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DIETARY INTERVENTIONS AND EDUCATION

Medical Improvisation Training as a Vehicle to Improve Empathetic Communication Skills in Nutrition and Dietetics Students

An Exploratory Pilot Intervention

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Medical improvisation, based on the theater, is the adaptation of improvisational techniques to achieve medical objectives including empathetic patient-provider communication. Theatrical improvisations are unscripted dialogues among actors, intended to meet performance goals. In this pilot study, 2 consecutive cohorts of graduate-level dietetics students (N = 26) received 6 hours of medical improvisation training over their respective 9-month academic years. Pre- and postintervention questionnaires indicated statistically significant increases in students' perception scores regarding specific components of empathetic communication including collaboration, flexibility, and self-confidence. Medical improvisation training may be a promising avenue for developing communication skills among nutrition and dietetics students. **Key words:** *communication skills*, *dietetics education*, *empathetic communication*, *empathy*, *improvisation*, *medical improvisation*

THEATRICAL IMPROVISATIONS are unscripted dialogues among actors, intended to meet performance and entertainment goals.[1] Improvisations occur in real time and are not written beforehand.[1] Theatrical improvisation uses defined techniques and rules that can be taught to aspiring theater students pursuing performance careers.[2] Rules for improvisation are intended to provide structure for the experience and typically include active listening, suspension of judgment of one's own or others' ideas, openness to new interpretations of words and thoughts, and active collaboration with other actors by accepting and responding to every message, whether verbal or nonverbal, offered by one's fellow improvisors.[1,3] Audience members are often invited to be more participative during improvisation than during scripted theater, suggesting directions, themes, and perhaps even lines to the actors.[1]

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Medical improvisation is the adaptation of improvisational techniques from the theater to meet medical objectives and to achieve desired patient-centered outcomes.[4] The goal of medical improvisation is to not to train health care professionals to be actors. Rather, medical improvisation seeks to provide opportunities for future and current practitioners to try out the kinds of complex, highly interactive, fluid communication skills that are routine in patient-provider encounters.[4] The ability to converse with patients in ways that are attentive, nonjudgmental, open, collaborative, flexible, and patient-focused is imperative for building therapeutic relationships and improving meaningful outcomes for patients.[4,5]

Determining which outcomes are important to patients requires the practitioner to infer the patient's thoughts and feelings and thus to communicate with empathy.[3,5] Empathy is the ability to imagine oneself in the situation of another, to understand what the situation might be like for the other person, and to take action based on one's own intuited perception of that situation.[6,7] The ability to empathize enables practitioners to build essential relationships, whether interacting with patients, clients, or coworkers.[6] Empathetic communication is a powerful tool that promotes collaboration and cooperation among health care professionals and patients, thus improving the quality of patient/client care.[8] Indeed, the development of empathetic relationships has been called the key to delivery of high-quality health care.[7,9]

Medical improvisation training promotes the development of empathy by encompassing the essential components of empathetic communication: listening, observing emotional and nonverbal cues, building collaboration, and adapting to the situation at hand.[2,3,10] Medical improvisation differs from role-playing or simulations that focus on scripted encounters with patients. Medical improvisation uses nonmedical, spontaneous scenarios for training.[11] This training may enable students to develop increased confidence to take risks, explore opportunities, and experiment with different approaches to situations before engaging in real-time encounters with patients or clients.[11]

While there is consensus that today's health care providers must possess deep knowledge in their discipline, evidence indicates that mastery of complex communication skills including empathy is also a crucial component of practitioner competency.[7,12,13] Recent research supports the assertion that empathetic communication skills should be intentionally integrated into the curriculum for students in the health professions.[2,6-8,10,14-17]

Konrath et al,[8] in a meta-analysis, found that dispositional empathy has declined in college students since 2000. Another study by Kelm et al[10] found a shortage of empathy among medical students and physicians and that empathy declined throughout medical training. In recent years, the need for development and enhancement of empathetic communication skills within the medical professions has been recognized. Medical improvisation training to develop empathy has been incorporated in courses and classrooms in schools of medicine, pharmacy, nursing, and mental health counseling, among others.[2,4,11,14,16-21]

As members of interdisciplinary health care teams, nutrition professionals play a key role in providing nutrition care and health education to patients. Educators in the health professions have recognized the importance of teaching empathetic communication skills, but there are few studies in the literature about specific methods for imparting such skills to nutrition and dietetics students.[7,22] Williams et al[7] studied a group of 293 health professions students at 4 Australian universities, including 45 (16%) dietetics students, and found that a 2-hour intervention provided through a DVD simulation significantly improved participants' self-reported empathy scores ($P < .0001$). Palermo et al,[22] in a systematic literature review encompassing 27 articles—2 of which described studies including nutrition and dietetics students—found that simulation may be an effective strategy for developing empathy in pre–health professions students. In particular, simulations helped students assume the roles of

the patients. However, during the intervention described in this article, the investigators were not aware of any nutrition and dietetics education program that incorporated medical improvisation training for teaching empathy in the curriculum.

The aims of this pilot study were (1) to assess the impact of medical improvisation training for nutrition and dietetics students on students' perceptions of skills required for empathetic communication with clients and patients and (2) to initiate the development of a rationale and methodology for further research on the topic. The importance of this effort lies in its potential to initiate a discussion of medical improvisation training into the curriculum provided to nutrition and dietetics students.

METHODS

Description of the pilot intervention

The pilot program was delivered to 2 consecutive cohorts of graduate-level dietetics students at a single university. All participants were in the process of completing identical nationally standardized supervised practice requirements as the final phase of their dietetics education before attaining eligibility to sit for the national Registration Examination for Registered Dietitian Nutritionists.[23] Because of the close congruency between cohorts regarding participant characteristics and the educational program being completed, the investigators decided to collect data from both consecutive classes to increase the number of participants. The pilot took place during regularly scheduled classes for graduate dietetics students at the university.

The classes were delivered by a registered dietitian nutritionist (RDN) with extensive training in medical improvisation. Sessions were organized and facilitated by an RDN in academia with expertise in dietetics education. The sessions consisted of selected improvisation exercises, followed by discussion and debriefing.[24-28] The same, identical improvisation program was delivered to both cohorts of students. For each cohort, a total of 3 face-to-face class meetings provided over an 8-month period were devoted to improvisation training. Each class was 2 hours in length. The program content was designed to encompass the essentials of empathetic communication: listening, observing, suspending judgment, responding, collaborating, and adapting.[5-7]

Students participated in targeted exercises as individuals, in pairs, and in small groups. Improvisation exercises allowed students to practice careful listening, collaboration, giving and receiving feedback, and placing oneself in the situation of another. Debriefing exercises allowed students the opportunity to reflect on the improvisation experience and to reinforce learning. The class sequence was designed to provide a progression of skill development, from basic listening and collaboration exercises to a final impromptu improvisation scenario focused on a typical clinical practice situation. A description of the intervention, including material presented at each class meeting, is found in Table 1. Examples of specific exercises used in the training are found in Table 2.

Evaluation instrument

The evaluation instrument was a questionnaire adapted with permission from Berk's Improvisation Evaluation Scale and consisted of 20 statements to be rated using a 1- to 4-point Likert scale[15] by the participants. Berk's Improvisation Evaluation Scale was developed initially to assess the perceived effectiveness of improvisation training in regards to anticipated outcomes and to facilitate the gathering of data from the implementation of improvisation training in classrooms.[15] Berk's scale was adapted in this intervention to evaluate students' perceived effectiveness of improvisation exercises and to meet specific ACEND goals concerning the communication skills and patient-provider interactions of students. The assessment instrument is found in the Figure. Postintervention, students were asked to report their perceptions on the helpfulness of the intervention and whether they would recommend continuing medical

Table 1. Session Sequence, Skill Focus, and Examples of Improvisation Activities/Games Used in Medical Improvisation Training Program

Session Sequence	Skill Focus	Improvisation Activity/Game	Training Objective
Session 1			*Demonstrate listening, risk-taking, and collaborative communication skills*
	Listening	Headlines[28]	Listen for understanding, rather than quickly responding
	Risk-taking	4-Headed Genius[24]	Demonstrate ability to suspend an agenda in a conversation
	Collaboration	Paired Drawing[25]	Demonstrate open-mindedness to alternative possibilities
	Collaboration	But vs And[25]	Reflect back others' ideas and build on the ideas of others
Session 2			*Practice previously introduced skills while demonstrating the application of observational and nonverbal communication skills to situations requiring emotional awareness*
	Observation	Awareness Quiz[25]	Identify details and describe possible meanings of details
	Nonverbal communication	Gibberish Interview[25]	Identify and read others' nonverbal communication
	Nonverbal communication	Status Cards[25]	Demonstrate awareness of one's own nonverbal communication
	Emotional awareness	Hitchhiker[27]	Recognize other's emotions and respond appropriately to emotional situations
Session 3			*Practice previously introduced skills while demonstrating the application of creativity and adaptability to solving problems*
	Creativity and adaptability to change	Draw a Tree[26]	Describe obvious and nonobvious details while applying mindfulness and critical thinking to a given situation
	Creativity	Think Links[28]	Identify similarities between 2 disparate objects in order to promote creative problem-solving
	Adaptability to change	Stroop[26]	Recognize resistance to change and adaptability to change
Session 4			*Summary and assessment of learned skills*
	Culmination and assessment	Students engage in simulated scenarios and receive feedback from peers and instructors	Demonstrate assimilation of skills as well as confidence in applying skills

Table 2. Examples of Improvisation Exercises Used in Medical Improvisation Training Program for Nutrition and Dietetics Students

Improvisation Exercises	Instructions	Debriefing Questions Postexercise
4-Headed Genius[24]	Four participants stand in front of their audience and link arms. The participants answer questions from the audience, each offering only 1 word each to form a complete sentence. The players should say the first word that comes to their mind without hesitation. When the sentence feels complete, the "4-headed genius" takes a bow.	What was the challenge in this exercise? What made this exercise easy? Difficult? When was the group successful? What did you learn about yourself in this process?
Paired Drawing[25]	Participants work in pairs without speaking to one another during the whole exercise. The task for each pair is to draw a face, with each participant only drawing 1 line or feature at a time, before relinquishing the writing instrument. If one of the partners hesitates, the drawing is finished. The drawing also needs to be titled—1 letter at a time, with each partner contributing 1 letter.	What was this process like for you? Were there any moments when you did not like what your partner drew? Do you like the end results? Are they anything like you expected? What are the benefits of collaboration? What are the downsides? What lessons can be taken from this exercise?
But vs And[25]	Participants form small groups of approximately 6-8 people. All groups are told they will have 2 min to plan a party. Each person must contribute to the planning, and no one can contribute more than 1 idea in a row. After the first contribution, each subsequent contribution must begin with "Yes, but...." After 2 min, an adjustment is made. The groups are now instructed they will have 2 min to plan a trip; however, in this round, each contribution after the first one will start with "Yes, and...."	In which activity, planning a party or planning a trip, did the group make the most progress? How did it feel to have your idea/contribution met with a "yes, but . . . "? How can you be more open to accepting the ideas of others?

(*continues*)

Table 2. Examples of Improvisation Exercises Used in Medical Improvisation Training Program for Nutrition and Dietetics Students (*Continued*)

Improvisation Exercises	Instructions	Debriefing Questions Postexercise
Gibberish Interview[25]	Three volunteers are needed for this exercise: an interviewer, a foreigner expert who does not speak English, and a translator. The audience suggests the topic and asks questions of the foreign expert. The translator has to interpret the questions from English to gibberish and translate the answers given by the foreigner from gibberish to English.	How did it feel to communicate in gibberish? Was the translator able to accurately communicate what you (the foreigner) intended? What role did body language play in your ability to communicate? For the observers, did the translation match how you perceived the communication in your head?
Draw a Tree[26]	Tell participants to have a blank piece of paper and pen or pencil available. Tell them you are going to give them 45 s to draw a tree. At 45 s, instruct the participants to look at their tree. Does it have a trunk? Branches? Leaves? Roots? (Most of the participants will not have drawn roots.)	What parts of the tree did you draw? Did you unintentionally forget to draw roots on your tree? Do you believe that the root system is an integral part of the tree? Why do you think they were left off? What things do we unconsciously ignore in the support systems (of our patients or clients) because we cannot see them? What are the dangers of not acknowledging what we don't readily see?
Culmination and assessment	Students randomly draw instructor-prepared communication simulation scenarios from a box and play them out. Scenarios include situations such as a job interview, a discussion with a patient newly diagnosed with a chronic disease, and a disagreement with a coworker.	Participants role-play with the facilitator, and the class participates in the debriefing after the role-play.

improvisation training with subsequent cohorts of students.

