and practical features of this device include an optional hands-free holder as well as a pitch shift button. Instead of having the typical on/off button that is found on traditional monotone electrolarynges, the TruTone has a button that is used to increase pitch (by applying more pressure) or decrease pitch (by pressing more softly) during real time (Ferrand, 2012). Although control of this button requires practice and patience, it is a skill well worth developing; effective pitch control allows the user to approximate stress and intonation patterns that are used by laryngeal speakers.

**AL Presentation**

At the end of the semester, each student gives an oral presentation in class using the AL exclusively. Students are encouraged to focus on their experiences as an AL user, including practice sessions and any extra speaking situations they may have completed (e.g., telephone calls, conversations, etc.). The project also calls for the students to discuss their individual strengths and areas for growth as an AL user, what they liked and disliked about the unit, and any suggestions they may have for how the unit could be improved. In addition, students are expected to demonstrate basic proficiency with the AL. Using a specially designed rubric (see Appendix B), the instructor evaluates each student’s AL skills using a 5-point rating scale (1 = poor, 2 = fair, 3 = good, 4 = excellent, 5 = exceptional). Specific skills rated include appropriate pitch for age/gender, articulation, on/off timing, sweet spot placement, use of pitch shift button, phrasing/use of pauses, overall intelligibility, enthusiasm/effort, organization/coherence of content, and creativity/originality (including above and beyond situations).

In past semesters, students’ experiences have included being hung up on when speaking to someone on the telephone, being ignored by salespersons in stores and restaurants, being laughed at or told to “turn that thing off” by family members, frightening their pets (particularly dogs), or even being verbally abused. For example, one student decided to use her AL to order food at the drive-thru window at a fast food restaurant. The cashier, who apparently thought it was a prank, began shouting profanities at the young lady through the loudspeaker. Unbeknownst to the agitated employee, the student recorded the incident and played the audio recording for the other students and me during her presentation! She seemed to bear this indignity with great patience, as she felt that the incident gave her a greater understanding of what laryngectomees sometimes encounter when using an AL with unfamiliar listeners.

In addition to discussing their experiences as AL users, students are encouraged to comment on the unit and/or the project and often give constructive suggestions for improvements that might be made to the TruTone unit. Some frequently offered suggestions include offering the unit in colors other than black (one student suggested a paisley pattern); making it louder; increasing its battery life; and including an on/off switch so that the unit is not accidentally activated when it is placed in one’s pocket, backpack, or purse. Some of the features that students often report liking about this particular AL are its small size, the pitch shift button, the optional
hands-free holder, and the instructional DVD that is included with each unit.

**Conclusion**

Overall, most students report enjoying the project and learning a great deal, especially regarding developing a sense of empathy toward laryngectomees. However, some students have reported more negative experiences, such as conflicts with spouses over using the AL at home as well as feelings of discomfort while using the AL. For example, one student stated during her presentation that if she really had to use an AL to communicate, she would simply choose not to talk. Such realizations, although seemingly negative, are vital to the growth of future speech-language pathologists as caring, knowledgeable professionals. Students must be encouraged to confront their own limitations, biases, and apprehension prior to becoming advocates for what may very well be a client’s most effective, if not only, communication option. As with virtually any other type of client we treat, providing the laryngectomee with an effective means of communication leading to enhanced quality of life should be given our utmost consideration.

**REFERENCES**


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**APPENDIX A. ARTIFICIAL LARYNX PROJECT**

**Part 1: Practice Sessions**

Two (2) 30-min practice sessions with the AL, using two (2) different listeners:

- One listener must be a classmate from this course.
- The second listener must be a familiar nonclassmate (e.g., friend, family member, etc.).
- Each session must consist of practicing tasks from the Laryngectomy Diagnostic Form.
- Each listener must provide a score for each task performed by the student, plus written comments.
- You should put in some independent practice time prior to each session.
- You MUST watch the included DVD in order to adjust the unit, troubleshoot, etc.

**Part 2: Presentation**

A brief, individual oral presentation in class, using the AL for the entire presentation:

- Focus on your experiences as an AL user, including practice sessions and any extra situations.
- Discuss your strengths and areas for growth as an AL user.
- Discuss what you liked/disliked about the unit. How could the AL itself be improved?
- Discuss what you liked/disliked about the project. How could the project be improved next time?
- Anything else you learned or experienced through this project that you would like to add?
- Remember, in addition to discussing your experiences with the AL, you will also be expected to demonstrate basic proficiency with the unit (including use of the pitch shift button).
- You will be provided with a rating form for the presentation by the instructor.
APPENDIX B. MEDICAL SPEECH-LANGUAGE PATHOLOGIST EVALUATION FORM FOR AL PRESENTATION

Student: ___________________________________________________

Each item is rated with a 5-point rating scale:

1 = poor, 2 = fair, 3 = good, 4 = excellent, 5 = exceptional, N/A = not applicable

_____ appropriate pitch for age/gender  _____ phrasing/use of pauses
_____ articulation skills  _____ overall intelligibility
_____ on/off timing  _____ enthusiasm/effort
_____ sweet spot placement  _____ organization/coherence of content
_____ use of pitch shift button  _____ creativity/originality (including “above and beyond” situations)

General comments: