Research Article

Teaching Medical Students Skills for Effective Communication With Patients Who Have Communication Disorders

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Purpose: Patients with communication impairments including speech, language, cognition, or hearing disorders face many barriers to communication in health care settings. These patients report loss of autonomy in health care decision making, are at increased risk for medical errors, and are less satisfied with health care than patients without communication disorders. Although medical students receive training in effective patient–provider communication, most of this training assumes patients have intact communication abilities. Medical students and other health care providers are often unprepared to meet the communication needs of patients with communication disorders in health care encounters. The purpose of this study was to assess the impact of a curriculum for training medical students to communicate effectively with patients who have a range of communication disorders.

Method: Twenty-six 2nd-year medical students volunteered for assessments before and after a required workshop in a

class. This workshop included instruction about different types of communication disorders and communication strategies, followed by practice with standardized patients portraying different communication disorders. Outcome measures included a knowledge test, ratings of self-efficacy, and evaluation of students' skills when interviewing standardized patients portraying aphasia and dysarthria.

Results: Medical students demonstrated significant improvements in knowledge, self-efficacy, and use of recommended communication techniques.

Conclusions: The curriculum appeared effective in changing medical students' knowledge and skills for working with patients with communication disorders. Equipping medical students to meet the needs of patients with communication disorders is 1 key element for improving the quality of health care for this patient population.

Adults with speech, language, cognitive–communication, or hearing impairments are vulnerable in health care. The difficulties that adults with different communication disorders have with understanding information being presented to them and/or expressing themselves can make it very difficult to exchange information accurately and efficiently with health care providers in the context of a typical health care encounter. As a result, adults with communication disorders are at higher risk for

adverse events in health care (Bartlett, Blais, Tamblyn, Clermont, & MacGibbon, 2008) and are less satisfied with their health care than peers without communication disorders (Hoffman et al., 2005). They commonly report being excluded from consultation and decision making, losing autonomy by having to rely on others to communicate for them, and being treated by health care providers as if they are intellectually impaired when they are not (Burns, Baylor, Dudgeon, Starks, & Yorkston, 2015; Fox & Pring, 2005; Hemsley, Balandin, & Togher, 2008; Law, Bunning, Byng, Farrelly, & Heyman, 2005; Morris, Dudgeon, & Yorkston, 2013; Murphy, 2006). Physicians have acknowledged challenges caring for these patients, impacting their confidence in making accurate diagnoses and treatment recommendations (Burns et al., 2015; Skinder-Meredith, Bye, Bulthuis, & Schueller, 2007; Ziviani, Lennox, Allison, Lyons, & Mar, 2004). One of the most significant communication barriers that patients with communication disorders face in health care settings is that many health care providers do not know how to communicate

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Editor-in-Chief: Julie Barkmeier-Kraemer

Editor: Anastasia Raymer

Received June 7, 2018

Revision received August 23, 2018

Accepted August 27, 2018

https://doi.org/10.1044/2018_AJSLP-18-0130

Disclosure: The authors have declared that no competing interests existed at the time of publication.

with them (Burns et al., 2015; Law et al., 2005; McCooley, Toffolo, & Code, 2000; Morris et al., 2013).

The Joint Commission and others have called for improved accessibility of health care environments for patients with communication disorders (Joint Commission, 2010; Kagan & LeBlanc, 2002; Law et al., 2005; Nordness & Beukelman, 2017; Patak et al., 2009). One method for improving communication access is to better prepare physicians and allied health providers with relevant communication skills (Burns, Baylor, Morris, McNalley, & Yorkston, 2012). Recognizing that many communication disorders are chronic conditions and that the patients who live with them may not be able to modify their level of speech or language ability, greater emphasis is being placed on the role of communication partners, including health care providers, to implement accommodations that support the ability of the patient to participate more fully in the communication situation (Kagan, 1998; Kagan & LeBlanc, 2002; O'Halloran, Worrall, & Hickson, 2011). Examples of such accommodations might range from something as simple as slowing down the pace of the interaction to incorporating low-tech multimodal communication such as pictures or key word writing, to implementing appropriate etiquette with patients who use speech-generating and other high-tech alternative and augmentative communication.

