

University of Nevada, Reno

**Examining the Impact of an Interprofessional Education Training Package on
Communication during Handoff Performance in Medical and Nursing Students:
A Behavior Analytic Approach to Assessment and Intervention**

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in
Psychology

by

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THE GRADUATE SCHOOL

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Abstract

Human-induced medical errors have officially been identified as the nation's third leading cause of death. Faulty teamwork and communication among interprofessional healthcare providers is a leading cause of such adverse events. Recently, an empirically validated handoff curriculum—known as Inpatient Settings Accelerating Safe Sign-outs (or I-PASS)—has been shown to effectively target communication accuracy and team coordination among healthcare providers. In attempt to further enhance this and other interprofessional healthcare trainings, however, the healthcare education literature has suggested the additional consideration of individual—yet still team relevant—skills such as values and perspective taking. In this study, a behavior analytic intervention—for the training of values and perspective taking skills—was combined with materials from the I-PASS handoff bundle, to create an interprofessional education (IPE) training package for medical and nursing students. Descriptive analysis methods—also from the behavior analytic literature—were used to compare communication performance during a simulated handoff task, prior to and following the completion of the abovementioned training package versus that of a control. Results demonstrated significant improvements in interprofessional communication accuracy and frequency during patient handoffs, independent of package type. Between-group differences were also observed with respect to changes in implicit relational responding—as captured by the Mixed-Trial Implicit Relational Assessment Procedure (MT-IRAP)—with respect to Cooperative and Individualized work

stimuli. Participants who completed the intervention involving the values and perspective-taking training demonstrated greater positive relations with the Cooperative work stimuli; whereas, participants from the comparative (i.e., control) intervention demonstrated greater positive relations with the Individualized work stimuli. Future suggestions on how to expand the research and results presented here have been provided.

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**Examining the Impact of an I-PASS plus Values and Perspective Taking Training
Package on Interprofessional Handoff Performance in Medical and Nursing Students:
A Behavior Analytic Approach to Communication Measurement**

The significant prevalence of medical errors in the United States' (US) healthcare system was first unveiled in a landmark report provided by the Institute of Medicine (IOM) in 1999. This document, entitled *To Err is Human*, concluded that adverse events—or unintended patient harm due to medical mismanagement—were responsible for between 44,000 to 98,000 American fatalities each year. James (2013) followed this report with updated research indicating that this estimate had dramatically increased to a range of 210,000 to 440,000 in less than a 15-year period. This increase in annual deaths has placed human induced adverse events as the nation's third leading cause of death, following only behind heart disease ($n = 611,105$) and cancer ($n = 584,881$; Center for Disease Control and Prevention, 2015b; Makary & Daniel, 2016).

In 2016, the Joint Commission conducted a “root causes” analysis of sentinel events to begin targeting factors associated with these high rates of US mortalities. Statistical data from this report identified failures in leadership, communication, and other human factors (e.g., short staffing, inadequate direction and orientation) as the main ingredients responsible for the team-based tragedies. Further, of these contributing causes, 67-72% of cases were due to communication failure involving two or more providers, administrators, or patients (Joint Commission, 2006; Joint

Commission, 2016). These statistics place communication failures within the healthcare system as responsible for twice as many deaths as those resulting from clinical inadequacy (Wilson, Runciman, Gibberd, Harrison, & Hamilton, 1995).

The sections that follow will provide an overview of the literature pertaining to a) the critical role of communication in medical errors and b) trainings by which interprofessional communication among healthcare teams, may be enhanced to reduce the current prevalence of human-induced adverse events. In doing so, the role of communication in medical errors—particularly with respect to those completed during transitions of patient care (i.e., handoffs)—will first be discussed. A historical account of team training strategies compiled from the healthcare literature will follow. Lastly, having offered this information, contributions from the behavior analytic literature will be introduced to further enhance an existing method for the assessment and intervention of team communication and performance in future healthcare providers.

Communication in Medical Errors

The dynamic nature of patient care requires the constant coordination of providers across all levels of the healthcare continuum (Institute of Medicine, 2001). This interaction has become increasingly more complex within our modern world, as healthcare delivery now requires team-based performance rather than the individualized work of siloed providers (Weller, Boyd, & Cumin, 2014). Examples of multidisciplinary healthcare teams include, but are not limited to, those a) in the direct care of the patient (e.g., physicians, nurses, case managers), b) responsible for the coordination of patient functions (e.g., resource management), or c) formed for only

emergent or specific events (e.g., code teams; TeamSTEPPS, n.d.). The ability to effectively communicate across these multi-level teams and functions is essential to ensuring patient safety (Anderson & Helms, 2000; Gittell, Beswick, Goldmann, & Wallack, 2015; Greenberg et al., 2007; Haas et al., 2015; Schaefer, Helmreich, & Scheidegger, 1994; World Health Organization, 2006).

Several systemic barriers have been identified as root causes for failure during the communication and coordination of patient care (Anderson & Helms, 2000; Leonard, Graham, & Bonacum, 2004; Pham et al., 2012). One of the first involves the presence of physical and environmental obstacles that interfere with the reception of patient, or other critically relevant, information (Apker, Mallak, & Gibson, 2007; Mukherjee, 2004; Solet, Norvell, Rutan, & Frankel, 2005). Examples of these potential distractors might include loud background noises (e.g., various monitors), provider shortages (i.e., not enough nurses on shift), and other prominent social contingencies (e.g., text messaging, people gossiping in the hallway). Next, is the use of disorganized or difficult-to-follow communication structures (De Meester, Verspuy, Monsieurs, & Van Bogaert, 2013; Haig & Sutton, 2006; Landucci & Gipe, 1999). Providers are more likely to forget or misinterpret critical patient information without some form of device or communication tool (e.g., a mnemonic device) to aid with information organization and retention (Starmer et al., 2012).

In addition to those listed above, one of the more complex factors involves the presence of psychological barriers such as professional silos and hierarchies (De Meester et al., 2013; Kreindler, Dowd, Dana Star, & Gottschalk, 2012; Robinson, Gorman,

Slimmer, & Yudkowsky, 2010; Thomas, Sexton, & Helmreich, 2003; Weller et al., 2014). Often times, hierarchical cultures—based on horizontal or vertical relations—are implicitly created within a given healthcare environment (Pham et al., 2012; Sutcliffe et al., 2004). These power-based relations generally have devastating impacts on communication and the increasing prevalence of medical errors (Thomas et al., 2003; Weller et al., 2014). As one particular example, healthcare providers on the “lower levels” of a given hierarchy (e.g., nurses) have been shown to withhold knowledge or pertinent patient information because they are afraid of the potential for public criticism or ridicule (O’Daniel & Rosenstein, 2008; Riesenbergr et al., 2009; Sutcliffe et al., 2004). The omission of information, however, often leads to increased rates of medical errors that may have been otherwise avoided under the presence of different cultural contingencies within that particular environment (O’Daniel & Rosenstein, 2008).

Handoffs. Given the prevalence of hierarchical cultures within healthcare, the Joint Commission (2009) states that patient “handoffs”—written or verbal transitions of patient care between two or more providers—are the most common settings for which communication breakdowns take place (Gordon & Findley, 2011). More than half of the communication-related sentinel events reported each year are rooted in the transfer of patient information from one provider to another (Joint Commission, 2006). Further, when considering malpractice cases, Greenberg et al. (2007) reports that 43% of errors involving communication failures are completed during these patient information interactions. This issue is even more recognized among providers who are more directly in contact with patient handoffs, as 51% of 160,176 hospital staff respondents reported

frequent “losses of *important* patient care information,” while completing handoffs during shift changes (Agency for Healthcare Research Quality, 2008).

Over an average hospital stay (i.e., 4.8 days), it is likely that patients will be “transferred” several times across multiple providers and units (Center for Disease Control and Prevention, 2015a). Handoffs involving residents and attendings, for example, occur between 1-2 times per day resulting in a minimum of 5-10 transfers per average admission (Riesenberg et al., 2009). Further, depending on the nature of a given patient’s case, each handoff may be completed with intradisciplinary providers from the same unit (e.g., nurse to nurse during shift change), interdisciplinary providers from different units (e.g., from surgery to ICU), and/or between providers working at different healthcare facilities (Anderson & Helms, 2000; Arora, Johnson, & Meltzer, 2008). Thus, similar to the child’s game of “telephone,” the likelihood of patient information being distorted during an average stay correlates with the number of patient transactions being completed (Riesenberg et al., 2009; Solet et al., 2005).

Background and Significance

Recent shifts in healthcare reform, resulting in heightened rates of patient care transitions, have led to increased governmental and organizational concern for patient safety (Gittell et al., 2015; Joint Commission, 2007; McDonald et al., 2007; Nasca, Day, Amis, & Force, 2010). Specifically, as providers become more specialized, teamwork and coordination have become the “new normal” for delivering effective patient care (e.g., patient-centered medical homes, Healthy People 2020; Nutting et al., 2009; US Department of Health Human Services & Office of Disease Prevention and Health

Promotion, 2012). The increased number of multidisciplinary provider involvement in patient-centered care teams will, therefore, lead to heightened frequencies of patient handoffs, resulting in amplified opportunities for communication breakdowns (Epstein & Street, 2011; Wachter & Shojania, 2004). One proposed method to begin targeting this significant demand for patient safety is to incorporate IPE and training into the curriculum of our nation's future healthcare providers (e.g., medical and nursing students; Centre for the Advancement of Interprofessional Education, 2013; Halbach & Sullivan, 2005; Lerner, Magrane, & Friedman, 2009; Morison, Boohan, Moutray, & Jenkins, 2004; Starmer, Spector, et al., 2014).

IPE. Within schools of healthcare education, IPE involves “two or more professions learning with, from, and about each other to improve collaboration and quality of care” (Centre for the Advancement of Interprofessional Education, 2013, p. 4). Based on standards initially developed by the Interprofessional Education Collaborative (IPEC), medical and nursing education accrediting bodies—or the Liaison Committee on Medical Education (LCME) and the Accrediting Commission for Education in Nursing (ACEN)—have joined in the effort to improve interprofessional collaboration by calling for the incorporation of IPE as a mandatory component of medical and nursing student education (Accreditation Commission for Education in Nursing, 2013, see 4.6; Liaison Committee on Medical Education, 2014, see 6.7). The best method to introduce this type of training, however, has yet to be empirically determined.

As a starting point, those conducting research in IPE have provided some initial directions for curriculum development and implementation. First, IPE experience has

been recommended to begin early (e.g., undergraduate work, pre-qualification) in the health providers' education (Lerner et al., 2009; Masiello, 2012; Morison et al., 2004) and be “woven” throughout the remaining training (Baker & Durham, 2013, p. 714; Halbach & Sullivan, 2005). Second, IPE activity shall include various providers who operate at many levels along the healthcare continuum (e.g., schools of public health and social work; Baker & Durham, 2013; Garbee et al., 2013). Lastly, researchers must consider the existing literature on healthcare team training to inform the structure of and material incorporation for IPE curricula within the various schools of healthcare professions (Gittell et al., 2015; Masiello, 2012).

Team Training in Health Care

Team training in healthcare has been used in a variety of settings and medical professions (Baker, Gustafson, Beaubien, Salas, & Barach, 2005). Some of these programs have been developed for domain specific practice (e.g., anesthesia); others involve more interdisciplinary collaboration (e.g., emergency departments, operating rooms). Despite these differences, a majority of the literature dedicated to this area is commonly rooted in one well-recognized program, originally established in aviation—Crew Resource Management (CRM). The following section will provide a brief history and overview of CRM and discuss the relevant healthcare programs that have since emerged from this seminal training.

Crew Resource Management (CRM). In 1979, the National Aeronautics and Space Administration (NASA) coordinated a workshop to determine common root factors in a recent series of aviation disasters (e.g., Canary Islands airline disaster;

Weiner, Kanki, & Helmreich, 1993). Reports indicated that 60-80% of incidents were due to human error caused by faulted leadership, interpersonal communication, and decision-making taking place in the cockpit (Wagener & Ison, 2014). Following NASA's lead, the Federal Airline Administration (FAA) introduced CRM as a method to enhance individual and team performance in the aviation industry (Helmreich & Foushee, 1993; Marshall, 2009). CRM has since, remained an essential training platform in aviation for more than 30 years (Kanki, Helmreich, Anca, & ScienceDirect (Online service), 2010).

CRM is a systems-based training method created to reduce human error through the use of all relevant resources (i.e., people, technology, information, and processes; Kanki et al., 2010). A key premise in this teaching method is the systemic and inherent nature of error (Safer Healthcare). Instead of seeking blame *after* an event happens, CRM encourages individuals to speak up when something is not being done appropriately. This support has been shown to combat the typical effects of hierarchical relations, such as remaining quiet due to fear of interpersonal power (Catchpole et al., 2007; Darley & Latane, 1968; Sundar et al., 2007).

Organizations who have embraced CRM have demonstrated an increase in attitudes toward safety awareness; improved communication, coordination, decision-making, and error management skills (Helmreich & Foushee, 1993; Helmreich & Merritt, 1998; Weiner et al., 1993). These results have been replicated across multiple teams who operate in various high-context environments (e.g., flight crews, maintenance teams, air control traffic and dispatch; Helmreich & Foushee, 1993; Oser, Salas, & Merket, 2001; Smith-Jentsch, Baker, & Salas, 2001). According to a more recent review

by Wagener and Ison (2014), CRM has also been shown to increase positive reactions toward, knowledge of, and performance with respect to teamwork concepts, principles, and performance. Furthermore, aircrews that have completed CRM training are significantly less likely to make aviation errors than compared to counterpart controls (Baker, Day, & Salas, 2006; Helmreich & Merritt, 1998; Kanki et al., 2010).

Anesthesia Crisis Resource Management (ACRM). Anesthesiology teams were among the first in the healthcare community to adopt the CRM model into their methods of interprofessional training (Howard, Gaba, & Fish, 1992). Anesthesia Crisis Resource Management (ACRM) was developed (at Stanford University and tested at Penn Medicine and Harvard) to help anesthesiologists better manage crises while working in multidisciplinary teams (Howard et al., 1992). A unique feature about the ACRM program is that the entire training, including the involvement of other physicians, nurses, and technicians, is completed in a simulated operating room (OR) environment (D Gaba, Howard, Fish, Smith, & Yasser, 2001). During this time, various OR scenarios (e.g., anesthetic overdose, complete power failure) are used to provide training in technical anesthesiology skills and team collaboration (D Gaba et al., 2001). Though training in ACRM has been conducted over the last 25 years, “no study done to-date, or even contemplated for the future” has been able to empirically demonstrate evidence of its impact on patient care (D. Gaba, 2010, p. 5; Zeltser & Nash, 2010).

MEDTeams. A second translational research effort of CRM is the MEDTeams project. MEDTeams was the first emergency department (ED) training program designed to aid in the reduction of medical errors through the use of interdisciplinary teams

(Morey et al., 2002). Similar to CRM, MEDTeams teaches emergency medicine providers that medical errors are often the result of systems-level breakdowns rather than individual mistakes (Reason, 1990; R. Simon, Salisbury, & Wagner, 2000). Its teaching strategy, thus, emphasizes general teamwork skills and behaviors, rather than context specific competencies (Morey, Simon, & Jay, 2003; Pizzi, Goldfarb, & Nash, 2001).

The MEDTeams training curriculum is taught using a mixture of classroom instruction, video scenarios, and a 4-hour supervised practicum (R Simon, Langford, & Lock, 2000). In a study involving seven EDs, this curriculum was shown to significantly improve attitudes and behaviors related to teamwork; increase perceived levels of institutional support; and reduce clinical error rates from 30.9 to 4.4% (Morey et al., 2002). Further, MEDTeams trainings have also been shown to promote cooperation and shared responsibility among physicians, nurses, technicians, and other key emergency medical providers (Morey et al., 2003).

TeamSTEPPS. More recently, Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS)—developed by the Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense (DoD)—was introduced as an evidence-based teamwork system designed to improve the quality, safety, and efficiency of healthcare (Baker & Durham, 2013; King et al., 2008; Salas, Burke, & Stagl, 2004; TeamSTEPPS, n.d.). The TeamSTEPPS instructional framework (presented in Figure 1) is comprised of four core competencies, or trainable skills, including: leadership, situation monitoring (shared performance monitoring), mutual support (backup behavior), and communication (Epps & Levin, 2015; King et al., 2008). These core

competencies are encircled by the patient care team, which includes the patient and all relevant healthcare providers. Performance, knowledge, and attitudinal outcomes are then depicted in the corners, resulting from proficiency in the four central skills or core competencies previously described (Epps & Levin, 2015).

In November 2006, the AHRQ and DoD released TeamSTEPPS as the national standard for team training in healthcare (King et al., 2008). Following this release, TeamSTEPPS has successfully been implemented into a variety of healthcare units and organizations (Cima et al., 2009; Liaw, Zhou, Lau, Siau, & Chan, 2014; Sheppard, Williams, & Klein, 2013). Teams who have completed the TeamSTEPPS curriculum have demonstrated reduced rates of medical errors (Cima et al., 2009; Haig & Sutton, 2006; Mann, Marcus, & Sachs, 2006); enhanced attitudes and perceptions toward teamwork (Sawyer, Laubach, Hudak, Yamamura, & Pocrnich, 2013; Sheppard et al., 2013); improved teamwork and communication skills (Turner, 2012; Ward, Zhu, Lampman, & Stewart, 2015); increases in self-confidence (Liaw et al., 2014); and greater dimensions of patient safety culture (Sheppard et al., 2013; Vertino, 2014; Weaver et al., 2010). Sawyer et al. (2013), for example, reported an greater frequency of nurse “challenges”—a mutual support skill used to double check the use of a procedure or medication dosage—resulting in increased detection (i.e., from 61.5% to 84.6%) and corrections of inadequate chest compressions.