The assessment was administered at baseline and postintervention for each of the 2 student groups. Following the completion of the improvisation training program for both consecutive student cohorts, SPSS v. 24 was used to conduct statistical analyses of the pilot data collected.[29] A nonparametric statistical test was chosen for analysis of the data from the ordinal Likert scale. For each cohort, and for the combined cohorts, Wilcoxon signed rank tests were used to compare baseline pretest questionnaire responses and final posttest responses for each of the 20 items on the survey. Statistical significance was defined as $P \leq .05$. Students gave informed consent to complete the questionnaire. The program was approved by the Appalachian State University institutional review board, which exempted the study from further review based on "Normal educational practices and settings."

FINDINGS

Fifteen students participated in the training program during year 1. During year 2, a total of 17 students participated in the initial training session; however, because of geographic and scheduling constraints associated with supervised practice assignments, 11 students were able to complete the program. All data for both cohorts were included in the statistical analysis. All of the students had completed a nationally accredited undergraduate Didactic Program in Dietetics and were enrolled in a nationally accredited graduate-level dietetics internship program of the host university.[23] The graduate curriculum of the program was identical for both participating cohorts. All of the participants were of traditional graduate student age (mid- to late-20s), and 88% were female, typical in nutrition and dietetics programs.[30]

Improvisation Self-Assessment (Pre- and Post-survey)				
Please rate each statement by scoring 1 – 4; 4 = always, 3 = sometimes, 2 = rarely,				
1 = never. Please answer as quickly as possible.				
1. I am comfortable trying new things.	4	3	2	1
2. I am comfortable making mistakes.	4	3	2	1
3. I am good at solving problems.	4	3	2	1
4. I develop and implement action plans that	4	3	2	1
support an overall vision for my department/organization.				
5. I am flexible in my thinking.	4	3	2	1
6. I am a creative thinker.	4	3	2	1
7. I feel confident thinking on the spot.	4	3	2	1
8. I feel confident answering questions for which I haven't prepared.	4	3	2	1
9. I listen carefully when others are speaking.	4	3	2	1
10. I possess a positive attitude towards change.	4	3	2	1
11. I view problems as opportunities.	4	3	2	1
12. I am confident speaking/presenting to a small group.	4	3	2	1
13. I am confident speaking/presenting to a large group.	4	3	2	1
14. I am comfortable with solving problems in new ways.	4	3	2	1
15. I am good at reading nonverbal communication.	4	3	2	1
16. I am able to link my prior knowledge and experiences to create solutions.	4	3	2	1
17. I easily accept others' ideas.	4	3	2	1
18. I respond quickly and decisively in challenging situations.	4	3	2	1
19. It is easy for me to trust my team members.	4	3	2	1
20. I am confident in my collaboration skills.	4	3	2	1

Figure. Improvisation questionnaire adapted from Berk's Improvisation Scale and utilized in improvisation training for nutrition and dietetics students. From Berk and Trieber.[15] Adapted and used with permission.

Significant pre/postintervention findings indicating increased posttest scores from baseline to the end of the intervention were found for each separate cohort and the combined cohorts for evaluation items 2 ("I am comfortable making mistakes"), 8 ("I feel confident answering questions for which I haven't prepared"), and 18 ("I respond quickly and decisively in challenging situations"). Other evaluation items that demonstrated significant pre/post–student perception changes for the combined cohorts included items 7 ("I feel confident thinking on the spot"), 11 ("I view problems as opportunities"), 13 ("I am confident speaking/presenting to a large group"), 14 ("I am comfortable with solving problems in new ways"), and 19 ("It is easy for me to trust my team members"). Each separate cohort demonstrated significant pre/postintervention changes for an item or items other than those that aligned for both cohorts or were significant for the combined cohorts. The results are reported in Table 3.

Additional data were collected from both cohorts (N = 26) when the final posttraining questionnaire was administered. The data were reviewed to identify trends regarding student perceptions of the improvisation experience. Students were asked whether the improvisation was "not helpful," "a little helpful," "helpful," "very helpful," or "extremely helpful." Of 24 students from the 2 cohorts completing the additional question, 100% (24/24) rated the program as "helpful" to some degree. Forty-six percent of respondents to the question (11/24) chose "very" (n = 8) or "extremely" helpful (n = 3), and 42% (10/24) chose "helpful." Three students (12%) indicated that the program was "a little helpful." Ninety-two percent (23/25) of students who completed an additional question regarding continuation of the program agreed that the training should be offered to future groups of students. Both students who indicated that the program should not be continued in the future and 3 additional students (5/25; 20%) added comments indicating that there had been "too many" improvisation training sessions.