Medical students typically receive training in effective patient-provider communication, learning various techniques for interviewing patients, including patients in shared decision making, and giving difficult news (Baile et al., 2000; Egnew, Mauksch, Greer, & Farber, 2004; Makoul, 2001; Mauksch, Dugdale, Dodson, & Epstein, 2008). This training, however, generally assumes that patients have intact communication skills. Patients with communication disorders often require different communication strategies to achieve the same goal of patient-centered care (Burns et al., 2015; Morris et al., 2013; Nordehn, Meredith, & Bye, 2006). For example, a common method taught in general patient-provider communication training to ensure the patient has understood recommendations or instructions is to use the "teach-back" method. In the teach-back method, after a health care provider has educated a patient on a particular topic such as safe use of a new medication, the provider asks the patient to then reverse roles and instruct the provider on the topic in the patient's own words (Paasche-Orlow, Schillinger, Greene, & Wagner, 2006). This allows the provider to check on the patient's understanding of the new information so that the provider can identify and correct any errors. However, general medical communication skills training programs do not necessarily instruct medical students how to do teach-back if the patient has language or speech impairments (or indeed, how to discern the difference between these two and the different communication accommodations needed). As another example, general medical communication skills training programs do not necessarily instruct medical students how to match communication supports to communication needs to find a good balance between supporting patient autonomy without overly restricting the patient's ability to express him- or herself. As

an illustration, a medical student encountering a patient who is unable to speak but has intact cognitive and linguistic abilities may resort to asking the patient a long string of yes/no questions in an effort to guess at the patient's message. However, an alphabet board accessed either through pointing or eye gaze scanning would promote considerably more autonomy for the patient to direct the conversation rather than hoping the provider lands on the correct topic through yes/no questions. A final example is that there are several points of etiquette relevant to communicating with people with communication disorders that would not be used with patients with typical speech and language abilities related to establishing communication preferences, appropriate use of guessing, and appropriate inclusion of family members or other caregivers (Morris, Yorkston, & Clayman, 2014).

New programs are introducing current and future medical, nursing, and allied health care providers to the unique needs of patients with communication disorders (Cameron et al., 2017; Eriksson, Forsgren, Hartelius, & Saldert, 2016; Forsgren, Hartelius, & Saldert, 2016; Heard, O'Halloran, & McKinley, 2017; Horton, Lane, & Shiggins, 2016; Legg, Young, & Bryer, 2005; Simmons-Mackie et al., 2007; Sorin-Peters, McGilton, & Rochon, 2010; Vento-Wilson, McGuire, & Ostergren, 2015; Welsh & Szabo, 2011). These training programs have been associated with improvements in providers' knowledge about and attitudes toward patients with communication disorders (Cameron et al., 2017; Sorin-Peters et al., 2010; Vento-Wilson et al., 2015; Welsh & Szabo, 2011). The few studies that have measured outcomes in terms of the impact of training on providers' communication skills have shown positive impacts of training (Eriksson et al., 2016; Forsgren et al., 2016; Legg et al., 2005). The primary limitation of this body of research is that most of the training programs address a single or small set of communication disorders, primarily the language impairment of aphasia. Although addressing the needs of patients with aphasia is certainly important, this focus almost solely on aphasia does not address the diverse needs of patients across the broad range of different communication disorders for whom varying communication strategies are needed. In addition, the still sparse body of evidence regarding the impact of training programs on providers' communication skills limits our understanding of the extent to which improvements in knowledge or attitudes translate to performance of skills.

Since 2010, medical students at the University of Washington have participated in a seminar, described further below as the FRAME program, to learn how to implement effective provider-patient communication with patients with communication disorders (Burns, Baylor, & Yorkston, 2017; Burns et al., 2012). The goal of the program is to teach medical students strategies that are easily applicable at bedside to facilitate communication with patients in the course of providing medical care. The particular emphasis of this program is to help students understand similarities and differences in communication accommodations needed across different types of communication

disorders, including language impairments, speech impairments, cognitive–communication impairments, and hearing loss. Examples of strategies taught include how to conduct a quick but valid assessment of language comprehension, how to differentiate when various augmentative communication supports are warranted for different types of communication impairments (e.g., an alphabet board vs. a picture board) and how to use them, how to manage communication breakdowns in a productive and respectful manner, and how to demonstrate appropriate etiquette for the different communication disorders. The purpose of this study was to evaluate outcomes of this training with medical students.