To promote the national dissemination of TeamSTEPPS and its adoption into various healthcare organizations, the AHRQ created a strategic plan for national implementation (King et al., 2008). This strategy involved the development of a master

training course with a structured a TeamSTEPPS curriculum, the hosting of an annual national conference for training followers, and the facilitation of community engagement and educational support through an online portal (TeamSTEPPS, n.d.). Those who have completed a TeamSTEPPS training, have recently recommended the incorporation of TeamSTEPPS into the curricula of future health care providers (Gittel et al., 2015). Due to difficulties associated with the design and implementation of controlled interventions in healthcare education (Baker & Durham, 2013), it is suggested that the components comprising the TeamSTEPPS curriculum may provide a supportive structure for the incorporation of team and communication training into IPE (Matthews et al., 2011; Nisbet, Lee, Kumar, Thistlethwaite, & Dunston, 2011).

Inpatient Settings Accelerating Safe Sign-outs (I-PASS). Given the significant impact of TeamSTEPPS on communication and coordination in teams, a portion of its curriculum was more recently adopted into a related training package dedicated specifically to the improvement of patient handoffs (Starmer, O'Toole, et al., 2014; Starmer et al., 2012; Starmer, Spector, et al., 2014). This intervention, known as the Inpatient Settings Accelerating Safe Sign-Outs (I-PASS) handoff bundle, is comprised of a workshop-based training on select TeamSTEPPS skills (i.e., multi-team systems, shared mental models) and communication strategies (e.g., brief, debrief, huddle); an introduction to a mnemonic device (i.e., I-PASS) to standardize verbal handoffs (see Figure 2 for sample); and an orientation to a printed or computerized tool to ease with handoff integration into electronic medical records (Starmer, O'Toole, et al., 2014). The impact of the I-PASS training bundle on communication and handoff success rates was

initially examined with medical residents in Starmer et al. (2013). Results of this single-site pilot research demonstrated a significant reduction in medical errors (from 33.8 to 18.3 per 100 admissions) and preventable adverse events (from 3.3 to 1.5 per 100 admissions); fewer omissions of key handoff elements on the resident's handoff documents; and an increased likelihood of handoffs occurring in a quiet and private location.

Following a review of successes and limitations from Starmer et al. (2013), the newly formed "I-PASS study group," in collaboration with the U.S. Department of Health and Human Services and Boston's Children's Hospital, launched an eleven-center study to further determine the effectiveness of the handoff training package (Sectish et al., 2010). From pre to post-implementation (i.e., January 2010 to May 2013), across 10,470 patient admissions, researchers reported a 23% and 30% reduction in medical errors (24.5 vs. 18.8 per 100 admissions, $P < 0.001$) and adverse events (4.7 vs. 3.3 per 100 admissions, $P < 0.001$), respectively (Sectish et al., 2010). Additionally, significant increases in the inclusion of key elements in written documents and oral communication were observed during handoff interactions. Further, these improved changes were at *no increased duration* for the completion of oral handoffs pre- and post-intervention (2.4 and 2.5 minutes per patient, respectively).

I-PASS in IPE. The line of research associated with I-PASS has begun to develop and disseminate additional curriculum intervention packages to incorporate into other areas of medical education (I-PASS Handoff Study; Sectish et al., 2010). A curriculum bundle, for example, was recently created for implementation into medical education

(O'Toole, Calaman, et al., 2014). Based on the original core resident workshop used in (O'Toole, West, et al., 2014), this readily available handoff-training package includes resources such as: a core medical student workshop (didactic and interactive session that teaches TeamSTEPPS techniques and principles), handoff simulation exercises (a guided interactive role-play session to practice skills learned), faculty development resources, and faculty observation tools. Additional training packages are also in the works for implementation in other schools of healthcare professions such as nursing (A. Starmer, personal communication, September 29, 2015).

Limitations. Though the I-PASS bundle has demonstrated significant effects on improved teamwork and communication during handoffs, opportunities for further investigation—particularly with respect to implementation in IPE—still remain. First, the literature exploring the impact of the I-PASS curriculum has only been assessed using medical residents. Though there has been recent discussion of incorporating I-PASS into schools of nursing and (earlier on in) medicine, the notion of a training involving multidisciplinary providers (e.g., nursing and medical students) has yet to be discussed. Given this information, the I-PASS handoff bundle may serve as an ideal platform for the incorporation of teamwork and communication training into an IPE curriculum involving medical and nursing students (Baker & Durham, 2013).

Additionally, the significant role of individual and shared values among members of a team have been shown to enhance team support (Sectish et al., 2010), collaboration (Sands, Stanley, & Charon, 2008), and cohesion (Malhotra, Majchrzak, & Rosen, 2007) during interprofessional trainings. Interestingly, however, there is no

component currently programmed in the I-PASS package to target these individual skills. The I-PASS training bundle—which focuses on teamwork and communication at the group level—may, thus, be enhanced by incorporating elements that target individual skills such as values and perspective taking (Baker, Gustafson, Beaubien, Salas, & Barach, 2003; Sands et al., 2008). A methodology, within Behavior Analysis, known as Acceptance and Commitment Therapy (ACT) exists to train these and other related psychological skills that may aid with the development of teamwork and group coordination (Bond, Hayes, & Barnes-Holmes, 2006; Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

The following section will discuss ACT as a means to promote an interdisciplinary collaboration, involving literature from both healthcare team training and behavior analysis, for the development and implementation of an IPE curriculum. In doing so, an orientation to the theory supporting ACT, its relevant processes, and associated framework will initially be provided. An overview of ACT as applied to organizational settings will follow. Next, details of specific ACT processes (i.e., values and perspective taking) that may aid with the development of teamwork and communication skills will be discussed. Finally, having offered this information, an IPE curriculum intervention will be proposed for the implementation of a combined nursing and medical student training.

Acceptance and Commitment Therapy

ACT is based on the theoretical and experimental work of Relational Frame Theory (RFT; see Hayes, Barnes-Holmes, & Roche, 2001). According to RFT, humans

engage in derived relational responding, which in turn influences their interaction with the world (Hayes et al., 2001). As an example, consider the ability to derive the relation of a dime being “more” than a nickel. A nickel is larger than a dime based on physical properties, but through language we are able to transform the ways by which we interact with both objects (Hayes et al., 2001). Though this example may be elementary, the same processes occur with respect to more complex relations (e.g., relationships, perceptions of self and others). Our abilities to plan, predict, evaluate, communicate, and relate to others, for example, all involve the derivation of relations through the use of language (Hayes, Strosahl, & Wilson, 1999).

ACT attempts to circumvent problems inherent in literal language by shifting one’s focus away from traditional didactics and dialogue (Stoddard & Afari, 2014). This shift allows individuals to notice and accept language, such as self-generated talk or rules, without trying to avoid or become entangled in a web of derived relations. For example, consider a nurse who is new to the emergency department and had a terrible encounter with an older physician during his first shift. Given this experience, he may derive the relation that older physicians have short tempers with nurses. Individuals who are able notice and accept language (e.g., self-generated rules), which has been influenced by derived relations (e.g., older physicians have short tempers), without having it impact current circumstances (e.g., interact with all physicians in the same manner, independent of age), demonstrate what ACT terms: “psychological *flexibility*” (Bond et al., 2006).

Psychological flexibility refers to the ability to contact (or sensitize to) the present moment, independent of current circumstances, and still act with respect to one's values (e.g., patient safety; Bond et al., 2006; Hayes, Masuda, Bissett, & Guerrero, 2004; Hayes et al., 1999; Hayes, Strosahl, & Wilson, 2012). At the core of ACT interventions, psychological flexibility can be enhanced through the use of experiential exercises, paradoxes, and metaphors used to target six key psychological processes (Bond et al., 2006; Hayes, Luoma, et al., 2006; Hayes, Masuda, et al., 2004; see Hayes et al., 1999; Hayes et al., 2012). The processes which comprise the ACT "hexaflex" framework (see Figure 3) include acceptance, defusion, contact with the present moment (i.e., present-moment awareness), self-as-context (i.e., perspective taking), values, and committed action (Hayes et al., 2012; Stoddard & Afari, 2014). This "hexaflex" was created to demonstrate the interdependent relation between each process and their combinatorial impact on one's overall level of psychological flexibility (Hayes, Luoma, et al., 2006). Acceptance, refers to the ability to make contact with internal experiences without trying to escape, change, or avoid those events. (Bond et al., 2006) Defusion involves a disentanglement from the language (e.g., rules or thoughts) generated through self-talk such that we are able to observe it more simply as words and separate from ourselves (Stoddard & Afari, 2014). Contact with the present moment refers to a process of non-judgmental and present-focused awareness. Perspective taking allows individuals to experience the world from the standpoint of others by shifting one's view from a participant to that of an observer (Hooper, Erdogan, Keen, Lawton, & McHugh, 2015). Values refer to paths or "life directions" that are

defined by an individual as important (e.g., patient safety; Hayes, Bunting, Herbst, Bond, & Barnes-Holmes, 2006; Herbst & Houmanfar, 2009). Committed action involves making appropriate changes such that one's behavior is aligned with their values.

Acceptance and Commitment *Training*

When ACT interventions are applied in organizations, the methodology is typically referred to as Acceptance and Commitment *Training* (ACTraining), as it involves non-psychotherapeutic variations of ACT techniques and procedures (Bond et al., 2006; Moran, 2011). To date, ACTraining has been successfully implemented into various organizational settings to increase employee performance (Bond & Flaxman, 2006; F. Bond & Bunce, 2000), academic performance (Chase et al., 2013), and general mental health (Bond & Flaxman, 2006; Donaldson-Feilder & Bond, 2004); as well as reduce depression (Bond & Bunce, 2000), stress and burnout (Brinkborg, Michanek, Hesser, & Berglund, 2011; Flaxman & Bond, 2010; Hayes, Bissett, et al., 2004; Noone & Hastings, 2009), and rates of sick leave and absences (Bond, Flaxman, & Bunce, 2008; Dahl, Wilson, & Nilsson, 2004). Further, depending on the needs of the setting, ACTraining has a flexible capability to be administered using either group workshops (e.g., Flaxman & Bond, 2010; Noone & Hastings, 2009), individualized training sessions (e.g., Dahl et al., 2004), and/or online modules (e.g., Chase et al., 2013; Ward & Houmanfar, Under Review).

ACTraining in Teams. The consideration of ACTraining in the area of teams has been recently prompted by Stewart, Barnes-Holmes, Barnes-Holmes, Bond, and Hayes (2006), as there are a number of critically relevant psychological phenomena that

impact individuals' abilities to operate effectively in groups (see p. 78). Active participation in teams, for instance, may be directly affected by factors such as perceived status (i.e., interpersonal power, hierarchies) and self-esteem, which operate within individual members of a group. A second psychologically relevant feature, mentioned in Stewart et al. (2006), is group cohesion.

Perspective taking and values clarification processes, within ACTraining, have been suggested as potential solutions to aid with the abovementioned psychological phenomena (Stewart et al., 2006; Ward & Houmanfar, Under Review). Training in perspective taking, for instance, may increase one's ability to see the world from "behind someone else's eyes," which may help equate the ways in which group status and power are viewed (Stewart et al., 2006; Williams, Parker, & Turner, 2007). Values exploration, on the other hand, allows for the identification of individual and shared values amongst members of a (multidisciplinary) team (Bond et al., 2006; Herbst & Houmanfar, 2009). In that regard, alignment in values (e.g., patient safety, evidence based-care) amongst interprofessional team members may lead to a strengthening of teamwork and cohesion in a given healthcare environment (Herbst & Houmanfar, 2009).

Emerging research in ACT has begun to provide support for the significant impact of perspective taking training and value alignment on teamwork coordination and cohesion. Hooper et al. (2015), for instance, examined the impact of perspective taking training on prejudice—or biased predispositions—towards others. This procedure involved the random assignment of participants to either an experimental (i.e., perspective taking training) or control (i.e., no training) condition. Before and following

training (or no training), participants viewed videos for and against capital punishment. Participants who underwent the experimental (i.e., perspective taking) training demonstrated a significant decrease in prejudiced attitudes during an everyday decision-making task.

In another ACTraining study, Chase et al. (2013) used an online approach to examine the additive impact of values exploration on goal-setting exercises in a group of 579 undergraduate students. Specifically, participants were randomly assigned to compete either a) an online goal-setting module to aid with the establishment of proximal and distal academic goals or b) the goal setting module and a second online values exploration module. Using a comparative analysis, overall results demonstrated that students who completed the additive values exploration module were significantly more likely to increase their academic performance and less likely to drop out of the university in the subsequent semester.

Also relevant to the current research, Ward and Homanfar (Under Review) used online ACTraining modules—focused on values clarification and perspective taking training—to improve the performance of leader-subordinate dyads in a high-context environment. Specifically, undergraduate students were paired with a confederate partner who acted as a leader during an online combat simulation. Following the completion of several combat sessions, participants completed either a) an online values clarification module only or b) both a values clarification module and an additional perspective taking training module before returning to their simulated battles. Results demonstrated that exposure to online values clarification and

perspective taking training modules allowed teams to demonstrate improved communication and coordination skills, allowing them to progress further (and at a faster and more consistent rate) in the simulated task, than when compared to teams from the counterpart control.

ACTraining in IPE. Given the abovementioned discussion, ACTraining in the areas of values and perspective taking may be used to enhance the training of healthcare teams within an IPE curriculum. Exercises pertaining to values exploration, for instance, may aid healthcare (e.g., medical or nursing) students in the identification of personal (e.g., achievement) and professional (e.g., patient safety) values. This process, as a result, may directly impact language and derived verbal relations surrounding behavior related to such values. An individual that values patient safety, for example, may be more likely to take cautious measures when completing a handoff to ensure the successful transfer of patient information.

The benefits of values clarification processes may also be seen at the group level. Similar to individual values, those shared amongst members of a healthcare team will follow the same continuous and directive framework (Herbst & Houmanfar, 2009). When values are identified and shared in a given group, alignment between individual values and practices may be occasioned with respect to that of the remaining members (Kolvitz, 1997). Further, value alignment amongst those involved in interprofessional healthcare teams may augment committed actions toward certain behavioral practices. Revising the previous example, value alignment with respect to patient safety may enhance the interaction (e.g., increase cohesion, decrease the prevalence of relational

hierarchies) of multidisciplinary providers due to a shared value of delivering safe and effective patient care.

ACTraining in perspective taking may also have a positive impact on communication and coordination in healthcare teams. As previously mentioned, one of the most common barriers to successful communication and handoff interaction in healthcare, is the prevalence of interpersonal and professional hierarchies (Riesenberg et al., 2009; Sutcliffe, Lewton, & Rosenthal, 2004). ACTraining in perspective taking may aid with the disentanglement of rules and relations derived around existing hierarchies by teaching individuals how to take the perspective of an observer, instead of a participant, within a given situation. Let us reconsider the abovementioned interaction between the nurse and older physician. The nurse *may have identified* a sarcastic and rushed tone from his brief conversation with the physician, but he was *also not aware* that the physician had just lost a patient in the room next door. Having the ability to perspective take in various scenarios involving multidisciplinary teams may enhance communication and coordination among providers as team members may, as a result, better understand the roles and contribution of individual members.

Purpose

Drawing upon the reviewed literature, the purpose of this study was to determine the impact of an IPE training package—involving I-PASS plus Values and Perspective Taking training—on interprofessional communication, during the completion of medical and nursing student patient handoffs. Changes in communication accuracy, and the frequency of comments reported, were assessed across two

intervention types (i.e., the experimental and control) using simulated interprofessional handoffs and a descriptive analysis of verbal interactions.

Method

Participants

This study served as an IPE curriculum intervention designed for 132 first year medical (N=69) and nursing students (N=63) at the University of Nevada, School of Medicine (UNSOM) and Orvis School of Nursing (OSON). All intervention and assessment phases were completed as part of a core curriculum course that was previously determined by both institutions' administrations. Credit in each course —offered at the discretion of the courses' faculty member—was made contingent upon task completion and was not in any way associated with student performance.

Setting

One large lecture hall and 14 standardized patient (SP) rooms, located on the UNSOM main campus, were needed for this study. The lecture hall was equipped to seat 140 students and contained a computer, 3 projectors, 3 projection screens, and a wireless microphone system. Each SP room was equipped with an exam table, various medical supply cabinets, a computer, and two video cameras (located in the front left and back right corners of each room). A “master control” room, located at the end of the SP room corridors, allowed for the research team to visually monitor, remotely control and, when needed, rearrange the camera angles inside all SP rooms.