DISCUSSION

This pilot study, to the best of the investigators' knowledge, is the first reported attempt to incorporate medical improvisation training into a nutrition and dietetics education program and to collect and analyze improvisation learning outcomes from dietetics students in a systematic way. The intervention demonstrated that a medical improvisation intervention is feasible to deliver within a graduate nutrition program at the university level. Moreover, medical improvisation training may be a promising strategy to be pursued by nutrition educators.

The investigators acknowledge that this pilot program had several significant limitations. The intervention did not include a comparison group of students who did not participate in the training. Thus, it was not possible to quantify the influence that students' growth in maturity and skill during their academic year could have had on the intervention results.

The evaluation instrument used has not been formally validated. It was chosen because, at the time of the study, the investigators were not aware of a suitable validated instrument designed for medical improvisation training. To the best of the investigators' knowledge, such an instrument has yet to be developed. A number of empathetic communication scales have been designed and tested within various health professions. However, these scales appear to be focused on evaluation of actual patient-provider interactions or overall program evaluation, not on assessing the interventions of medical improvisation training.[31-33]

Cohorts of dietetics interns are often small, and this was reflected in the low number of participants in each group. The pilot study of 2 consecutive student cohorts could have affected the findings due to unrecognized differences between the 2 groups or to the unintended differences in the delivery of the program between the 2 years.

The investigators noted several positive outcomes from this pilot program. Data analysis indicated that nutrition and dietetics students perceived that they benefited in

Table 3. Pre- and Post–Improvisation Survey Results for Year 1 Cohort, Year 2 Cohort, and Combined Year 1 and Year 2 Cohorts[a]

Survey Question	Year 1, Baseline-Posttest (N = 15), *z* Score (*P*)	Year 2, Baseline-Posttest (N = 11), *z* Score (*P*)	Combined Cohorts, Baseline-Posttest (N = 26), *z* Score (*P*)
1. I am comfortable trying new things.	− 1.518 (.129)	− 0.816 (.414)	− 1.706 (.088)
2. I am comfortable making mistakes.	**− 2.683 (.007)**	**− 2.646 (.008)**	**− 3.581 (.000)**
3. I am good at solving problems.	− 0.333 (.739)	**− 2.000 (.046)**	− 1.387 (.166)
4. I develop and implement action plans that support an overall vision for my department or organization	− 1.903 (.057)	− 0.333 (.739)	− 1.699 (.089)
5. I am flexible in my thinking.	− 1.513 (.130)	− 1.134 (.257)	− 1.882 (.060)
6. I am a creative thinker.	0.000 (1.000)	− 1.414 (.157)	− 0.881 (.378)
7. I feel confident thinking on the spot.	− 1.811 (.070)	− 1.403 (.161)	**− 2.285 (.022)**
8. I feel confident answering questions for which I haven't prepared	**− 3.127 (.002)**	**− 2.070 (.038)**	**− 3.704 (.000)**
9. I listen carefully when others are speaking.	0.000 (1.000)	− 0.447 (.655)	− 0.302 (.763)
10. I possess a positive attitude toward change.	− 1.115 (.248)	− 0.447 (.655)	− 0.837 (.403)
11. I view problems as opportunities.	*− 1.897 (.058)*	− 1.134 (.257)	**− 2.333 (.026)**
12. I am confident speaking/presenting to a small group.	− 1.706 (.088)	− 0.686 (.493)	− 0.756 (.450)
13. I am confident speaking/presenting to a large group.	− 1.697 (.090)	− 1.613 (.107)	**− 2.310 (.021)**
14. I am comfortable with solving problems in new ways.	**− 2.333 (.020)**	− 1.265 (.206)	**− 2.524 (.012)**
15. I am good at reading nonverbal communication.	− .378 (.705)	− .966 (.344)	− 0.966 (.334)
16. I am able to link my prior knowledge and experiences to create solutions.	0.000 (1.000)	**− 2.121 (.034)**	− 1.500 (.134)
17. I easily accept others' ideas.	− 0.577 (.564)	− 1.667 (.096)	− 1.528 (.127)
18. I respond quickly and decisively in challenging situations.	**− 2.111 (.035)**	**− 2.333 (.020)**	**− 3.116 (.002)**
19. It is easy for me to trust my team members.	**− 2.126 (.033)**	− 1.414 (.157)	**− 2.556 (.011)**
20. I am confident in my collaboration skills.	− 0.378 (.705)	− 0.378 (.705)	− 0.535 (.593)