Method

Methods were approved by the institutional review board at the University of Washington.

The FRAME Training Program

The FRAME training program is based on common clinical techniques used by speech-language pathologists, as well as research documenting the experiences of patients with communication disorders in health care and recommendations from patients for improving patient care (Bartlett et al., 2008; Burns et al., 2015; Hoffman et al., 2005; Morris et al., 2013, 2014). The FRAME program highlights five key areas of communication accommodations for patients with communication disorders (see Table 1; Burns et al., 2012). These five principles are applicable to most people with communication disorders, although specific tools or techniques might vary. For example, most people with communication disorders benefit from multimodal communication where gestures, writing, pictures, or other modes of communication are combined with speaking/listening to convey information. However, the specific modalities that are helpful differ across disorders (i.e., an alphabet board can be helpful for someone with reduced speech intelligibility but relatively intact cognitive–linguistic abilities to spell a message, whereas someone with aphasia may not be able to use a spelling board due to language processing difficulties).

The FRAME training program was initially implemented in the fourth-year rehabilitation medicine clerkship. Based on student feedback that the skills taught would have been useful in earlier required clerkships, the program has been moved to the preclinical curriculum (second-year medical students). Prior to an in-person training session, students view a 20-min online module covering key characteristics of the four broad categories of communication disorders: language, speech, cognitive–communication, and hearing loss. They then attend a 2-hr in-person session. The first 45 min consists of demonstrating different communication strategies, after which the students practice the strategies in simulated medical interviews with speech-language pathology students from the speech and hearing sciences department who portray aphasia and dysarthria.

The speech-language pathology students provide feedback and further guidance to the medical students on their use of communication strategies.

Participants

Although all second-year medical students at the University of Washington received the FRAME training as part of their curriculum during the year of this study, participation in this research component was voluntary and unrelated to course requirements. From the enrollment of 224 students, 26 students elected to participate in the research study, which consisted of assessment sessions before and after the training. All 26 student participants completed both assessment sessions. They were paid for their participation.

The mean age of participants was 27 years (range: 23–33 years), and 21 (81%) were women. Generally, they had little experience interacting with people with communication disorders. No participants reported having interacted with more than five patients with communication disorders, and only three (12%) reported interacting more often than monthly with a friend or family member with a communication disorder. No participants reported experiencing a communication disorder themselves.

Data Collection

The assessment sessions were held 1–2 weeks before the training and then 1–2 weeks after the training. Three tasks, described below, were completed in each session.

Knowledge Test

Participants completed a 10-item multiple-choice quiz created for this study that assessed knowledge of definitions and symptoms of different communication disorders and recommended communication strategies. Changes in the number of items answered correctly from pre- to posttraining were evaluated with a paired *t* test. SPSS Version 18 was used for all statistical analyses.

Self-Efficacy

One of the key goals for the FRAME training is that students will demonstrate confidence, openness, and respect toward working with patients with communication disorders, even if they do not have a highly polished repertoire of communication skills. This aligns with the viewpoints of patients with communication disorders who have expressed tolerance for physicians who do not know exactly how to communicate with them as long as the physicians are engaged, respectful, and willing to try to interact with them (Burns et al., 2015). To that end, the second task consisted of four items asking participants to rate their confidence for working with patients with communication disorders (see Table 2) on a scale from 1 to 10, with 1 = *not at all certain I can do* and 10 = *highly certain I can do*. Results for each item were analyzed separately, using a paired *t* test to evaluate changes after training.

Table 1. FRAME mnemonic with examples of strategies taught and assessed in this study.

F: Familiarize yourself with how your patient communicates BEFORE starting the medical interaction

Ask the patient about preferences for communication or existing strategies.
 Assess how well the patient can understand what you say (asking the patient if he or she can understand you is not a reliable assessment).
 Ensure the patient has a way to express himself or herself.
 Clarify the role of others present (family) and if the patient wishes them to be involved in helping with communication.