Design

A comparative (pre vs. post) design was used to compare the effect of two intervention packages: 1) the experimental intervention—which included an in-person I-PASS workshop and a subsequent online module training on Values and Perspective Taking—and 2) a control intervention—which included the same I-PASS workshop and a different online module on Interpreters in Healthcare. The I-PASS workshop was first provided to both groups simultaneously, and then students received instructions for their randomly assigned online module via a personalized email and hyperlink. Those assigned to the experimental intervention received a hyperlink that directed them to the Values and Perspective Taking module. Those assigned to the control group received a hyperlink that directed them to a module on Interpreters in Healthcare.

Training Content and Materials

The I-PASS workshop and online training modules were adopted from existing materials and research in the healthcare and behavior analytic training literature. Content for the I-PASS workshop was based on a previously developed medical student curriculum provided by O’Toole et al. (2014), available within the MedED Portal online library. Scripts and material covered in the Values and Perspective Taking (i.e., experimental intervention) module were generated from a line of research beginning with Chase et al. (2013) and, more recently, Ward and Houmanfar (Under Review). Subject matter for the Interpreters in Healthcare (i.e., control intervention) module was based on material provided by online resources such as the Certification Commission for Health Care Interpreters and the National Board of Certification for Medical Interpreters.

I-PASS handoff bundle workshop. The 90-minute (in-person) I-PASS workshop included both a lecture and guided patient handoff activity. The lecture content was comprised of three main components, including: 1) the role of communication in medical errors, 2) three elements of the TeamSTEPPS framework (i.e., multi-level teams, shared mental models, and communication), and 3) the instruction on the I-PASS handoff structure and process. The guided activity, which followed the lecture, took place at the end of the workshop and involved the implementation of a “practice” interprofessional handoff. During this time, medical and nursing student pairs—or in some cases, groups of three—were formed and asked to review two assigned patient cases. After the review period was complete, each student briefly provided and received a patient case report to and from their interprofessional peer(s). This exercise and, consequently, the remainder of the training session then concluded with a 10-minute debriefing session.

The materials for the I-PASS workshop included 1) a PowerPoint presentation for visual support during the lecture content and 2) 132 folders—filled with workshop materials—that were compiled for each student participant. The lecture PowerPoint was similar to that found in O’Toole et al. (2014) except that some of the excess content (e.g., videos) was removed to keep the total workshop time condensed to 90 minutes. Participant folders included a “note copy” of the PowerPoint presentation slides, a packet for the patient scenarios needed for the guided activity, and a laminated “pocket card” with the I-PASS mnemonic written out for quick, future reference when needed.

Online modules. The online modules for both interventions followed the same general format. Each was comprised of 30-minutes worth of educational and interactive content and was administered via Qualtrics—an online survey distribution tool. The educational content in each module included several video segments and multiple-choice questions. The video segments, each about one-minute in length, provided learners with a general orientation to a select topic within each module. The experimental intervention module included a basic introduction to the ACTraining literature and a general orientation to values and perspective taking processes. The control intervention module included a basic introduction to the role and proper use of interpreters within healthcare environments. The multiple-choice questions, presented at the end of each video segment, were designed to ensure participant attention to the module content. An inclusion criterion of 75% accuracy was utilized to select participants' performance data for within and between group analyses.

Finally, following the completion of the educational content, the application segment was presented such that participants had the opportunity to apply the information they had just learned to real life scenarios. For the Values and Perspective Taking module, this segment of training involved the application of the learned values and perspective taking skills to one's own life. For the Interpreters in Healthcare module, this segment of training involved application of the learned content to simulated video scenarios. The complete scripts used for both the experimental and control modules can be found in Appendices A and B, respectively.

Dependent Measures

Primary measures. A simulated patient handoff procedure was used as the primary behavioral assessment for this study. Interprofessional communication during these simulations was examined with respect to five behavioral categories dependent on the performer's role in a given handoff scenario. When a participant served as a handoff "provider," frequencies of errors (i.e., mistakes), steps missed (i.e., one aspect of a segment missed), omissions (i.e., entire segments missed), and correct/complete categories of patient information provided, were coded and scored using of a descriptive analysis method (to be described below). When the participant served as the handoff "receiver," the number of correctly "synthesized" categories—based on that learned in the I-PASS mnemonic—were scored. In addition to those described above, the final primary measure for this study was the average duration of patient handoff interactions, which involved both speaker and listener roles.

Descriptive analysis. Primary measures were analyzed using a descriptive analysis method that was introduced in Johnson, Houmanfar, and Smith (2010) and, later (more directly), in Smith, Houmanfar, and Denny (2012). In Johnson et al. (2010), researchers used a referential coding system (see Bijou, Chao, & Ghezzi, 1988) to assess measures of productivity and customer service. This coding system provided a method to quantify, code, and score communication that was originally captured via audio/video recordings. The analytic process involved the a) transcription of audio/video recordings, b) development of operationally defined coding categories, and c) scoring of the transcribed segments with respect to the correctly identified coding category. Smith et al. (2012) recently introduced a refined version of this method, which allowed for

researchers to categorize and quantify communicative statements exchanged between dyad pairs to measure human performance, such as frequencies of correct responding and the duration of verbal interactions.

Based on the methods described above, the primary behavioral measures for this study were examined in three stages, involving 1) transcription, 2) scoring, and 3) result compilation. The transcription stage required trained members of the research team to watch videos of the handoff simulations and transcribe all words exchanged between dyads during the medical and nursing students' handoff interactions. Once all dyads had been transcribed, each sentence was then broken into functional segments for scoring.

For the "provider" role, the scoring process involved matching spoken segments with respect to their corresponding categories of I-PASS (e.g., illness severity, action list; see example in Appendix C) and indicating whether or not the segment provided was a) complete, b) missing, c) erred, or d) omitted. A "complete" segment was scored with a "C" when all of the information for that particular I-PASS category was correct and complete (e.g., Jenny Smith is a 28-year old female). A "missing" segment was scored with an "M" when the segment included correct information, but left out a key portion (e.g., Jenny Smith is a female). "Erred" segments were scored with an "E" when information provided was inaccurate (e.g., Jenny Smith is a 50 year-old female). "Omitted" I-PASS categories were scored with an "O" when no information was provided with respect to a given category at any time during the delivery of a patient case (e.g., the patient's name, age, and gender was skipped entirely).

To examine “synthesis by receiver” performance on the part of the handoff receiver, a frequency count was taken with respect to the number of synthesized (i.e., clarified, summarized) comments pertaining to unique I-PASS categories. In other words, if two comments were made with respect to a particular item on the action list, it was only counted once. Finally, once all individual data sets had been completed, the averaged results for the two patient cases provided and two patient cases received by each participant were compiled into a summary sheet for data analyses.

Interobserver agreement (IOA). Three trained observers were used for the descriptive analyses used in this study. IOA data was collected for 70% of all pre- and post-training scoring. IOA was calculated by dividing the number of agreements by the total number of agreements plus disagreements, multiplied by 100. IOA for pre-training interactions was 95% and IOA for post-training interactions was 97%.

Secondary measures. Secondary measures were collected via an online assessment and two Likert scale assessments that were compiled from the behavior analytic and healthcare education literature. The online assessment—or the Mixed-Trial Implicit Relational Assessment Procedure (MT-IRAP)—was administered through a special program created (and closely monitored by) a faculty member affiliated with the UNSOM. The Likert Scale assessments (described below) were administered online using Qualtrics. A brief description pertaining to each assessment has been provided below.

Mixed-Trial Implicit Relational Assessment Procedure (MT-IRAP). The MT-IRAP is a computerized assessment used to assess implicit relational responding toward a given set of stimuli (e.g., words; Baker et al., 2015; Barnes-Holmes, Waldron, Barnes-

Holmes, & Stewart, 2009; Levin, Hayes, & Waltz, 2010). Implicit, in this case, can be differentiated from *explicit* based on the amount of time allotted for participants to generate a given response (Barnes-Homes, Barnes-Homes, Power, Hayden, Milne & Stewart, 2006). Unlike measures that allow for explicit responding—or sufficient time for response consideration—the IRAP requires rapid, “automatic” responding with respect to the presentation of multiple stimuli. The experimental benefit of using this procedure is that participants are less likely to emit responses that appear most “appropriate” or socially desirable—as with explicit responding—given pressure within the current context (Hughes, Barnes-Holmes, & De Houwer, 2011; Nicholson & Barnes-Holmes, 2012).

In a typical MT-IRAP procedure, there are five stimuli that appear on a screen at any given time: 1) a target stimulus, 2) an evaluative stimulus, 3) the relational response cue, and the two relational response options 4) “yes” and 5) “no” (see Figure 4 for a sample screen shot). For this study, the MT-IRAP was used to assess implicit responding with respect to Cooperative and Individualized work stimuli. The target stimulus—presented at the top of the screen—was randomly selected from a group of 8 stimuli comprised of 4 Cooperative (e.g., teamwork) and 4 Individualized (e.g., on my own) work words (see Table 1 for full list of stimuli). The evaluative stimulus, located directly below the target stimulus, either included the term “Good” or “Bad.” Next, displayed below the evaluative stimulus, the relational response cue—“agree” or “disagree”—was included to provide instruction on how to relationally respond with respect to both stimuli provided above. And, finally, located at the bottom left and right corners of the

screen, the relational response options “yes” and “no” remained available to participants during each set of stimuli presentations.

Attitudes Toward Health Care Teams (ATHCT) Scale. The ATHCT Scale is a 20-item tool on a 4-point Likert scale that was used to determine the effect of IPE on attitudes toward care quality and teamwork (Heinemann, Schmitt, & Farrell, 2002; National Center for Interprofessional Practice and Education). More recently, though, Curran, Sharpe, and Forristall (2007) introduced a modified version of this tool, which includes 14-items rated on a 5-point Likert scale. This adapted version (see Appendix D) was used for the current study.

Readiness for Interprofessional Learning Scale (RIPLS). The RIPLS is a 19-item tool with a 5-point Likert scale used to assess the readiness of healthcare students for interprofessional learning (National Center for Interprofessional Practice and Education; Parsell & Bligh, 1999). 15 of the 19 items from the RIPLS Likert scale were used in this study (see Appendix E).

Social Validity. A satisfaction/feedback form was used to solicit general information about the participant’s experience in the IPE curriculum intervention. The first part of this form asked participants to rate—on a 5 point Likert scale (Very Poor to Very Good)—their overall experience with respect to five intervention categories: the 1) patient handoff simulations, 2) I-PASS training workshop, 3) online module training, 4) online survey completions, and 5) overall training organization. Following the completion of their ratings, participants were asked to a) identify beneficial and/or

challenging components of the experience in an open-ended answer format. Responses were coded and scored with respect to common themes of reported student responses.

Procedure

This study was completed in four experimental phases, which included the: I) Preliminary Cultural Assessment, II) Pre-Intervention Assessment, III) Intervention, and IV) Post-Intervention Assessment. Phase I and Phases II through IV were completed during the first (i.e., Fall 2015) and second (i.e., Spring 2016) semesters, respectively, of the medical and nursing students' undergraduate education. The components comprising each Phase are illustrated in Figure 5 and have been further described below.

Phase I: Preliminary Cultural Assessment. The Preliminary Cultural Assessment involved the administration of the IRAP and RIPLS. Both assessments were introduced in an administration-approved "core" course in the UNSOM and OSON students' curriculum such that all participants were exposed to the assessments at the same time. Immediately following the assessment's verbal introduction, an email was sent out to the students, which included further direction on how to complete and access each tool via an online hyperlink. Students were given the remainder of their class period that day to complete each assessment. If students did not have access to a computer during the allotted class time, they were instructed to complete the assessments at home within 48 hours. Those that did not complete the assessments within this time frame were excluded in the preliminary group analysis.

Phase II: Pre-Intervention Assessment. The Pre-Intervention Assessment was administered in two parts: online and in-person. The online portion involved the completion of a participant demographic form and the adapted ATHCT scale. The in-person (and behavioral) portion included the patient handoff simulation.

Phase II: Online Assessment. Similar to Phase I, students received a personalized hyperlink to complete each online assessment via email. A 48-hour window was allotted to open and complete the assessments using a home or campus computer. Course credit (in the course that housed the IPE intervention) was made contingent on full assessment completion.

Phase II: Patient Handoff Simulation. For the patient handoff simulation, participants were randomly assigned to one of five “waves”—or pre-arranged student groups. Each “wave” was comprised of an equally distributed ratio of medical to nursing students (e.g., 14:14) and was expected to report to the handoff simulation at a specified time. Given that the medical student participants outnumbered the nursing students, confederate nursing students were asked to serve as dyad partners for 6 of the medical students in the final wave. These 6 students were volunteer, upper division nursing students whose data was excluded from this study.

Upon arrival, students completed a simulation orientation led by a member of the research team. The purpose of this orientation was to provide instruction related to the simulation content and process (see Figure 6). Following orientation, the medical and nursing students were guided to two separate classrooms, where they were allotted 15-minutes, a black pen, and a 3” x 5” note card to review two patient cases. All medical

students received cases A and B and all nursing students received cases C & D. Representatives of the research team were stationed at the entrance of each room to supervise participant behavior during this period. Each case (written in paragraph format) provided general information about the given patient, including: his/her current illness severity, medical history, and action items for the medical team. Nothing further about the case, other than that explicitly provided, was to be assumed or further diagnosed.

After the review period was completed, both student sets were guided to a randomly assigned SP room, where they met their handoff partner. The 14 SP rooms were arranged in 2 rows of 7 such that entrance was accessible through either an inside or outside hallway corridor. Nursing students entered their assigned rooms via the inside hallway corridor and medical students via the outside hallway corridor. This arrangement was made for two reasons: 1) the medical students were responsible for activating the audio/video recording for each session by logging into “B-line”—an online system accessible through only the outside corridor—and 2) the research team wanted to ensure that the participants were unaware of their partner until they had completely entered their assigned SP room.

After entering the SP rooms, participants were instructed to handoff both patient cases to their assigned interprofessional partner in a particular order. The front 7 SP rooms (i.e., rooms 1-7) displayed instruction for the medical students to provide their reports first and have the nursing students follow with theirs. In the back 7 SP rooms (i.e., rooms 8-14), the instruction was reversed (i.e., medical followed nursing).

Following the completion of all patient case deliveries, participants submitted their note cards to a member of the research team and exited through the same corridors by which they had originally entered. Lastly, before leaving the building, a debriefing form (provided at the end of each corridor) was distributed to participants as they exited for the day. This half-sheet form had information about the remaining study phases and, if interested, methods to contact the research team with questions.

Phase III: Intervention. The Intervention Phase was completed one-week following the Pre-Intervention Assessment and consisted of two training components: 1) the 90-minute, in-person workshop on the I-PASS handoff bundle and 2) a (subsequently completed) 30-minute online training module.

Phase III: I-PASS handoff bundle workshop. Led by a physician and hospital administrator from the Reno community, the I-PASS workshop took place in the same lecture hall described above. Upon entrance to the training, participants were asked to a) sign-in with a member of the research team (to confirm their attendance) and b) find a seat in accordance with a “color-assigned” folder (i.e., blue for medical students; green for nursing students). Though each folder contained the same materials necessary workshop completion (e.g., a copy of the presentation with note slides, handouts for the guided activities) the purpose of the color distinction was to ensure that students from one health profession (e.g., medical student) were seated next to students from the other (e.g., nursing student). The content (adopted from O’Toole et al. [2014]) covered during the I-PASS workshop has already been described above (see “Independent Variables”).

Phase III: Online modules. Immediately following the completion of the I-PASS workshop, participants received an email with general instructions about, and a hyperlink to, their assigned online training module. Module assignments were randomly distributed as follows: 65 (34 medical and 31 nursing) students received a personalized link to the module on Values and Perspective Taking (i.e., experimental intervention) and 67 (35 medical and 32 nursing) students received a personalized link to the module on Interpreters in Healthcare (i.e., control intervention). Similar to the previous online requirements, students had two days from the reception of their personalized email (i.e., the day of the I-PASS training) to complete their assigned module training.

Phase IV: Post-intervention assessment. One-week following the I-PASS workshop, participants received an email with instruction on, and hyperlinks to, the completion of the Post-Intervention Assessment. The Post-Intervention Assessment included a) a second patient handoff simulation, b) a second administration of the IRAP, ATHCT, and RIPLS, and c) the completion of a satisfaction/feedback form. The patient handoff simulation and online survey administrations followed the same procedures as those used during Phase II. Also, as with previous phases, participants had two days to complete the online assessments and course credit (in the course that housed the IPE experience) was made contingent on full assessment completion.

Data inclusion criterion. Following the completion of all experimental phases, an inclusion criterion was used to determine eligible data sets for the final analyses. To ensure treatment integrity, participant data sets were excluded if students a) missed/did not complete an entire segment of training (i.e., the I-PASS workshop or

their assigned online module), b) failed to meet the minimum accuracy of 75% or higher on their online modules, or c) missed/did not complete 3 or more of the pre- and post-training assessments. Fourteen (5 medical and 9 nursing) out of the 132 students (i.e., 10.6%) met this criterion, leaving the final participant count for data analysis at 118. The demographic information pertaining to these data sets are presented in Table 2.

Results

The following sections provide an overview of results pertaining to performance data for participants who met the inclusion criterion. A summary of overall findings with respect to changes in handoff provider and receiver performance for both the experimental and control intervention groups will be presented first. Next, a series of statistical analyses pertaining to the experimental findings will be provided.