[a]All items were evaluated using the Wilcoxon signed rank test. Statistically significant findings are in **bold** print. Items trending toward significance are *italicized.*

several ways from medical improvisation skills improvisation training designed to develop empathetic communication skills.[2,10] The students recognized improvements in communication skills important to empathy including collaborating, problem-solving, decision-making, flexibility, and demonstrating confidence in a variety of circumstances. A majority of students reported that the intervention was helpful to them to some degree. Medical improvisation training provided students with opportunities to demonstrate several required competencies for their education program. Training included the use of appropriate communication skills to promote behavioral change and the demonstration of the ability to function as a member of the interprofessional health care team.

The results of this pilot intervention indicate that medical improvisation training for nutrition and dietetics students may be a promising avenue for future pedagogical research. Moreover, they probably would align with interprofessional efforts underway in other health care disciplines.[2,14,16,17] Table 4 provides a list of recommended resources for educators who may want to consider incorporating and evaluating medical improvisation activities in their classrooms of health professionals.

Well-controlled studies of greater size and power, as well as the development of an appropriate evaluation instrument, are needed to determine the effects of medical improvisation training in nutrition and dietetics education. Moreover, optimal instructional delivery methods for such training are warranted. Further research and implementation of medical improvisation training in dietetics education programs should benefit the patients and clients of the nutrition professionals who are proficient in empathetic communication.

Table 4. Suggested Resources for Further Learning: Improvisation Theory, Techniques, and Skills Training

Alda A. *If I Understood You, Would I Have This Look on My Face?* New York, NY: Random House; 2017.

Gesell I. *Playing Along: 37 Group Learning Activities Borrowed From Improvisation Theatre.* Duluth, MN: Whole Person Associates; 1997.

Goodard P. *Improv-ing Agile Teams: Using Constraints to Unlock Creativity.* Bradford-on-Avon, United Kingdom: Agilify Ltd; 2015.

Koppet K. *Training to Imagine.* Sterling, VA: Stylus Publishing; 2013.

Salit C. *Performance Breakthrough: A Radical Approach to Success at Work.* New York, NY: Hatchett Books; 2016.

Tiagarajan S, Tagliati T. *Jolts! Activities to Wake Up and Engage Your Participants.* San Francisco, CA: John Wiley & Sons; 2011.

Zablocki C. *Improv 101: 101 Improvisational Exercises to Unleash Your Creative Spirit.* Denver, CO: Positively Humor; 2005.

REFERENCES

1. Moshavi D. "Yes and...": introducing improvisational theatre techniques to the management classroom. *J Manag Educ*. 2001;25:437-449.
2. Hoffman A, Utley B, Ciccarone D. Improving medical student communication skills through improvisational theater. *Med Educ*. 2008;42(5):537-538.
3. Larson H, Friss P, Heape C. Improvising in the vulnerable encounter: using improvised participatory theatre in change for healthcare practice. *Arts Humanit High Educ*. 2018;17(1):148-165.
4. Hoffmann-Longtin K, Rossing JP, Weinstein E. Twelve tips for using applied improvisation in medical education. *Med Teach*. 2018;40(4):351-356.
5. Habash DL. Unfolding, embracing, and reflecting on the narrative within nutrition and dietetics: does the patient's story help the dietitian to impact health behaviors? *Topics Clin Nutr*. 2015;30(2):122-126.
6. Wendover AK, Boissy A, Rice TW, Gilligan T, Velez VJ, Merlino J. The REDE model of healthcare