R: Reduce rate

Allow the patient sufficient time to process information and formulate responses.
 Speak slowly and in short chunks of information if patient has comprehension problems.
 Have an attitude of patience and reassure patient it is ok to “take your time.”

A: Assist patient with communication

Be willing to “step forward” to help with communication; do not sit back and wait for the patient to fix communication breakdowns.
 Confirm correct understanding of messages.
 Let the patient know when you do not understand something; do NOT pretend to understand when you do not.
 Be flexible to try different strategies until you find something that works. The same patient may need different strategies at different times.
 Use the “least restrictive” accommodation (do not limit the patient to yes/no responses if they are able to communicate more than that).

M: Mix communication methods

Do NOT rely solely on speaking and listening; SHOW, don’t just TELL.
 Use body language, gestures, pictures, writing, drawing to supplement spoken language.
 Have communication aids (picture boards, alphabet boards, white boards, and pens/paper) readily available for patients; customize picture boards for the vocabulary and concepts you use in your setting.
 Use these different modalities to help patients with comprehension problems understand what you are saying.
 Encourage patients who have expressive impairments to use these different modalities to help them convey their messages.
 Allow extra time for patients who use augmentative and alternative communication devices to enter messages into the device.

E: Engage patient to respect autonomy

Speak directly with the patient; family members should help you communicate WITH the patient, but they should not communicate FOR the patient.
 Do NOT “talk down” to patients—keep your tone of voice natural, respectful, and appropriate to the age of the patient.
 Ask the patient if it is ok to guess at what they are trying to communicate; some patients regard guessing as rude interruptions.
 Interact with the patient as you would other patients including social banter to build rapport, soliciting patient viewpoints, and providing full information and education.

Note. Table 1 is adapted and expanded from Burns et al. (2012).

Demonstration of Communication Skills

The purpose of this assessment was to evaluate participants’ communication skills during simulated patient interviews with standardized patients. Standardized patients are individuals who may but often do not have the medical

condition of interest. They are trained to portray the symptoms or characteristics of the condition in an authentic and reliable manner. They are then incorporated into simulated clinical experiences for the purposes of training and assessing the communication and clinical skills of

Table 2. Pretraining, posttraining, and effect size data for the self-efficacy items.

Item	Pretraining <i>M (SD)</i>	Posttraining <i>M (SD)</i>	Cohen’s <i>d</i> effect size
Recognize different types of communication disorders (i.e., recognize the different symptoms of different types of aphasia or the difference between aphasia vs. apraxia vs. dysarthria)	3.4 (1.5)	5.2* (1.9)	1.80
Change the way you communicate to help people with different communication disorders understand you	4.9 (2.3)	7.1* (1.4)	1.75
Change the way you communicate to help people with different communication disorders express themselves	4.8 (2.0)	7.0* (1.3)	1.97
Change the way you communicate to help people with different communication disorders feel included and respected in the medical encounter	5.9 (1.8)	7.7* (1.2)	1.45

Note. All items start with the stem, “How confident are you that you can do the following?” The rating scale is 1–10, with 1 = *not at all confident* and 10 = *highly confident*.

**p* = .000 (from pre- to posttraining).

medical and other allied health students (Hill, Davidson, & Theodoros, 2010; Zraick, 2012).

Interview data collection. Four standardized patients, who are employed by the University of Washington, were hired for this project. All four individuals were highly experienced working as standardized patients in the University of Washington School of Medicine, although this was the first time any of them had portrayed a communication disorder (none of the four had a communication disorder). Two female standardized patients portrayed nonfluent aphasia characterized by moderate auditory and reading comprehension impairments and severe verbal and written expression impairments. Two male standardized patients portrayed dysarthria associated with Parkinson's disease, which was characterized by severely reduced speech intelligibility and mild cognitive-linguistic processing difficulties. The severity levels were targeted to the more severe range for expressive capabilities to compel the medical student participants to have to incorporate more extensive and multimodal communication strategies and thus to have more opportunity to demonstrate the need for and benefits of the training. In preparation for these roles, the standardized patients engaged in approximately 6 hr of training that included detailed blueprints of the cases, extensive practice of the scenarios and symptoms, analyses of targeted communication skills and accommodations the medical students might attempt, and assessment of reliability of portrayals across the two standardized patients portraying each case. Additional information about the training and reliability of portrayals by these standardized patients is available elsewhere (Baylor et al., 2017).