Primary Dependent Measures

Patient handoff simulation: Between-group summary. Figure 7 provides a visual depiction of the results for the pre- and post-training patient handoff simulations. Group results for those who completed the experimental intervention are shown in the top panel and group results for those who completed the control intervention are shown in the bottom. Overall, independent of intervention type, handoff providers demonstrated an increased frequency in correct information, and decreased frequencies in missing, erred, and omitted information delivered to the handoff receivers. Additionally, handoff receivers displayed an increase in the number of synthesized I-PASS categories offered to the handoff providers.

Figure 8 displays this information differently by focusing specifically on the pre- to post-training changes for both interventions. Based solely on average change, those who completed the experimental intervention demonstrated a stronger improvement in the correct ($M = 3.25, SD = 3.00$ vs. $M = 2.91, SD = 2.53$), erred ($M = -0.83, SD = 0.75$ vs. $M = -0.70, SD = 0.99$), omitted ($M = -3.25, SD = 2.55$ vs. $M = -2.89, SD = 2.33$), and synthesized I-PASS categories ($M = 3.31, SD = 2.46$ vs. $M = 3.16, SD = 2.53$). This change between groups, however, was not found to be statistically different in any mentioned category ($p = .80, .64, .69, .19$, respectively). Accordingly, statistical analyses were conducted to examine more specific differences observed in provider and receiver performance based on several experimental factors (i.e., predictors) reported for all student participants.

Patient handoff simulation: Provider performance. A general linear model was used to examine change in provider performance for both interventions. This model followed an analysis of variance (ANOVA) procedure, which uses a least squares regression to examine relationships between a given number of predictors and a select continuous variable. The predictors used in this analysis were: intervention type (i.e., experimental or control), student affiliation (i.e., medical or nursing), gender (i.e., male or female), and previous handoff experience (i.e., prior history or none). The continuous variables were the improvement scores with respect to the changed (i.e., increased or decreased) instances of correct, missing, erred, and omitted information provided during the handoff simulations. In addition to examining main effects—or the relations between one predictor and a given continuous variable—this model also included an

analysis of two-way interactions between intervention type and each of the other three predictors (i.e., student affiliation, gender, and previous handoff history).

Correct instances of handoff communication. Table 3 provides a summary of results for the increased frequencies of correct/complete handoff responses. Overall, I-PASS was shown to be effective, as all participants demonstrated an average increase of 3.08 ($SD = 2.77$) correct responses, which was significantly greater than 0 (i.e., no change), $F(1,110)=29.82, p < .0000003, \eta_p^2 = .21$. No effects pertaining to instances of correct information emerged based on intervention type $F(1,110)=.07, p = .80, \eta_p^2 = .001$, student affiliation $F(1,110)=1.50, p = .224, \eta_p^2 = .01$, or gender $F(1,110)=2.02, p = .16, \eta_p^2 = .02$ were observed. There was, however, an effect based on previous handoff experience, $F(1, 110) = 3.36, p = .07, \eta_p^2 = .03$. Students without previous handoff experience showed greater levels of improvement in correct instances of handoff communication than those with such experience ($M = 3.24, SD = 2.75$ vs. $M = 1.85, SD = 2.76$).

Missing instances of handoff communication. Table 4 provides a summary of results pertaining to the decreased frequency of missing information. Across intervention groups, the average change was -0.051 ($SD = 1.11$), which was *not* significantly greater than 0, $F(1,110)=2.018, p = .158$. Given these findings, no other main effects with respect to decreased instances of missing information will be reported.

Erred instances of handoff communication. Table 5 provides a summary of results pertaining to providers' erred communication. An average improvement of -0.77 ($SD = 0.87$) was observed in all participants, which was substantially below 0, $F(1, 110) = 40.40$, $p < .00000005$, $\eta_p^2 = .27$. No effects pertaining to intervention type $F(1,110)=.22$, $p = .64$, $\eta_p^2 = .002$., student affiliation $F(1,110)=.1.71$, $p = .19$, $\eta_p^2 = .02$, or previous handoff experience $F(1,110)=.10$, $p = .76$, $\eta_p^2 = .001$ were observed. A main effect, however, was found with respect to gender, $F(1, 110) = 3.30$, $p = .072$, $\eta_p^2 = .029$. Male students, on average, had a larger decrease in errors ($M = -0.93$, $SD = 1.16$) than compared to female students ($M = -0.68$, $SD = 0.67$).

A two-way interaction for error reduction was also observed between intervention type and student affiliation, $F(1, 110) = 4.57$, $p = .035$, $\eta_p^2 = .04$. The experimental intervention (i.e., I-PASS plus Values and Perspective Taking) was equally effective for both nursing and medical students in reducing errors ($M = -0.84$ vs. $M = -0.98$, respectively), pairwise comparison $p = .55$. However, the control intervention (i.e., I-PASS plus Interpreters in Healthcare) was more effective in reducing errors in nursing students than compared to medical ($M = -1.08$ vs. $M = -0.49$), pairwise comparison $p = .018$. Also, when comparing the intervention type for each student group separately, a statistical trend indicated an advantage of the experimental intervention for medical students, $p = .10$; whereas, no evidence of differential effectiveness was found among nursing students, $p = .48$.

Omitted instances of handoff communication. Table 6 provides a summary of results pertaining to decreased omission rates for the handoff provider communication. On average, omissions decreased by -3.08 ($SD = 2.44$) responses for all participants, which was substantially below 0, $F(1, 110) = 46.43, p < .0000000005, \eta_p^2 = .30$. No effects pertaining to decreased omission rates with respect to intervention type $F(1, 110) = .16, p = .69, \eta_p^2 = .001$, gender $F(1, 110) = 1.21, p = .27, \eta_p^2 = .01$, or previous handoff experience $F(1, 110) = 2.46, p = .12, \eta_p^2 = .02$ were observed. A main effect, however, was found with respect to student affiliation, $F(1, 110) = 11.02, p = .001, \eta_p^2 = .091$. Medical students, on average, had a larger decrease in omissions ($M = -3.70, SD = 2.55$) than compared to nursing students ($M = -2.33, SD = 2.09$).

Patient handoff simulation: Receiver performance. The handoff receiver performance analysis showed an increase in the number of synthesized comments from pre- to post-training ($M = 3.24, Md = 3.5$). The distribution of this difference, however, was heavily skewed with many individuals showing no increase at all ($n = 22$), and some individuals ($n = 5$) even showing a decrease, ranging from -0.5 to -2.5 (see Figure 9). Given this finding, a hurdle regression—which allows for the analysis of a mixture model— was used to further analyze change in synthesized comment frequencies. As a first logical step, individuals who benefited from the IPE intervention—or showed an increase in number of synthesized comments (i.e., “learners”)— were distinguished from those who demonstrated either a) no change or b) a negative change (i.e., “non-learners”). Next, those who cleared this “learning” hurdle were analyzed as a separate

participant subset. This subsequent analysis considered the level of significant training impact for those who did demonstrate positive comment change.

In the first part of the model, differences among learners and non-learners were distinguished based on intervention type, student affiliation, gender, and whether or not participants had previous handoff experience. Overall, there was confirmation that learning did occur among all participants, $b = 2.32$, $se = 0.68$, $p = 0.001$. However, gender was the only significant predictor, showing that men improved more than women, $b = -0.92$, $se = 0.34$, $p = 0.006$. No reliable effects emerged for intervention type, $b = 0.35$, $se = .27$, $p = 0.19$, student affiliation $b = -0.33$, $se = .29$, $p = 0.24$, or previous handoff experience, $b = 0.16$, $se = 0.43$, $p = 0.71$. Also, within the group of learners—which were analyzed in the second part of the model—no predictors demonstrated significance (see Table 7).

Patient handoff simulation: Handoff Duration. Similar to that used to examine changes in handoff provider performance, a general linear model was used to determine pre- to post-training changes in average handoff duration. Overall, participants (independent of intervention type) demonstrated a significant increase in their average time to handoff completion ($M = 9.57$ seconds, $SD = 30.93$), $F(1,110)=4.00$, $p < .05$, $\eta_p^2 = .04$. No specific effects pertaining to average duration changes, however, emerged based on intervention type $F(1,110)=.001$, $p = .98$, $\eta_p^2 < .001$, student affiliation $F(1,110)=1.32$, $p = .25$, $\eta_p^2 = .01$, gender $F(1,110)=.39$, $p = .54$, $\eta_p^2 = .003$,

previous handoff experience $F(1,110)=.04$, $p = .85$, $\eta_p^2 < .001$, or any of the earlier mentioned two-way interactions (see Table 8).

Two correlational analyses were conducted to further examine the relationship between average changes in handoff performance and duration. A Pearson correlation, which focused on the relationship between provider performance (i.e., changes in correct, missed, erred, and omitted information) and average changes in duration, revealed a statistical trend with respect to both a) the increased frequency of correct information ($r = .16$, $n = 118$, $p = .09$), and b) the decreased frequencies of erred ($r = -.16$, $n = 118$, $p = .09$) and omitted ($r = -.17$, $n = 118$, $p = .06$) information. A Spearman's correlation, which allows for the analysis for nonparametric measures, was used to examine the relationship between changed frequencies of synthesized comments and average time for completion. Results indicated a statistically significant, positive correlation between the number of synthesized comments offered and the average time to handoff completion ($r_s = .36$, $p < .001$).

Secondary Dependent Measures

MT-IRAP. Figures 10 through 12 present the pre- and post-training average MT-IRAP scores for each singular (e.g., "Alliance") and list level (e.g., all Cooperative work stimuli) stimulus set. Comparisons for each relational combination—involving either a Cooperative or Individualized work stimulus and either the evaluative stimulus "Good" or "Bad"—were examined at the between (i.e., experimental vs. control) and within (i.e., medical vs. nursing) group levels. Observed differences (i.e., increases or

decreases) in the average MT-IRAP scores indicate a change in either strength (e.g., greater or lesser) or direction (i.e., positive or negative) of the stimulus relation made with respect to given a target and evaluative stimulus combination. In other words, increased MT-IRAP scores (e.g., from .18 to .22), post intervention, represent a stronger implicit relation between a target stimulus (e.g., Alliance) and the evaluative stimulus “Good.” Whereas, a decrease in average participant scores signifies greater relational strength with respect to a given target stimulus (e.g., Alliance) and the evaluative stimulus “Bad.”

Between group comparisons. Participants who completed the experimental intervention (see Figure 10, top panel), demonstrated an increase in their average MT-IRAP score for three of the four singular Cooperative work stimuli: Alliance ($M = .51, SD = .96$ vs. $M = .73, SD = .61$) Consideration of Others ($M = .46, SD = .75$ vs. $M = .52, SD = .62$), and Partnership ($M = .48, SD = .82$ vs. $M = .79, SD = .74$). Of these stimuli, the only change approaching significance was Partnership, $p = .07$. For the singular Individualized work stimuli, 2 of the 4 MT-IRAP scores demonstrated an increase—On My Own ($M = .05, SD = 1.04$ vs. $M = .06, SD = .99$) and Survival of the Fittest ($M = -.12, SD = .79$ vs. $M = -.08, SD = .78$). The remaining 2—Doing it My Way and Flying Solo—demonstrated a decrease ($M = .17, SD = .88$ vs. $M = -.01, SD = .85$; $M = .15, SD = .87$ vs. $M = .16, SD = .89$). Neither change, however, yielded statistical significance.

In opposition to the experimental group, participants who completed the control intervention (see Figure 10, bottom panel) demonstrated a decrease in MT-IRAP scores for three of the four singular Cooperative work stimuli: Alliance ($M = .66, SD = .88$ vs. M

= .54, $SD = .78$), Consideration of Others ($M = .61, SD = .70$ vs. $M = .57, SD = .87$), and Team Player ($M = .51, SD = .68$ vs. $M = .40, SD = .65$). Similar to the experimental group, though, 2 of the 4 singular Individualized work stimuli demonstrated an increase in average MT-IRAP score: Flying Solo ($M = -.24, SD = 1.01$ vs. $M = -.21, SD = 1.02$.) and On My Own ($M = -.05, SD = 1.07$ vs. $M = .22, SD = .90$). The remaining 2—Doing it My Way ($M = .10, SD = 1.00$ vs. $M = -.08, SD = .87$) and Survival of the Fittest ($M = -.03, SD = .95$ vs. $M = -.08, SD = .85$)—demonstrated a decrease. No significant changes with respect to any mentioned stimulus combination in the control group were observed.

Within group comparisons: Experimental intervention. Statistical analyses also were conducted to examine pre- to post-training differences for medical and nursing students who completed the experimental intervention. At the list level (i.e., all Cooperative vs. all Individualized work), medical students (Figure 11, top panel), on average, demonstrated a decrease in MT-IRAP scores with respect to the Cooperative work stimuli ($M = .62, SD = .64$ vs. $M = .54, SD = .57$) and an increase in MT-IRAP scores with respect to the Individualized work stimuli ($M = .20, SD = .68$ vs. $M = .23, SD = .60$). At the singular stimulus level, increases and decreases in MT-IRAP scores were equally distributed across Cooperative and Individualized work stimulus categories. MT-IRAP scores increased for 2 singular Cooperative work stimuli [Alliance ($M = .57, SD = 1.06$ vs. $M = .76, SD = .69$) and Partnership ($M = .68, SD = .91$ vs. $M = .75, SD = .86$)] and 2 singular Individualized work stimuli [Survival of the Fittest ($M = -.12, SD = .88$ vs. $M = -.006, SD = .94$) and Doing it My Way ($M = .36, SD = .90$ vs. $M = .40, SD = .72$)], while the

other 4 target stimuli demonstrated a decrease in the average observed MT-IRAP scores. None of these changes were shown to be statistically significant.

For the nursing students (Figure 11, bottom panel), all singular Cooperative work stimuli demonstrated an increase in the average participant MT-IRAP score post training. This change was statistically significant at both the list level for the Cooperative work stimulus category ($M = .38, SD = .48$ vs. $M = .67, SD = .46$), $p = .05$ and at the singular stimulus level for Partnership ($M = .19, SD = .55$ vs. $M = .83, SD = .58$), $p = .001$. As for the singular Individualized work stimuli, nursing students generally performed opposite of the medical students. Nursing students demonstrated an increase in MT-IRAP scores with respect to Flying Solo ($M = -.12, SD = 1.04$ vs. $M = .11, SD = 1.06$) and On my Own ($M = -.23, SD = 1.18$ vs. $M = -.12, SD = 1.33$), and a decrease with respect to My Way ($M = -.23, SD = .74$ vs. $M = -.56, SD = .71$) and Survival of the Fittest ($M = -.13, SD = .60$ vs. $M = -.16, SD = .55$). None of the singular or list level stimuli for the Individualized work stimulus set yielded statistical significance.

Within group comparisons: Control intervention. Similar to with the experimental group, statistical analyses were conducted to examine pre- to post-training differences for medical and nursing students who completed the control intervention. On average, medical students in the control group (Figure 12, top panel) demonstrated a decrease and increase in MT-IRAP scores with respect the list level Cooperative work ($M = .63, SD = .66$ vs. $M = .59, SD = .66$) and Individualized work stimulus sets ($M = -.10, SD = .74$ vs. $M = -.005, SD = .93$), respectively. At the singular stimulus level, increases and decreases in MT-IRAP scores were also distributed across

each Cooperative and Individualized work stimulus category. MT-IRAP scores increased for 2 singular Cooperative work stimuli [Consideration of others ($M = .62, SD = .69$ vs. $M = .71, SD = .98$) and Partnership ($M = .67, SD = 1.00$ vs. $M = .74, SD = .88$)] and a singular Individualized work stimulus [On My Own ($M = .01, SD = .98$ vs. $M = .21, SD = 1.14$)], while the other 5 target stimuli (i.e., Alliance, Team Player, Doing it my Way, Flying Solo, and Survival of the Fittest) demonstrated a decrease in the observed average MT-IRAP score. None of these changes were shown to be statistically significant.

Similar to the medical students in the control group, the nursing students (Figure 12, bottom panel) exhibited a decrease and increase in average MT-IRAP scores with respect to the Cooperative ($M = .51, SD = .60$ vs. $M = .48, SD = .48$) and Individualized work ($M = -.04, SD = 1.12$ vs. $M = .06, SD = .43$) stimulus sets at the list level. As for the singular target stimuli, nursing students in the control group generally performed opposite to those within the experimental group. Decreases in average MT-IRAP scores were found with respect to each singular Cooperative work stimulus. Increases with respect to 3 singular Individualized work stimuli (Flying Solo, On My Own, and Survival of the Fittest) were also observed post training ($M = -.29, SD = 1.19$ vs. $M = .009, SD = .68$; $M = -.17, SD = 1.27$ vs. $M = .23, SD = .46$; $M = -.01, SD = 1.13$ vs. $M = .02, SD = .76$). None of these singular or list level stimuli for this nursing student group resulted in statistical significance.

ATHCT. A two-way ANOVA was used to compare the mean differences of the ATHCT change scores between each experimental group and two factors: intervention type and student affiliation. A summary of the results and a mean plot from this analysis

are provided in Table 9 and Figure 13, respectively. Overall, participants in the experimental group demonstrated a more positive change than compared to those in the control group ($M = -.06$ vs. $M = -.47$). This between group effect, however, was not statistically significant, $F(1, 114) = .15, p = .70$. Also, though medical students on average rated the ATHCT higher than nursing students within each group ($M = .31$ vs. $M = -.85$), this effect was not statistically significant $F(1, 114) = 1.24, p = .27$.