communication: optimizing relationship as a therapeutic agent. *J Patient Exp*. 2014;1(1):8-13.
7. Williams B, Brown T, McKenna L, et al. Student empathy levels across 12 medical and health professions: an interventional study. *J Compassionate Healthc*. 2015;2:4.
8. Konrath SH, O'Brien EH, Hsing C. Changes in dispositional empathy in American college students over time: a meta-analysis. *Pers Soc Psychol Rev*. 2011;15(2):180-198.
9. Hardee JT, Platt FW. Exploring and overcoming barriers to clinical empathic communication. *J Commun Healthc*. 2009;3(1):17-23.
10. Kelm Z, Womer J, Walter J, Feudtner C. Interventions to cultivate physician empathy: a systematic review. *BMC Med Educ*. 2014;14:219.
11. Watson K, Fu B. Medical improv: A novel approach to teaching communication and professionalism skills. *Ann Intern Med*. 2016;165(8):591-592.
12. Donofrio N, Spohrer J, Zadeh HS. Viewpoint: research-driven medical education and practice: a case for T-shaped professionals. https://pdfs.semanticscholar.org/c981/265467da99c55e60ae1cee62994a5044b333.pdf. Published 2010. Accessed August 20, 2017.
13. Kak N, Burkhalter B, Cooper MA. *Measuring the Competence of Healthcare Providers*. Bethesda, MD: Quality Assurance Project; 2001.
14. Watson K. Serious play: teaching medical skills with improvisational theater techniques. *Acad Med*. 2011;86(10):1260-1265.
15. Berk RA, Trieber RH. Whose classroom is it, anyway? Improvisation as a teaching tool. *J Excell Coll Teach*. 2009;20(3):29-60.
16. Boesen KP, Herrier RN, Apgar DA, Jackowski RM. Improvisational exercises to improve pharmacy students' professional communication skills. *Am J Pharm Educ*. 2009;73(2):35.
17. Shochet R, King J, Levine R, Clever S, Wright S. "Thinking on my feet": an improvisation course to enhance students' confidence and responsiveness in the medical interview. *Educ Prim Care*. 2013;24(2):119-124.
18. Eisenberg A, Rosenthal S, Schlussel Y. Medicine as a performing art: what we can learn about empathic communication from theater arts. *Acad Med*. 2015;90(3):272-276.
19. Bayne HB, Jangha A. Utilizing improvisation to teach empathy skills in counselor education. *Couns Educ Superv*. 2016;55:250-262.
20. Campbell C. Interprofessional communication and teambuilding using applied improvisational exercises. *Creat Nurs*. 2014;20(2):116-121.
21. Atluru A. What improv can teach tomorrow's doctors. https://www.theatlantic.com/education/archive/2016/08/what-improv-can-teach-tomorrows-doctors/497177. Published 2016. Accessed May 6, 2018.
22. Palermo C, Bearman M, Palermo C, Allen LM, Williams B. Learning empathy through simulation a systematic literature review. *Simul Healthc*. 2015;10(5):308-319.
23. Academy of Nutrition and Dietetics. 5 steps to become a registered dietitian nutritionist. https://www.eatrightpro.org/about-us/become-an-rdn-or-dtr/high-school-students/5-steps-to-become-a-registered-dietitian-nutritionist. Published 2018. Accessed May 6, 2018.
24. Gesell I. *Playing Along: 37 Group Learning Activities Borrowed From Improvisational Theater*. Duluth, MN: Whole Person Associates; 1997.
25. Koppett K. *Training to Imagine: Practical Improvisational Theatre Techniques for Trainers and Managers to Enhance Creativity, Teamwork, Leadership, and Learning*. 2nd ed. Sterling, VA: Stylus Publishing LLC; 2012.
26. Thiagarajan S, Tagliati T. *Jolts! Activities to Wake Up and Engage Your Participants*. 1st ed. San Francisco, CA: Pfeiffer; 2011.
27. Zablocki CJ, Zablocki JR. *Improv 101: Unleash Your Creative Spirit*. Denver, CO: Positively Humor; 2005.
28. Marks P. Improvisation skills. Lecture presented at: Level 2 Improvisation Class; 2015; Fort Mill, SC.
29. *IBM SPSS Statistics for Windows, Version 24.0* [computer program]. Armonk, NY: IBM Corporation; 2016.
30. Academy of Nutrition and Dietetics. *Compensation and Benefits Survey of the Dietetics Profession*. Chicago, IL: Academy of Nutrition and Dietetics; 2018.
31. Nicolai J, Demmel R, Hagen J. Rating scales for the assessment of empathic communication in medical interviews (REM): scale development, reliability, and validity. *J Clin Psychol Med Settings*. 2007;14(4):367-375.
32. King S, Holosko MJ. The development and initial validation of the Empathy Scale for Social Workers. *Res Soc Work Pract*. 2011;22(2):174-185.
33. Fields SK, Mahan P, Tillman P, Harris J, Maxwell K, Hojat M. Measuring empathy in healthcare profession students using the Jefferson Scale of Physician Empathy: health provider-student version. *J Interprof Care*. 2011;25(4):287-293.