Each medical student participant interviewed one standardized patient portraying aphasia and one portraying dysarthria before and after participating in the FRAME training. The order in which they interviewed the standardized patients portraying different disorders was counterbalanced across participants and then reversed for the postraining assessment. To reduce the impact of familiarity, participants interviewed different standardized patients portraying each condition in the pre- versus postassessments. The participants were informed that these were standardized patients portraying a first outpatient clinic visit to establish care and that the patients had a problem, question, or concern that they wanted to communicate to the physician. Participants were told the communication diagnosis of the standardized patient (simply identified as "aphasia" or "dysarthria") based on the premise that these standardized patients were portraying communication disorders that had been present for several months to several years, and therefore, the existence of the communication disorder would likely be documented in their medical records for new providers to see. However, participants were given no other information about the patients' communication abilities or preferences. The intent was to improve the ecological validity of the scenarios by mimicking what might happen in many outpatient encounters with a new provider in that a chart review would likely yield brief mention or basic information about the presence of a communication disorder,

but detailed information about how the patient communicates would likely not be available to the new provider before the actual encounter. The participants were instructed that their task was to find out the standardized patient's concern or question, but they did not have to perform any medical examination or provide any treatment recommendations.

The interviews were held in outpatient examination rooms in the medical center. Communication materials in all rooms consisted of a commercially available picture communication page with pictures representing typical medical care vocabulary, an alphabet board, a white board with marker, and a pad of paper with a pen. These materials were placed on the counter to be visibly evident and available to participants. Participants were told they could use anything in the room, but they were not given any further instructions about the communication materials (in their training, the standardized patients were told that they should not initiate use of or requests for the materials in order to allow the medical student participants to have the opportunity to initiate use of materials). Participants were told they had 10 min for the interview. If they learned the patient's complete message before 10 min, the standardized patient ended the encounter; otherwise a researcher stopped the interview after 10 min.

Multiple messages were developed for the standardized patients and consisted of concerns that patients might present with when meeting a new provider. For example, one message was that the patient was having trouble sleeping at night, felt that one of his or her medications was making him or her too sleepy during the day and thus disrupting sleep cycles, and wanted to explore other possible medications and their side effects (Yorkston, Baylor, Burns, Morris, & McNalley, 2015). Each message contained three main points to control for length and complexity. The aphasia and dysarthria standardized patients used different messages, and different messages were used for the pre- versus postassessments. However, during each session, the two aphasia standardized patients used the same message as did the two dysarthria standardized patients.

Interview data analysis. The interviews were video-recorded for later analysis.

Video raters. Nine second-year graduate student volunteers in the speech-language pathology program at the University of Washington rated the video samples. They were paid for their participation. They underwent approximately 6 hr of group training prior to starting the ratings and were also provided with a written guide to the rating instrument to refer to throughout the project.

A total of 104 videos were rated (26 participants $\times$ 2 time points $\times$ 2 standardized patients at each time point). Two raters scored each video, and results were averaged across the two raters. Each rater viewed the same number of aphasia and dysarthria videos and the same number of pre- and postraining videos. Raters did not score the pre- and postraining videos for the same participant, and they were blinded as to which videos were from the pre- versus postraining sessions.

Rating instrument. The rating instrument, under development at the time of this study, consisted of six sections, one for each of the FRAME skill areas (noted in Table 1) and one for general interviewing skills. The “general interviewing skills” included basic interviewing techniques that, though not specifically taught in the FRAME program, are expected to be demonstrated by medical students at this level of training (introducing yourself to the patient, establishing rapport, etc.). The raters scored the performance of each participant in each of the six skill areas and an overall rating of their performance, on a 0- to 10-point scale. Scores were multiplied by 10 to be on a 0–100 scale for final presentation. On this scale, 0 = *needs improvement* and indicates that participants demonstrated little or no awareness or concern for the communication needs of the patient and they implemented none or one of the targeted communication strategies. A score of 50 = *expected* and was used when participants demonstrated awareness of the patient’s communication needs and made sustained efforts to implement strategies, but the participant might not be highly facile with strategies. This reflected that, at this level of training, students would not be expected to be highly polished with using communication strategies, but they were at least demonstrating awareness and basic skill levels. A score of 100 = *truly exceptional* and was used when participants implemented appropriate communication strategies with comfort, success, and efficiency, thus demonstrating genuine ease and naturalness.