RIPLS. Similar to the ATHCT, a two-way ANOVA was used to compare the mean differences of the RIPLS change scores between each experimental group and two factors: intervention type and student affiliation. A summary of the results and a mean plot from this analysis are provided in Table 10 and Figure 14, respectively. Overall, participants in the experimental group demonstrated a more positive change than compared to those in the control group ($M = -2.80$ vs. $M = -3.15$). This between group effect, however, was not statistically significant, $F(1, 109) = .037, p = .85$. Also, though medical students on average rated the RIPLS higher than nursing students within each group ($M = -2.79$ vs. $M = -3.15$), this effect was not statistically significant $F(1, 109) = .038, p = .85$.

Social Validity

A summary of the participant experience ratings is provided in Table 11. On average, independent of intervention type or student affiliation, the “interprofessional patient handoff simulation” ($M = 3.28, SD = 1.02$), “I-PASS training workshop” ($M = 3.22, SD = 1.13$), and “overall training organization” ($M = 3.31, SD = 0.96$) were the top three-rated experience categories. Figure 15 provides a visual representation of the number of

comments made with respect to the most “beneficial” (top panel) and “challenging” (bottom panel) aspects of the intervention. Overall, the most frequently reported “beneficial” and “challenging” aspects were focused on a) the interprofessional handoff simulation experience and b) the understanding and application of I-PASS, respectively. An additional descriptive summary (i.e., “word cloud”) of the open-answered comments made with respect to each “beneficial” (top panel) and “challenging” (bottom panel) question has also been included Figure 16. Each comment “cloud” was created such that words used most frequently are represented in greater proportions (i.e., size) than those used less often.

Discussion

This study served as an initial attempt to utilize the I-PASS handoff bundle within the context of an IPE intervention package. Unlike previous I-PASS research, which has only examined the impact of the I-PASS bundle with respect to one healthcare provider population at a time (Starmer et al., 2013; Starmer et al., 2014), the present research introduced a modified version of the I-PASS curriculum to provide training for both medical and nursing students simultaneously. Results demonstrated similar findings to that which has generally been shown in the literature—enhanced communication during handoffs for those serving in both the provider (i.e., increased accuracy, decreased errors and omissions) and receiver (i.e., increased frequency of synthesized comments) roles (Starmer et al., 2013; Starmer et al., 2014). The additional contribution of this study is that performance improvement rates were observed *interprofessionally*, across both medical and nursing student populations.

This study also served as a preliminary attempt to provide a combined IPE intervention involving both group learning (i.e., I-PASS) and individual skill training in the area of values and perspective taking (Baker, Gustafson, Beaubien, Salas, & Barach, 2003; Sands et al., 2008). This experimental training package—comprised of the I-PASS handoff bundle and an online module on Values and Perspective Taking—was examined with respect to primary (i.e., handoff performance) and secondary measures (e.g., implicit relational responding) and compared to that of a control training package—comprised of the same I-PASS handoff bundle and an online module on Interpreters in Healthcare. For the primary dependent measures, which included frequencies of handoff provider and receiver communication, no statistical differentiation was found based on intervention type. There were, however, several predictors that were significantly related to performance improvement for all participants served in both provider and receiver roles.

Primary dependent measures. The predictors used in our statistical analyses were based on that which was reported in the student demographic survey: student affiliation (i.e., medical or nursing), gender, and previous handoff experience. Moreover, average increases in the frequency of correct information provided by handoff “providers” was significantly impacted by students’ previous handoff experience. Those without prior experience demonstrated greater improvement as compared to those with such experience. Also, gender was found to be a factor in the average change in erred and synthesized comments reported. Males demonstrated a greater decrease in errors and increase in synthesized comments than compared to their female

counterparts. Last, student affiliation was statistically related to the change in frequency of patient information omissions. On average, medical students demonstrated a larger decrease in patient omissions as compared to nursing.

Two-way interactions involving the consideration of a) intervention package and b) the abovementioned predictors were also statistically examined. A significant interaction, involving package type and student affiliation, was found with respect to decreased rates of erred information. Though the experimental package was shown to be equally effective for both medical and nursing students overall, differential preference—decreased rates of erred information—was observed within each student population. Medical students who completed the experimental intervention demonstrated a larger decrease in erred information than compared to those in the control; whereas, the opposite was shown within nursing—the control package demonstrated a larger impact than compared to the experimental.

Descriptive analysis methods. The ability to examine interprofessional communication with respect to the aforementioned performance categories (i.e., frequencies of correct, erred, omitted, and synthesized information) was made possible via the use of descriptive analysis methods. Prior to this study, communication performance among healthcare providers has generally been measured with respect to subjective and/or result-based rating scales (Baker & Durham, 2013; O’Toole et al., 2014). Appendix F provides an example of such a tool that is currently being used to observe and assess handoff communication in accordance with the I-PASS protocol. With these kinds of tools, performers are limited in the feedback they receive, as

observer reporting is based on overall results (e.g., patient summary was “never” or “always” provided) instead of specific, modifiable behaviors (e.g., *what* information was provided or omitted with respect to patient summary). Further, without a more detailed understanding of where errors are occurring and why (e.g., errors vs. omissions), the performer will be unable to correct faulted behavior (i.e., erred communication) in the future.

The descriptive analysis method used in this study, serves as a significant contribution to the interprofessional communication literature as it has allowed for the identification of where errors are occurring, within each medical and nursing student handoffs, and for what reasons. The transcription, coding, and scoring process made this possible by assessing qualitative information (i.e., handoff communication) *quantitatively*. In doing so, an IOA protocol was introduced to examine the individual communication segments *objectively*—involving two separate scoring personnel. The resulting product then allowed for the identification of correct vs. erred information based on *different* coding *categories* (e.g., missed units of information, inaccurately provided information, and information that was omitted entirely). Finally, having completed this analytic process, performance change with respect to each communication category was able to be examined pre and post completion of two separate intervention packages.

The ability to identify a) where errors are occurring during handoffs and b) what aspects of those errors can successfully be targeted via communication interventions is vital for healthcare organizations. Having access to this information will allow for

enhanced decision-making capabilities with respect to time and resources allocated to current and/or future communication interventions. If, for instance, a leader (e.g., course instructor, departmental director, etc.) is aware of current levels of performance (e.g., high omissions during patient summaries), and what interventions have historically improved target behaviors relevant to that performance (e.g., more training on how to conduct a patient summary), they will be better equipped to make decisions about what aspects of training need to be introduced to their students, employees, etc.—and do so in a cost effective manner (e.g., there is no need to spend time or money for training on the action list segment).

Changes in implicit relational responding. In addition to the consideration of communication analyses, the MT-IRAP was used to examine change in implicit relational responding with respect to Cooperative and Individualized work stimuli. Though no significant change was reported for either group, differential changes in average MT-IRAP scores at the list level (i.e., the averages of all Cooperative work stimuli and all Individualized work stimuli) were observed following the completion of both intervention packages. Combined results for medical and nursing students from the experimental intervention (involving the Values and Perspective Taking module) demonstrated an increase in average MT-IRAP scores for the Cooperative work stimuli, and a decrease in MT-IRAP scores for the Individualized work stimuli. This change in MT-IRAP scores indicates a greater relational strength with respect to a) the Cooperative work stimuli and the evaluative stimulus “Good” and b) the Individualized work stimuli and the evaluative stimulus “Bad” following intervention completion. Combined results

for medical and nursing students who completed the control intervention (which included the Interpreters in Healthcare module), on the other hand, demonstrated the opposite trend: increased relational strength with respect to a) the Cooperative work stimuli and the evaluative stimulus “Bad” and b) the Individualized work stimuli and the evaluative stimulus “Good.”

One potential moderator for the abovementioned changes relates to student affiliation. For medical students, MT-IRAP results equally fluctuated across categories independent of intervention type. Two of the four Cooperative work stimuli demonstrated an increase in MT-IRAP scores; whereas, the remaining two demonstrated a decrease in MT-IRAP scores for both training packages. With nursing students, however, MT-IRAP results for the Cooperative and Individualized work stimuli were found to oppose one another based on group assigned intervention. For the experimental group, all MT-IRAP scores for Cooperative work stimuli showed an increase in relational strength with respect to the stimulus “Good,” and two of the four individual stimuli (Doing it My Way and Survival of the Fittest) showed an increase in relational strength with respect to the stimulus “Bad.” With the control group, conversely, all four Cooperative work stimuli resulted in a heightened association with the evaluative stimulus “Bad,” and three out of the four individual stimuli resulted in a heightened association associated with the evaluative stimulus “Good” (Flying solo, On my Own, and Survival of the Fittest).

Experimental intervention: Nursing students. The nursing student group who completed the experimental intervention yielded several changes in their average MT-

IRAP scores that are of particular interest to the current study. First, the MT-IRAP scores for all Cooperative work stimuli demonstrated an increase in average relational strength with respect to the evaluative stimulus “Good.” This general increasing trend may appear to be somewhat expected, given the nature of the nursing profession (O’Daniel & Rosenstein, 2008); yet, this same pattern was not shown to be the case for the nursing students who completed the control intervention. Next, of the Cooperative work stimuli that demonstrated this MT-IRAP score change, “Partnership” was the only stimulus that resulted in a statistically significant difference. The term “Partnership”—defined by Merriam-Webster Dictionary as “the state of being partners”—is especially worth highlighting as it suggests more of a “stakeholder” approach to a given team dynamic. For this reason, partnership can be differentiated from terms such as “Alliance,” “Consideration of Others,” and “Team Player,” as it represents much more than a union or a successful coordination among members in a given group. Partnership, instead, may provide the perception of a collaborative relationship between two or more individuals who each hold an *equal* role.

In addition to that above, it should also be noted that the increased scores for the Cooperative work stimuli did not infer a subsequent suppression or reduction of relational strength pertaining to the Individualized work stimuli. As mentioned in Levin et al. (2010), this is likely due to the notion that all stimuli assessed on the MT-IRAP must be considered independently and with respect to an individual’s unique relational histories (Levin et al., 2010). For the nursing students within the experimental group, there were two Individualized work stimuli that, similar to the Cooperative work stimuli,

demonstrated an increase in implicit relational responding with respect to the evaluative stimulus “Good.” These particular stimuli— “Flying Solo” and “On My Own”— were two phases that represent a position of confidence and self-sufficiency in the workplace. Being able to “fly solo” or “work on one’s own” often represents a mastery of skill and/or potential autonomy with respect to one’s decision-making capability.

The aforementioned changes have important implications for medical errors involving nurse performance in the workplace. To begin, the literature on communication failure places the withholding of pertinent patient information as a leading cause of medical error in healthcare settings (Joint Commission, 2006; Joint Commission, 2016). Often times, the root cause of this issue relates to the presence of hierarchical cultures where nurses are afraid to “challenge” physicians or voice their opinions publicly (Nadaolski et al., 2006; O’Daniel & Rosenstein, 2008; Sutcliffe, et al., 2004). Given that changes in implicit relational responding have been shown to serve as predictors for overt behavior (Carpenter, Martinez, Vadhan, Barnes-Holmes, & Nunes, 2012; Levin et al., 2010; Nicholson & Barnes-Holmes, 2012), increases in implicit relational responding with respect to stimuli such as “Partnership,” “Flying Solo,” and “On my Own,” may be correlated with an increased likelihood for nurses to speak up during instances where they may feel a patient is at risk for harm. Future research may further explore this probability by examining nurse behavior (e.g., frequency of “challenges” or speaking up) during nurse-physician interactions under the presence or absence of hierarchical contingencies.

Overall implications. The implications of this study highlight the contribution of behavior analytic assessment and intervention methods with respect to the training and measurement of interprofessional communication in both the healthcare education and clinical settings. With regard to assessment, descriptive analysis methods may be used to pinpoint and target aspects of communication accuracies and failures during the completion of interprofessional patient handoffs. Results from this detailed level of analysis can then be further used to inform the design of future healthcare interventions. Having identified which aspects of a given communication process need improvement, health professionals may also be able to cut down on time and resources that would be otherwise allocated for future, unnecessary trainings (e.g., if provider is only having difficulties with one aspect of the handoff protocol, training should only be introduced to target that).

The behavior analytic assessment of implicit relational responding—as captured by the MT-IRAP—may also serve as a beneficial tool to enhance the understanding and prediction of interprofessional communication as related to psychological factors in the workplace. As a starting point, Pham et al. (2012) mentions how “hierarchical barriers [within healthcare settings] are often implicit” (p. 454). The assessment of implicit stimulus relations involving (vertical or horizontally oriented) hierarchical stimuli, thus, may provide healthcare leaders insight into the various social contingencies that may be impacting effective communication among providers. Further, if the presence of hierarchical contingencies is detected (e.g., physician-nurse hierarchies), healthcare leaders may then use this information to consider the implementation of interventions,

which target hierarchical barriers (e.g., nurse not speaking up) to decrease the likelihood of communication failure and, as a result, medical errors.

As a potential intervention to begin targeting pro-cooperative workplace relations, the experimental training package—involving the Values and Perspective Taking online module—demonstrated enhanced performance during interprofessional communication and increased positive relations with respect to Cooperative work stimuli. Though the increase in implicit relational responding was not found to be statistically significant, average group results in the experimental intervention demonstrated an opposite trend when compared to the results observed in the control intervention group. In particular, this intervention package appeared to be most effective with the nursing students who demonstrated a significant increase with respect to the term “Partnership,” and additional increases with respect to the stimuli “Flying Solo” and “On my Own.”

Limitations. There were a number of limitations associated with this study. The first relates to schedule coordination between the medical and nursing school. In order to effectively provide this curriculum intervention, a course within each groups’ curriculum had to be designated as the “host” for the allotted time periods. This process involved meeting with several instructors from both academic institutions to coordinate dates and *borrowed* time, for the 4.5 hours of training and assessment. The best scheduling option for both groups required that students complete the intervention process across three separate days—later referred to as “Phases II through IV.” The main limitation associated with this split, relates to the delay between the I-PASS

training and the post-training handoff simulation assessment. Several students reported difficulties with having the week delay and having to recall the I-PASS mnemonic without having any discussion about the content since the training.

A second limitation involved the handoff simulation procedure. While the student pairs were in the SP rooms completing their patient handoffs, they were not allowed to have any materials besides the 3" x 5" card they had used to write notes on during their allotted vignette review periods. This was a great resource for students when *providing* their patient handoffs, but made it challenging for those who were in the *receiving* role. Students mentioned difficulties with remembering the information they had received from their handoff partners without having materials (i.e., pen and paper) to take notes during the delivery process. This limitation may have further impacted the frequencies at which handoff receivers provided synthesized comments.

An additional area for potential improvement involves the measurement of engagement during participant completion of the in-person I-PASS workshop. For this study, medical and nursing students were checked in to the workshop session via a sign in sheet to measure attendance of those physically present. There were no measures taken, however, to ensure medical and nursing students' active responding to the content presented. Given the significant improvements in handoff communication, the notion of active participation does not appear to be a concern for this study. However, it should also be noted that the likelihood of student engagement may have potentially been affected by a variety of factors including the professional status of the workshop instructor. In order to control for factors such as the consistency of instruction, future

trainings involving the I-PASS workshop may consider the inclusion of instructional tools (e.g., fill in the blank notes sheets, short answer questions, quizzes) that students can submit as a means to account for student engagement.

A final limitation of this study was the necessity of at-home completion for the online training modules. Given the previously mentioned difficulties with scheduling, instructors could not afford to allot further in-class (i.e., supervised) time for this portion of the intervention. As a result, students were asked to complete the modules from home where researchers were unable to control for confounds (e.g., social and environmental distractions) that may have impacted the complete consumption of training content. Maximal efforts were made, however, to ensure participant attention during module completion by programming: a) several (7-10) “checkpoint” questions—based on the video content previously provided—during the instruction section and b) interactive short answer questions throughout the application section. Student data that did not meet the mastery criteria of 75% or higher on the “checkpoint” questions were excluded from final analyses.

Future Research. Future research can expand on this study in a variety of different areas. First, further descriptive analyses can be conducted to more thoroughly examine behavior on the part of the handoff receiver. In this study, only performance of handoff providers was a) coded with respect to patient information categories (e.g., patient summary) and b) scored based on information accuracy (e.g., correct, erred, etc.). The receiver performance, on the other hand, was examined only with respect to the frequency of synthesized comments provided. Future research in this area might

consider developing a similar scoring system to that of the handoff providers for the handoff receivers in order to examine accuracy of communication being synthesized.

Additional studies might also examine the impact of the current intervention packages on handoff performance with respect to differing student populations. For this study, participants were in their first year of medical and nursing education to control for previous clinical experience. As an initial replication, though, research might assess for communication differences observed in medical and nursing student groups who are further along in their undergraduate (i.e., second or third year) or graduate training. Moreover, once a program of research with this population has been developed, it is also suggested that this type of intervention and assessment package include additional providers who will work at varying levels along the healthcare continuum (e.g., social work, pharmacy, health administration, etc.). The only changes necessary to accommodate such variety would include the modification of the patient vignettes, such that all included providers have a role with respect to each given case.

Another way to expand on the present research is to vary the methods in which patient information is initially delivered. For this study, the vignettes were created based on the same format used in the in-person I-PASS workshop: a paragraph summary of all relevant patient information. This structure was ideal for the present study, as students in their first year of medical and nursing education were not equipped to organize patient information from a patient chart on their own. Future studies might consider using alternative formats such as patient charts, standardized patients, or even electronic medical records for the initial method of patient information delivery to

handoff providers. In either case, the delivery method should be matched with the current level of students who are completing the simulated handoffs.

Further work in the area of ACTraining may be conducted to determine the differential impact of training in select versus combined components of the ACT “hexaflex.” In this study, only values and perspective taking processes were trained as an additive intervention to the existing I-PASS handoff bundle. Future studies, however, might compare performance between groups who have received ACTraining in these same processes (i.e., values and perspective taking) versus that, which has received training in all six (or fewer) components of the hexaflex. As an example, Bunting (2010) compared the impact of an a) 30-45 minute training on values to intervention group involving the entire hexaflex. Results of which From a cost-benefit perspective, if only certain components of the hexaflex (e.g., mindfulness, values, and perspective taking) are found to demonstrate desired performance change (e.g., increased frequency of synthesized comments), there will be no need for additional training (e.g., defusion, acceptance) with respect to that particular target population.

Future research should also address the capacity for which the MT-IRAP may best serve as an assessment tool within the context of interprofessional healthcare environments. In this study, the Cooperative and Individualized work stimuli used in the MT-IRAP were selected based on previous research conducted with entry-level undergraduate students. These stimuli (see Table 1), however, may function differently for students once they have entered into their medical and nursing training. Further, there may be more relevant stimuli that are more strongly associated with

interprofessional communication in the workplace that should be introduced. Future research might consult the healthcare education literature to determine and pilot a MT-IRAP stimuli for the use of healthcare-relevant assessments on implicit interprofessional relations.

Following the consideration of healthcare-relevant stimuli, future research should be conducted to further examine the predictive utility of the MT-IRAP with respect to varying situations of interprofessional collaboration. For this study, participants had up to 15 minutes to deliver 4 patient cases (2 from medical and 2 from nursing), which was more than enough time, as the average duration for handoffs completed during post-training was 93.89 seconds ($SD = 33.33$). In future studies, however, one may consider testing interprofessional communication and teamwork under contingencies that mock an MT-IRAP completion: high-pressure, quick decision-making, and rapid responding. Specifically, one may examine whether interprofessional communication and teamwork tested under stressful and potentially time-sensitive contingencies (e.g., code scenarios or simulations involving mass fatalities) results in more predictive alignment with MT-IRAP results than compared to situations that are dissimilar to testing.

Summary

In sum, this study aimed to provide an IPE training package for medical and nursing students to enhance interprofessional communication during patient handoffs. Two separate training packages, involving an in-person I-PASS workshop and an online module on either a) Values and Perspective Taking (i.e., the experimental package) or b)

Interpreters in Healthcare (i.e., the control package), were introduced. Independent of intervention type, results demonstrated significant improvements in both handoff provider (e.g., increased correct and decreased erred information) and receiver (e.g., increased number of synthesized comments) performance. Differences between interventions, however, were also observed with respect to Cooperative and individualized implicit relational responding from pre- to post-training. Participants who completed the experimental package demonstrated a greater increase in implicit relations involving the Cooperative work stimuli and the evaluative stimulus “Good;” whereas, those in the control showed the opposite trend.

Several recommendations have been offered to further expand this line of research on interprofessional communication in healthcare settings. First, similar to that used in this study with handoff providers, descriptive analysis methods should be used to examine communication on the part of the handoff receiver. Second, it is encouraged that handoff simulations be completed with the involvement of additional providers along the healthcare continuum (e.g., pharmacy, social work, health administrators). Next, the MT-IRAP should be further considered within the context of healthcare as a tool to examine the likelihood of overt behavior occurring in the presence of interprofessional contingencies. This may include additional a) consideration of the stimuli selected for the assessment and b) research with respect to the settings under which the tool’s predictive utility is found most prominent (e.g., code and mass fatality scenarios).

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Tables

Table 1.

Target, Evaluative, and Response Stimuli for the MT-IRAP.

Cooperative work target stimuli	Individualized work target stimuli	Evaluative stimuli	Response options
Alliance	Doing it my Way	Good	Yes
Consideration of Others	Flying Solo	Bad	No
Partnership	On my Own		
Team Player	Survival of the Fittest		

Table 2.
Participant Demographic Information by Intervention Type.

Student Group	Experimental N=61		Control N=57	
	Medical	Nursing	Medical	Nursing
Participant Count	33	28	31	26
Male	16	4	16	5
Female	17	24	15	21
Age 18-23	13	19	10	15
Age 24-29	16	5	19	7
Age 30-35	2	3	1	2
Age 36+	2	1	1	2
Prior Handoff Experience	7	3	5	3

Table 3.

I-PASS Results: Change in Correct/Complete Information

Source	df	F	Sig.	Partial Eta Squared
Corrected Model	7	1.130	.350	.067
Intercept	1	29.816	.000	.213
Intervention type	1	.065	.800	.001
Gender	1	2.024	.158	.018
PrevHandExp	1	3.357	.070	.030
Student	1	1.496	.224	.013
Int type * Gender	1	.793	.375	.007
Int type * PrevHandExp	1	.032	.859	.000
Int type * Student	1	1.598	.209	.014

Table 4.
I-PASS Results: Change in Missing Information

Source	df	F	Sig.
Corrected Model	7	2.327	.030
Intercept	1	2.018	.158
Intervention type	1	.327	.569
Gender	1	7.695	.007
PrevHandExp	1	2.295	.133
Student	1	.623	.432
Int type * Gender	1	1.172	.281
Int type * PrevHandExp	1	.086	.770
Int type * Student	1	2.883	.092

Table 5.
I-PASS Results: Change in Erred Information

Source	df	F	Sig.	Partial Eta Squared
Corrected Model	7	1.398	.213	.082
Intercept	1	40.395	.000	.269
Intervention type	1	.221	.639	.002
Gender	1	3.298	.072	.029
PrevHandExp	1	.096	.758	.001
Student	1	1.707	.194	.015
Int type * Gender	1	1.673	.199	.015
Int type * PrevHandExp	1	.199	.656	.002
Int type * Student	1	4.570	.035	.040

Table 6.
I-PASS Results: Change in Omitted Information

Source	df	F	Sig.	Partial Eta Squared
Corrected Model	7	1.989	.063	.112
Intercept	1	46.425	.000	.297
Intervention type	1	.155	.694	.001
Gender	1	1.206	.274	.011
PrevHandExp	1	2.455	.120	.022
Student	1	11.016	.001	.091
Int type * Gender	1	.004	.953	.000
Int type * PrevHandExp	1	.008	.929	.000
Int type * Student	1	.003	.953	.000

Table 7.
I-PASS Results: Change in Synthesized Comments

<i>"Learners" vs. "Non-Learners"</i>				
	b	Std. Err.	z	Sig.
Intervention type	.353	.266	1.33	0.185
Gender	-.920	.337	-2.73	0.006
Student	-.339	.288	-1.18	0.238
Previous Exp.	.164	.440	0.37	0.709
cons (Intercept)	2.316	.682	3.40	0.001

<i>"Among Learners"</i>				
	b	Std. Err.	z	Sig.
Intervention type	-.164	.124	-1.32	0.186
Gender	.054	.134	0.40	0.686
Student	.113	.131	0.86	0.388
Previous Exp.	-.068	.195	-0.35	0.726
cons (Intercept)	1.27	.254	5.00	0.000

Table 8.
I-PASS Results: Change in Average Handoff Duration

Source	df	F	Sig.	Partial Eta Squared
Corrected Model	7	.466	.857	.029
Intercept	1	3.995	.048	.035
Intervention type	1	.001	.976	.000
Gender	1	.386	.536	.003
PrevHandExp	1	.038	.847	.000
Student	1	1.319	.253	.012
Int type * Gender	1	.314	.577	.003
Int type * PrevHandExp	1	.018	.893	.000
Int type * Student	1	1.837	.178	.016

Table 9.

ATHCT Results: Change Scores

Source	df	F	Sig.
Corrected Model	3	.489	.691
Intercept	1	.265	.608
Intervention type	1	.151	.698
Student	1	1.242	.267
Int type * Student	1	.121	.729

Table 10.

RIPLS Results: Change Scores

Source	df	F	Sig.
Corrected Model	3	.033	.992
Intercept	1	10.305	.002
Intervention type	1	.037	.848
Student	1	.038	.846
Int type * Student	1	.020	.887

Table 11.
Social Validity: Overall IPE Experience Rating

	Overall Results	Experimental		Control	
		Medical	Nursing	Medical	Nursing
Handoff Simulations	3.29	3.06	3.54	3.28	3.27
I-PASS Training	3.21	3.00	3.18	3.41	3.27
Module Training	2.14	1.73	2.25	2.56	2.04
Online Surveys	2.86	2.67	2.89	2.91	2.96
Training Organization	3.31	3.21	3.46	3.25	3.31

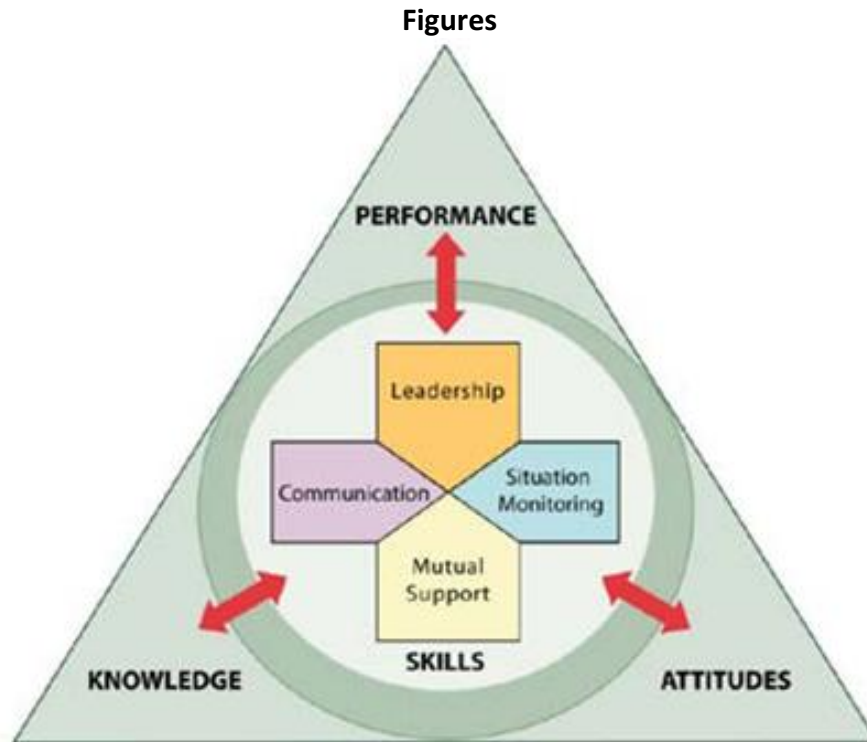


Figure 1. TeamSTEPPS instructional framework. This framework is comprised of four core competencies (leadership, situation monitoring, mutual support, and communication) encircled by the patient care team, which includes the patient and all relevant healthcare providers. Performance, knowledge, and attitudinal outcomes are then depicted in the corners, resulting from proficiency in the four central skills or core competencies previously described.

Sample Verbal Handoff		
I	Illness Severity	OK, this is our sickest patient, and he's full code.
P	Patient Summary	AJ is a 4-year-old boy with a history of ex 26-week gestation admitted with hypoxia and respiratory distress secondary to a left lower lobe pneumonia. He presented with cough and high fevers for 2 days before admission, and on the day he presented to the emergency department he had worsening respiratory distress. In the emergency department, he was found to have an Na of 130, likely secondary to volume depletion versus syndrome of inappropriate secretion of antidiuretic hormone. He received a fluid bolus and was started on O ₂ at 2.5 L. He is on Ceftriaxone.
A	Action List	Please look in on him at approximately midnight and make sure his vitals are unchanged and his oxygen saturation is stable. Check to determine if his blood culture is positive tonight.
S	Situation Awareness and Contingency Planning	If his respiratory status worsens, please get another chest radiograph to determine if he is developing an effusion.
S	Synthesis by Receiver	OK, so AJ is a 4-year-old ex-premie admitted with hypoxia and respiratory distress secondary to a left lower lobe pneumonia on Ceftriaxone, O ₂ , and fluids. You want me to check on him at midnight to make sure he's stable and check his blood culture. If his respiratory status worsens, I will repeat a radiograph to look for an effusion. I think I have it.

Figure 2. Sample verbal handoff with the I-PASS mnemonic. Original source of image can be found in Starmer et al. (2012).

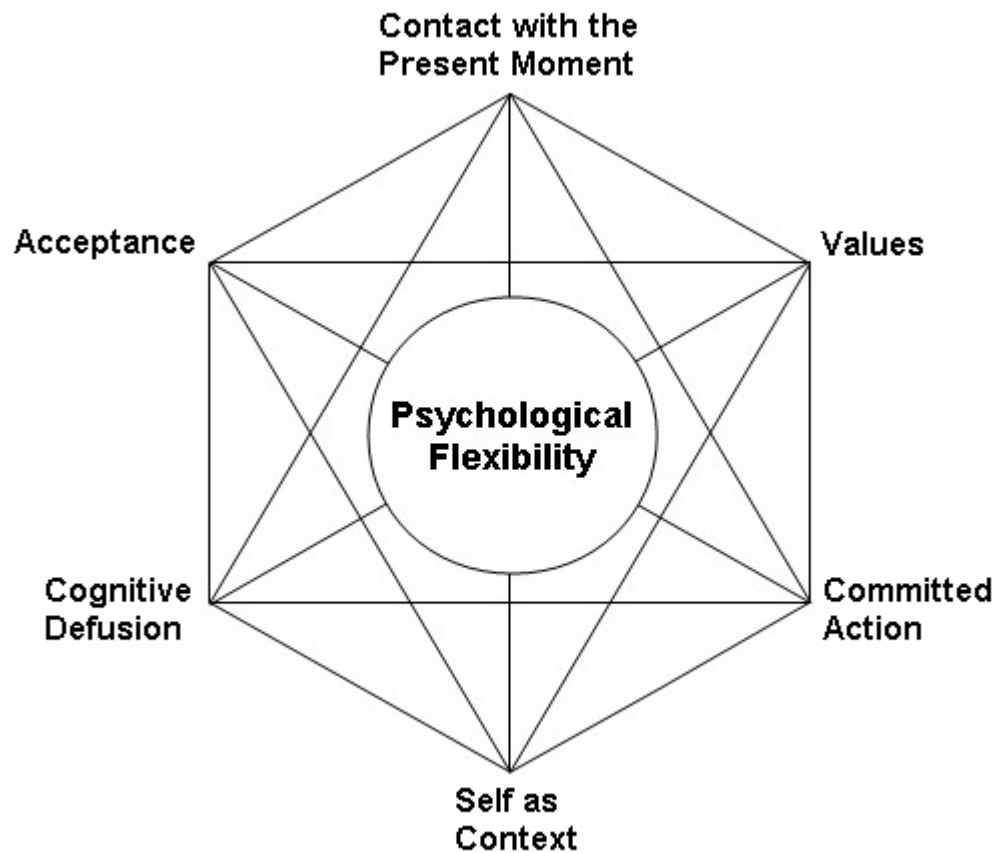


Figure 3. Acceptance and Commitment Therapy (ACT) Hexaflex. ACT is comprised of six key processes—contact with the present moment, values, committed action, self as context (i.e., perspective taking), defusion, and acceptance— which are targeted during interventions. The ACT Hexaflex provides an illustration of this framework, demonstrating the interdependency of each key process and their collective impact on one’s level of psychological flexibility.

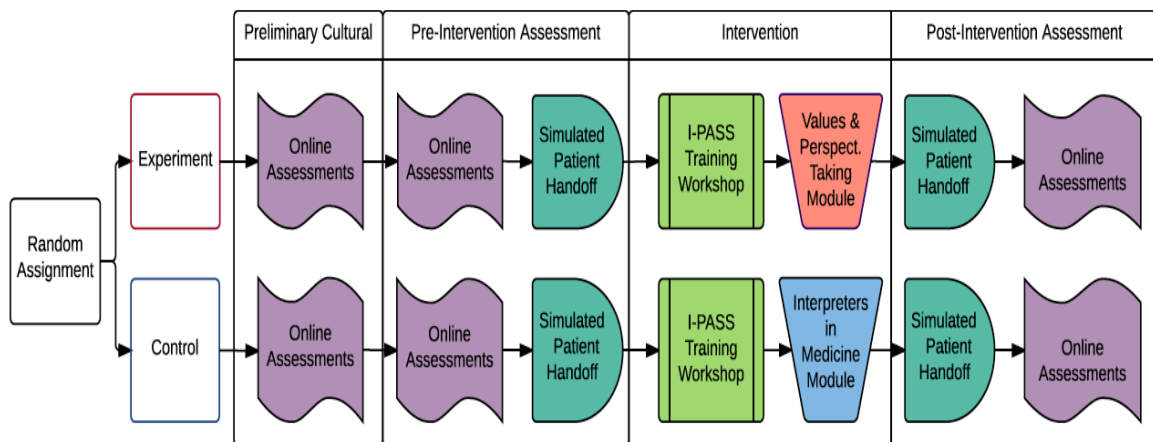


Figure 4. Process map of the four experimental phases. This study included four experimental phases: the I) Preliminary Cultural Assessment, II) Pre-Intervention Assessment, III) Intervention, and IV) Post-Intervention Assessment. This figure illustrates the sequence for administration and components comprising each phase.