Data analysis. Data were collapsed across standardized patients portraying the same disorder based on prior analyses indicating good reliability across case portrayals (Baylor et al., 2017). Results for the two communication disorders were analyzed separately because different communication techniques would be appropriate for the different diagnoses. Results for each of the communication skills sections in the FRAME checklist were analyzed separately using paired *t* tests to assess for change after treatment.

Rater reliability. Two videos (one aphasia and one dysarthria) were rated twice by all nine raters. Intrarater reliability was judged according to the percentage of ratings that were the same or within 1 point on the original 10-point scale when repeated by that rater: 69.8% of the ratings met this criterion (73.0% for the aphasia scenario and 66.7% for the dysarthria scenario). Interrater reliability was evaluated by first averaging the two scores available for each rater on each of the two videos as described above and then calculating intraclass correlations for the nine raters. The intraclass correlation values were .898 for the aphasia case, which is good reliability (Portney & Watkins, 2009, p. 595), and .670 for the dysarthria case, which is moderate reliability.

Results

The targeted significance level for statistical tests was $p < .05$.

Knowledge Test

The mean pretraining score on the knowledge quiz was 4.96/10 ($SD = 1.1$). The posttraining mean score was 7.23/10 ($SD = 1.8$). The change was statistically significant ($p = .000$). Cohen’s *d* effect size adjusted for the correlation due to repeated measures was large at 1.90.¹

Self-Efficacy

Descriptive statistics for the self-efficacy items are in Table 2. Paired *t* tests revealed significant improvement after training for all four items ($p = .000$), and effect sizes were large. Despite the significant improvements, confidence levels were still only moderate–high after training, suggesting room for further improvement. Participants appeared to feel least confident in their ability to identify different types of communication disorders and most confident in their ability to help patients feel included and respected in medical encounters.

Demonstration of Communication Skills

Figures 1a and 1b present the ratings of participants’ communication skills when they interviewed the standardized patients portraying aphasia and dysarthria, respectively. Significant improvements ($p < .05$) were observed in all skill areas when working with both standardized patient diagnoses, except for the “reducing rate” skill area in the dysarthria scenario. The most dramatic improvement was seen in the skill area of “familiarizing yourself with how the patient communicates.” Cohen’s *d* effect sizes (adjusted for the correlation between repeated measures) were large in each of the skill areas, except for general interviewing skills. After training, most skill areas hovered around the “expected” level, meaning that the participants demonstrated awareness of patients’ communication needs and made appropriate if not highly polished efforts to implement communication strategies.

Discussion

The purpose of this study was to explore the impact of the FRAME communication skills training program on preparing medical students to work with patients who have communication disorders. The results revealed significant improvements in students’ knowledge of communication disorders, their self-efficacy for working with this population, and their implementation of communication strategies when interviewing standardized patients portraying aphasia and dysarthria. Qualitative data collected from the students and reported elsewhere suggested that the medical students found the training to be helpful and that it filled a gap in their education by providing information that they had not received elsewhere (Burns et al., 2017). Students reported that the hands-on practice with

¹Cohen’s *d* effect size: < 0.20 is small, 0.50 is moderate, and 0.80 or above is large.