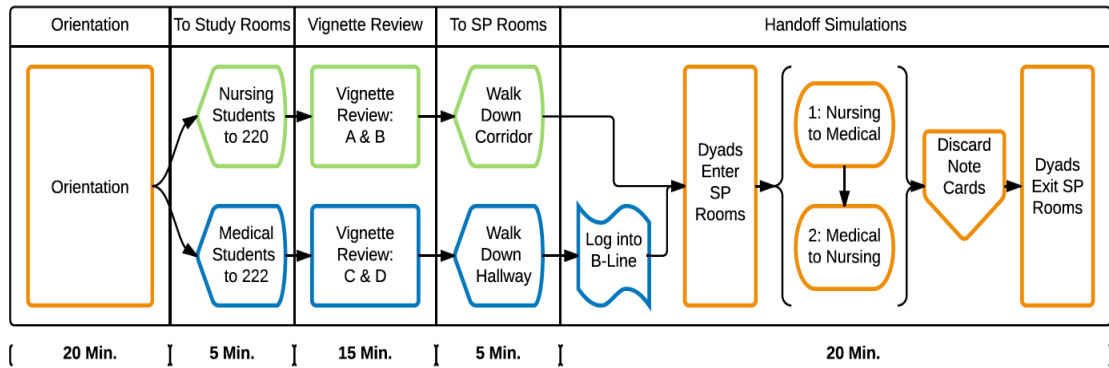


Figure 5. Process map of the interprofessional handoff simulation procedure. This image provides a visual representation of the order and process by which the interprofessional handoff simulations were completed.



Figure 6. Mixed-Trial Implicit Relational Assessment Procedure (MT-IRAP) sample screenshot. In a typical MT-IRAP procedure, there are five stimuli that appear on a screen at any given time: 1) a target stimulus, 2) an evaluative stimulus, 3) the relational response cue, and the two relational response options 4) “yes” and 5) “no” (see Figure 6 for a sample screen shot). For this study, the target stimulus—presented at the top of the screen—involved either a randomly selected Cooperative or Individualized work stimulus (see Table 2 for full list of stimuli). Displayed below the target stimulus, the evaluative stimulus was either “Good” or “Bad.” The relational response cue—“agree” or “disagree”—was presented below the evaluative stimulus to provide instruction on how to relationally respond with respect to both stimuli provided above. And, finally, located at the bottom left and right corners of the screen, the relational response options “yes” and “no” remained available to participants during each set of stimuli presentations.

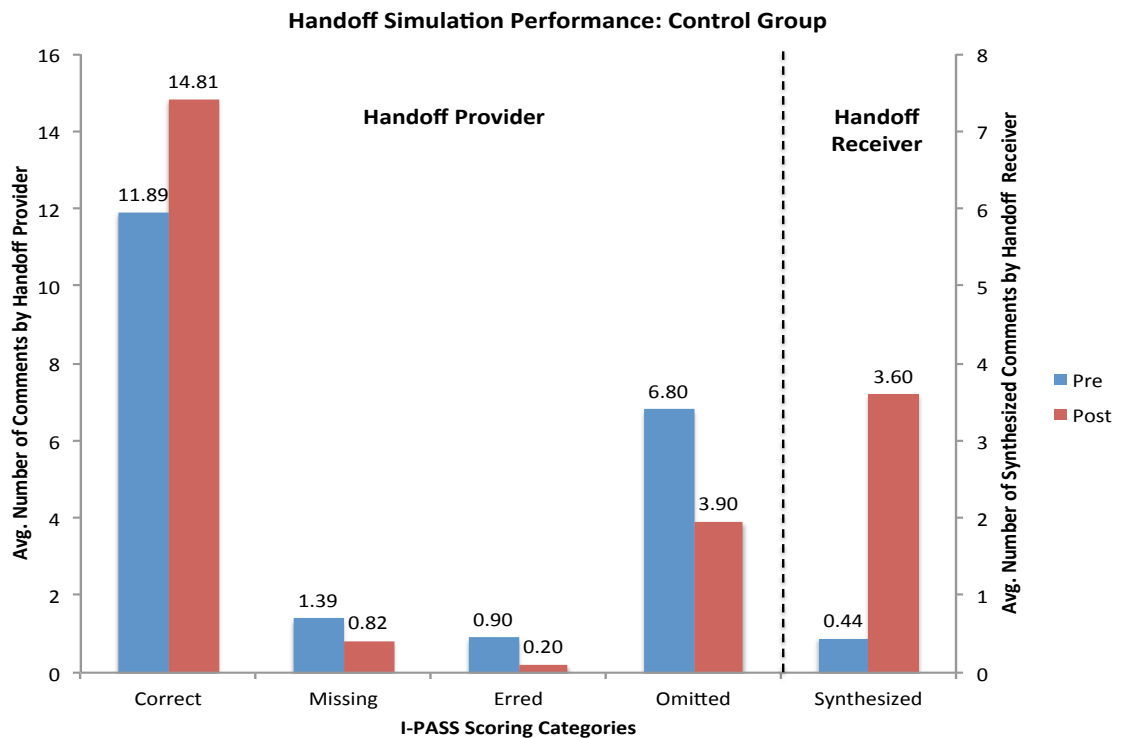
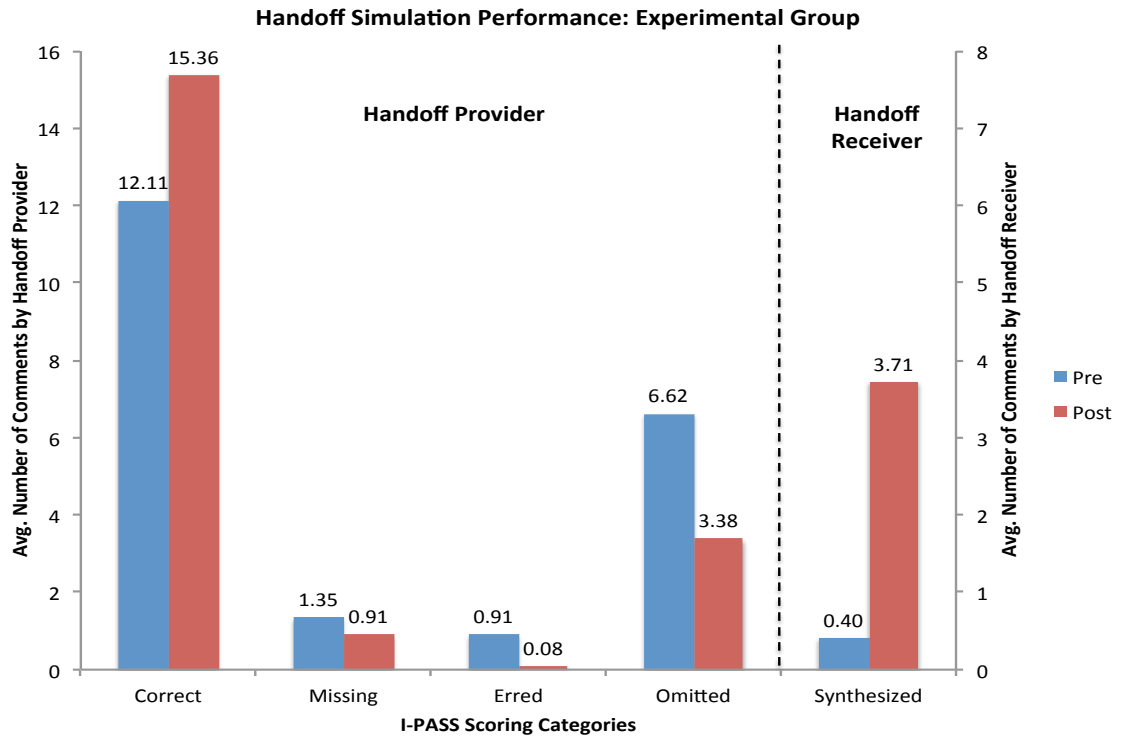


Figure 7. Provider and receiver performance during the patient handoff simulations for all participants in the experimental (top panel) and control (bottom panel) groups.

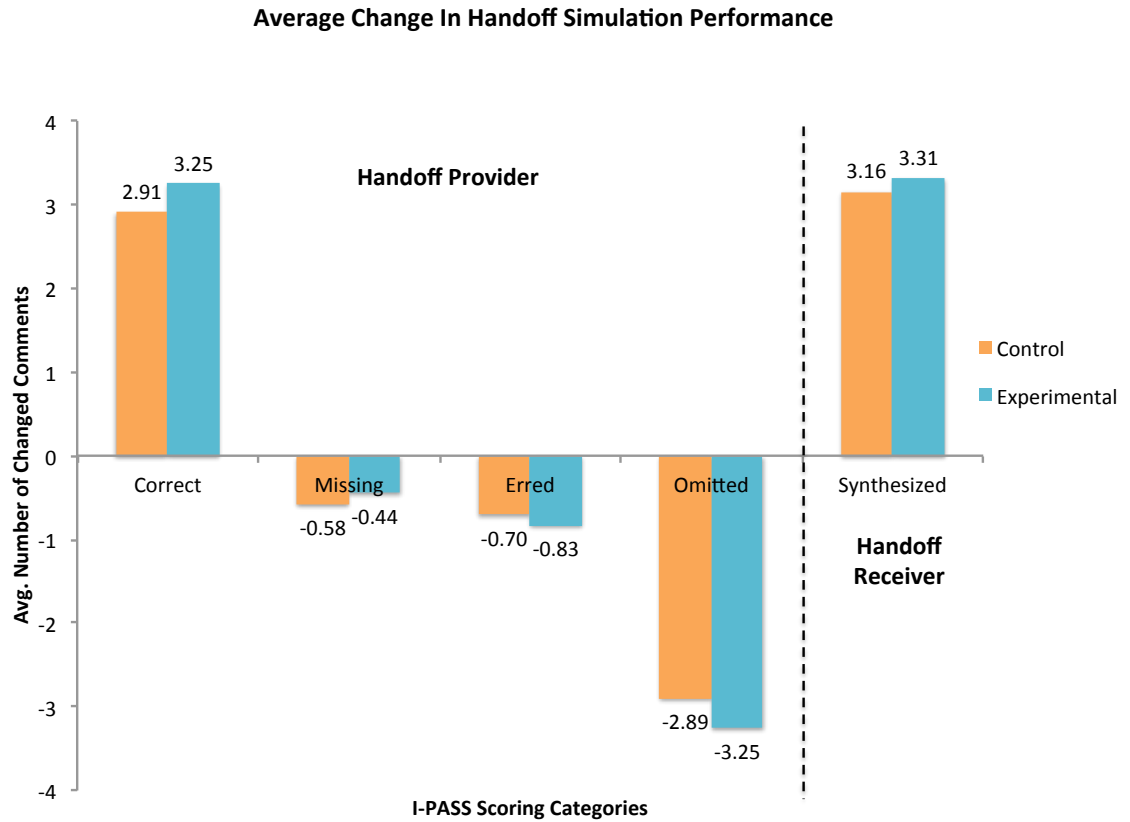


Figure 8. Average change in provider and receiver performance during the patient handoff simulations for both experimental groups. Change in this case was calculated by subtracting post-training results from those obtained during pre-training.

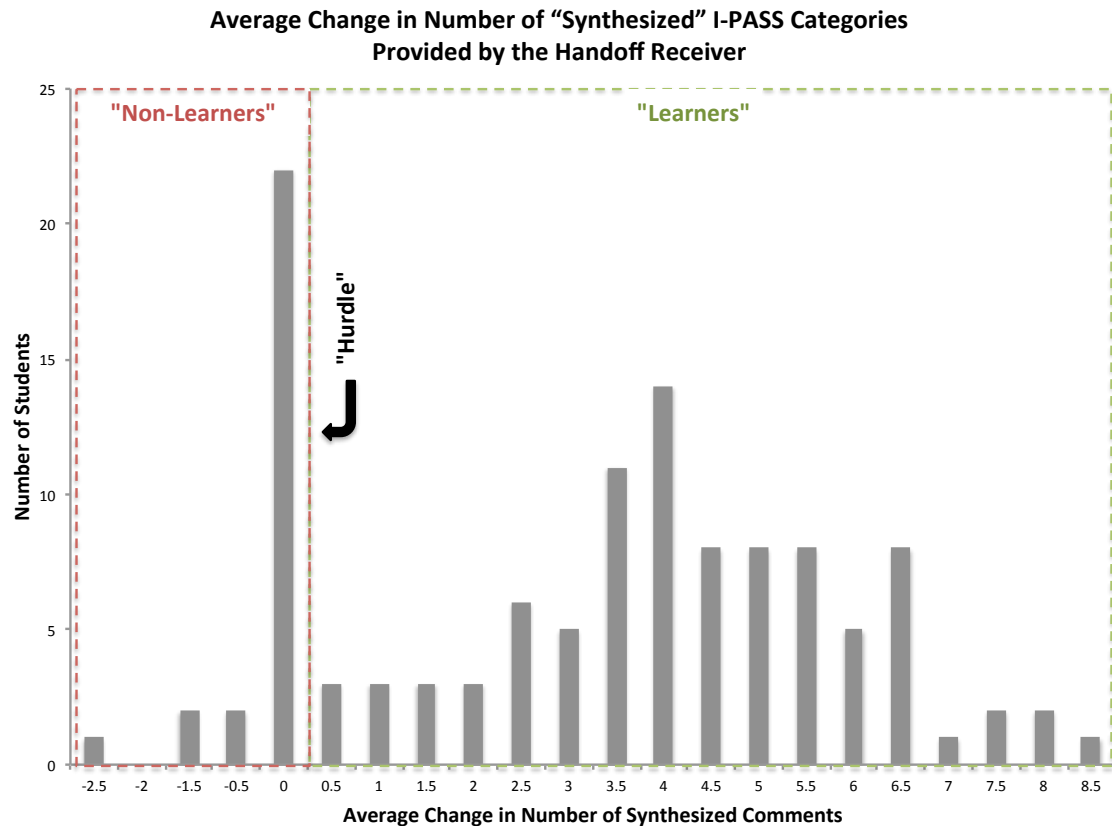


Figure 9. Average change in number of synthesized I-PASS categories provided by the handoff receiver. Change, in this case, was calculated by subtracting post-training synthesized comment frequencies from those obtained during pre-training. For data analytic purposes, those who either demonstrated a) no change (n=22) or b) a negative change (n=5) were grouped among the “non-learners.” Then, using a hurdle regression, change was analyzed based on those who did and did not clear the learning “hurdle.”