Figure 1. (a and b) Communication skill levels demonstrated by the medical students in each FRAME skill area when interviewing standardized patients portraying aphasia (a) and dysarthria (b). The original 0–10 rating scale was multiplied by 10 for presentation. On the y-axis, 0 = *needs improvement* and indicates that participants demonstrated little or no awareness or concern for the communication needs of the patient, and they implemented none or one of the targeted communication strategies. A score of 50 = *expected* and was used when participants demonstrated awareness of the patient's communication needs and made sustained efforts to implement strategies, but the participant might not be highly facile with strategies. This reflected that, at this level of training, students would not be expected to be highly polished with using communication strategies, but they were at least demonstrating awareness and basic skill levels. A score of 100 = *truly exceptional* and was used when participants implemented appropriate communication strategies with comfort, success, and efficiency, thus demonstrating genuine ease. Asterisks designate a significant difference between pre- and posttraining at $p < .05$. The numbers in parentheses above the bars are Cohen's d effect sizes corrected for repeated measures.

the speech-language pathology students was particularly beneficial and that that experience also provided an opportunity for interprofessional interaction (Burns et al., 2017). One unexpected finding was the significant improvement in students' general interviewing skills because this was not the focus of the training. However, it is possible that learning how to modify communication skills, as well as the additional practice offered by the simulations, helped to advance students' overall skillsets.

This study makes a novel contribution to the growing body of literature regarding teaching health care providers the skills needed to work with patients with communication disorders by expanding that training to cover a broader range of communication disorder types and by placing more emphasis on evaluating communication skills in addition to knowledge and attitudes (Forsgren et al., 2016; Legg et al., 2005). Although the significant gains demonstrated in this study are promising, lingering questions point to the need for future research. Perhaps this is best illustrated in this study with the skill area of "reduce rate," in which significant improvements were not observed when the students were interacting with the standardized patients portraying dysarthria. This lack of significant improvement might be attributed to various causes. One possibility is that the students were already proficient in this strategy before training. The students' pretraining proficiency in this skill area was fairly commensurate with other areas, but this raises the point that further research should clarify the skills that students already possess from general communication training versus new skills that they need to develop for patients with communication disorders. A second question is whether the FRAME program provided the information or experience needed to change students' skills in this area. The significant improvements observed in all other aspects of the study suggest that the training program does lead to change, but further refinement is necessary to identify the most effective content and methods for training. A final issue is the method of measuring outcomes. For example, the raters reported that the "reducing rate" skill was particularly difficult to score due to the subjectivity of the construct and difficulty in discerning what was "slow enough." Further work on developing and validating the measurement instrument is underway.

Although there are many areas where future research could contribute to how medical and allied health providers are trained and prepared for working with patients with communication disorders, health care provider training is only one step in improving overall accessibility of health care settings for patients with communication disorders. Additional efforts need to include administrators and others in the health care setting to address a wide range of issues, including appropriate identification of patients with communication disorders and their needed accommodations; schedule constraints that limit the time and flexibility that health care providers have with patients who have special communication needs; aspects of the physical environment such as signs and navigation aids that are often not usable for people with communication disorders;

and forms, education materials, and other paperwork that are often inaccessible to people with cognitive and/or language impairments, among other issues (Beukelman & Nordness, 2017; Kagan & LeBlanc, 2002; Nordness & Beukelman, 2017; Parr, Pound, & Hewitt, 2006; Rose, Worrall, & McKenna, 2003).

Limitations of this study include the small sample size of medical students and that the sample was predominantly women. Further research should expand the exploration of the impact of this training to larger and more diverse samples, including samples of students from other health care disciplines. Further research might also include a no-treatment control group of medical students to ensure that the gains in communication skills during the standardized patient interviews are due to training and not simply to repeated exposure to the simulations. In addition, a more comprehensive assessment would involve evaluating students as they interact with patients with a wider variety of communication disorders and in a wider variety of communication tasks (e.g., educating a patient). Finally, the extent to which medical students use the skills in future encounters with actual patients is unknown.

Conclusions

In conclusion, the FRAME training program was associated with significant gains in medical students' knowledge about communication disorders, self-efficacy for working with this patient population, and demonstration of appropriate communication strategies. The FRAME training program fills a gap in medical students' clinical education by providing information about the broad range of patients with different communication disorders that they may encounter in all aspects of clinical care. The program was highly feasible to implement and can dovetail nicely with existing medical school curricula related to communication skills training and/or awareness of populations with disabilities.

Acknowledgments

This work was supported by National Institute on Deafness and Other Communication Disorders Grant R03DC012810, awarded to C. Baylor. We gratefully acknowledge the contributions of time, energy, and expertise by the medical students, speech-language pathology student raters and volunteers, and standardized patients.

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