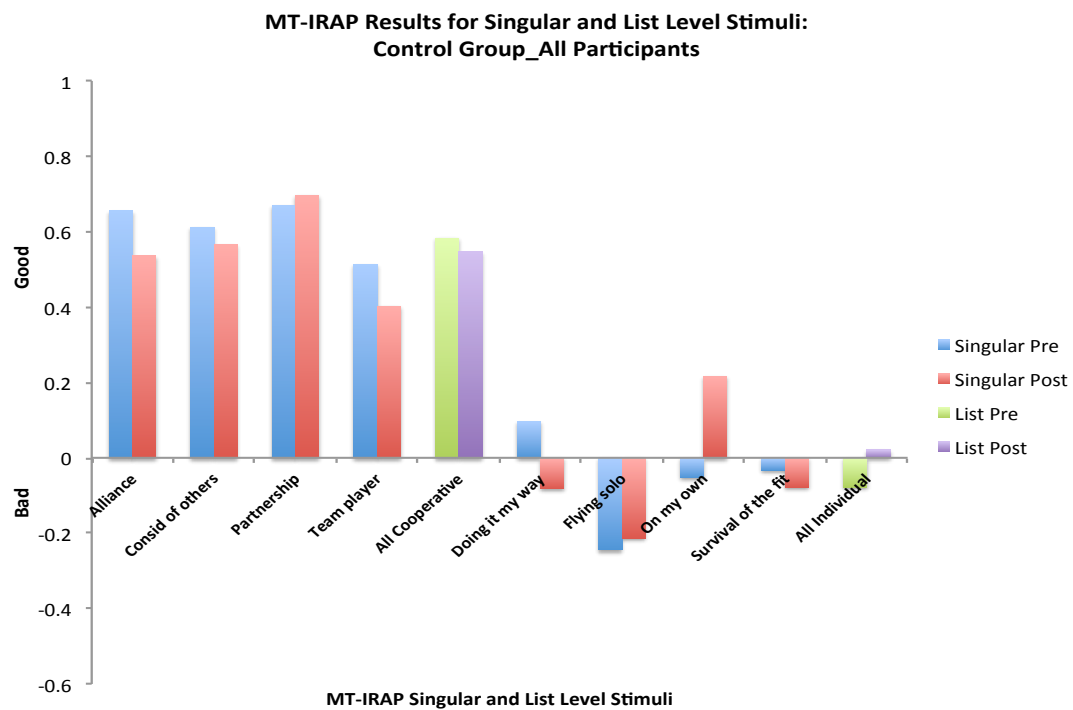
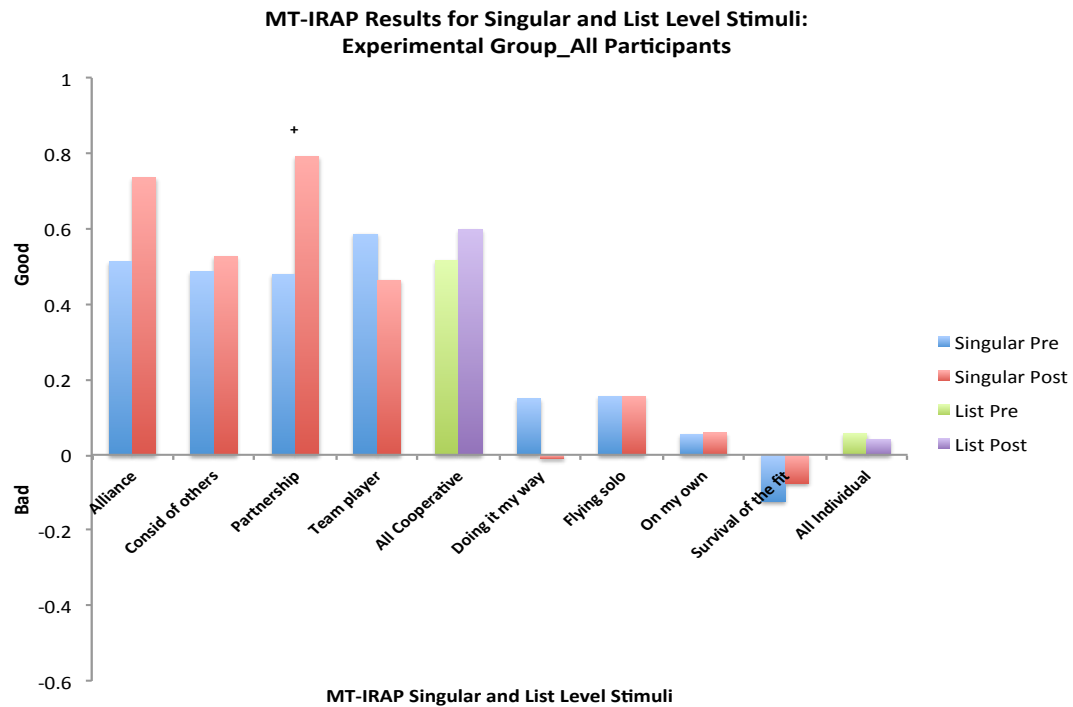


Figure 10. MT-IRAP Results for singular (e.g., Alliance) and list level (e.g., all Cooperative work) stimuli for all participants in the experimental (top panel) and control group (bottom panel).

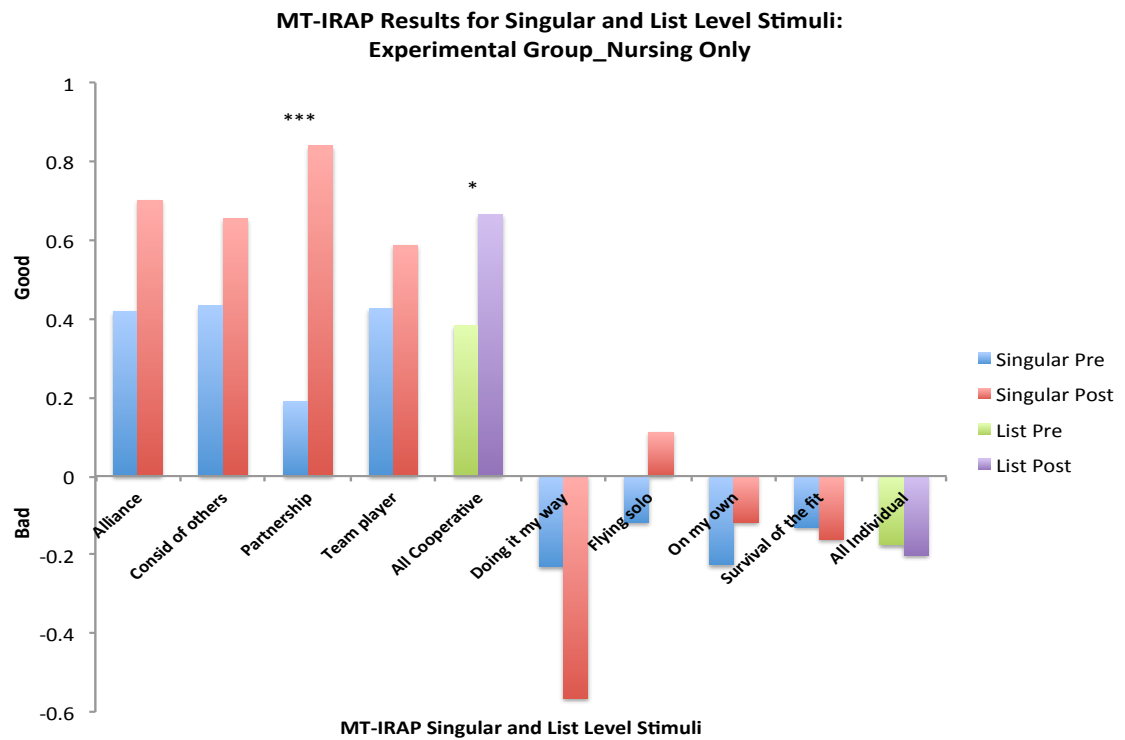
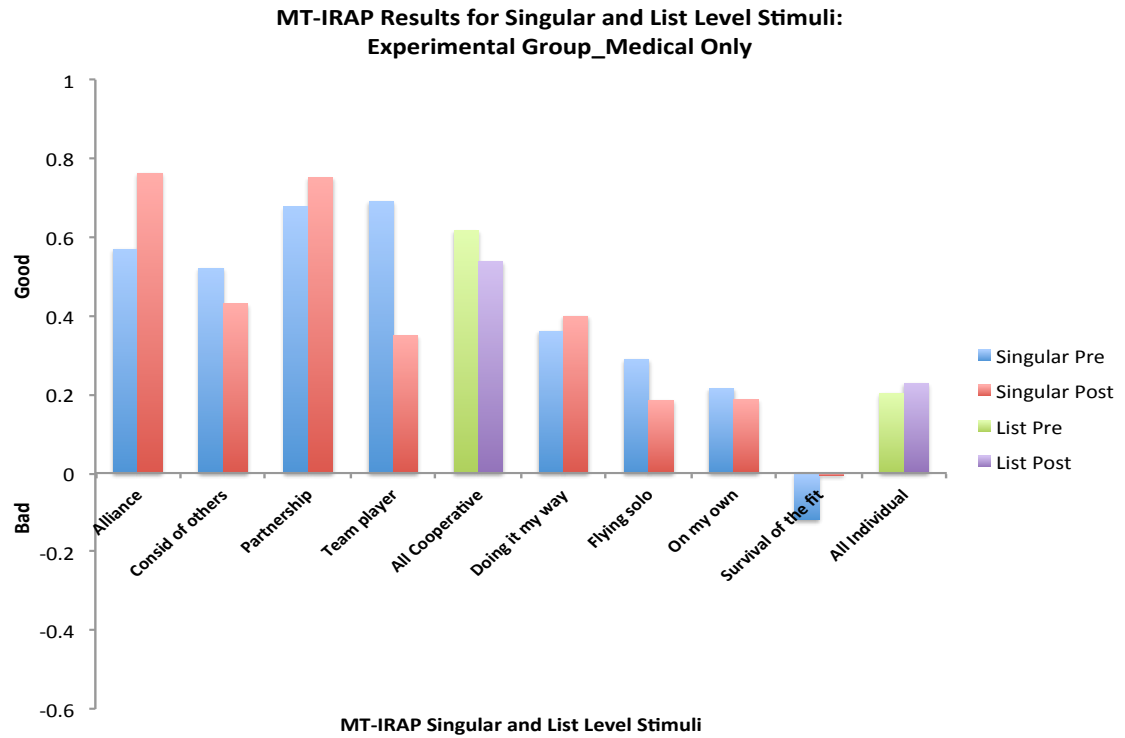


Figure 11. MT-IRAP Results for singular and list level stimuli for all medical (top panel) and nursing (bottom panel) students within the experimental group.

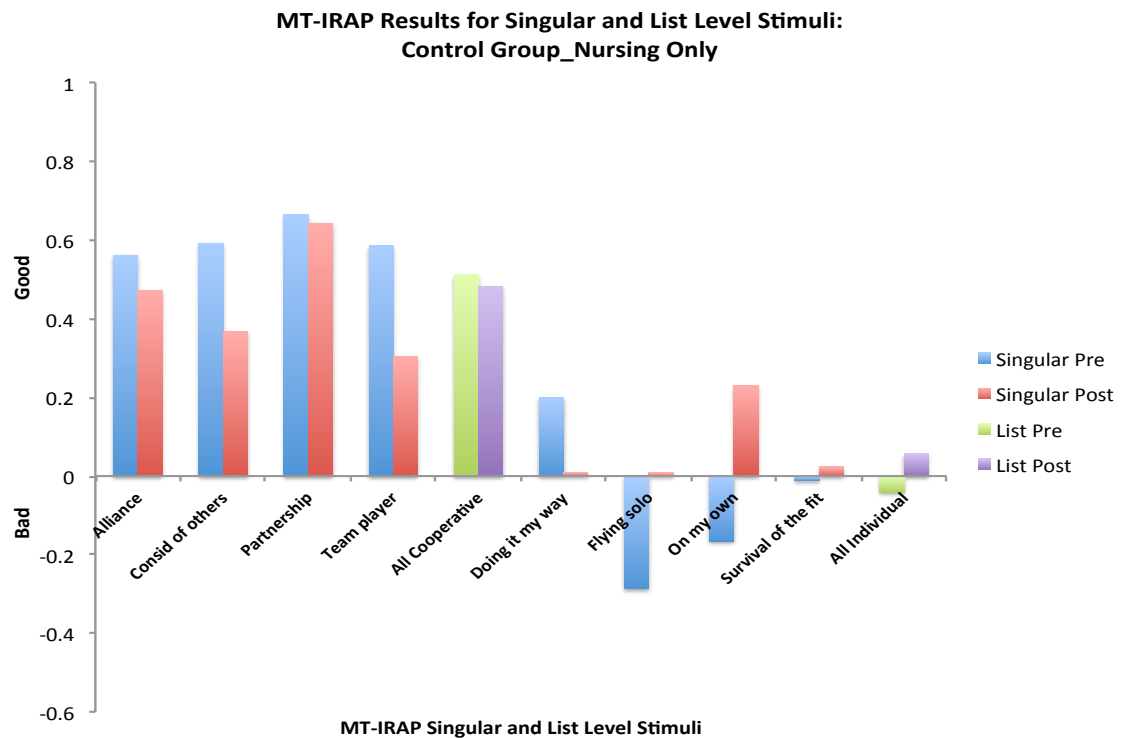
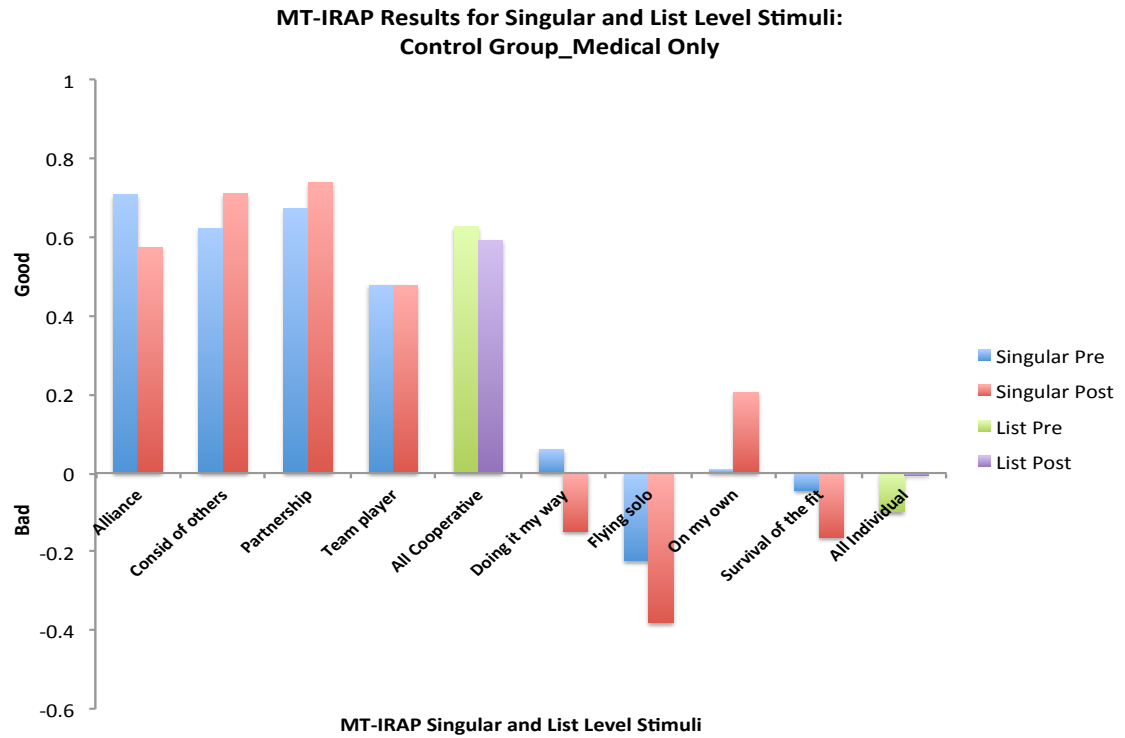


Figure 12. MT-IRAP Results for singular and list level stimuli for all medical (top panel) and nursing (bottom panel) students within the control group.

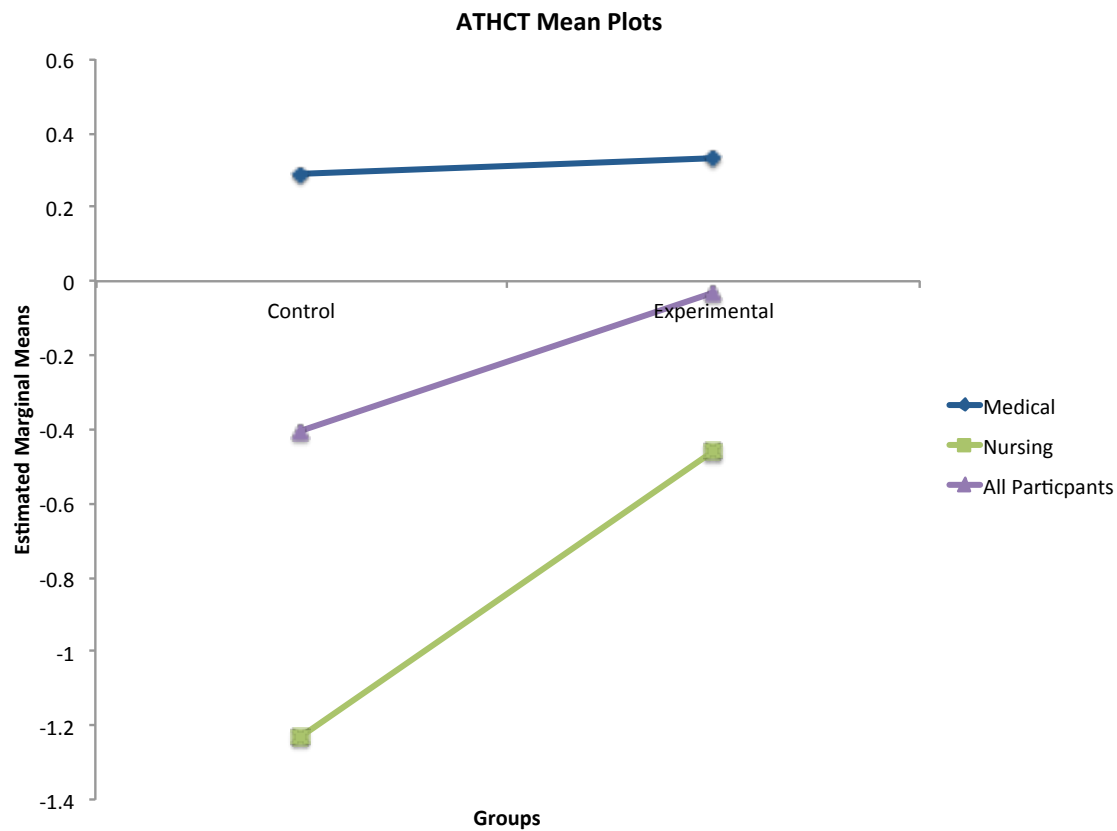


Figure 13. Mean plots of average change scores on the Attitudes Toward Health Care Teams (ATHCT) scale for a) medical students, b) nursing students, and c) participants within the experimental and control groups.

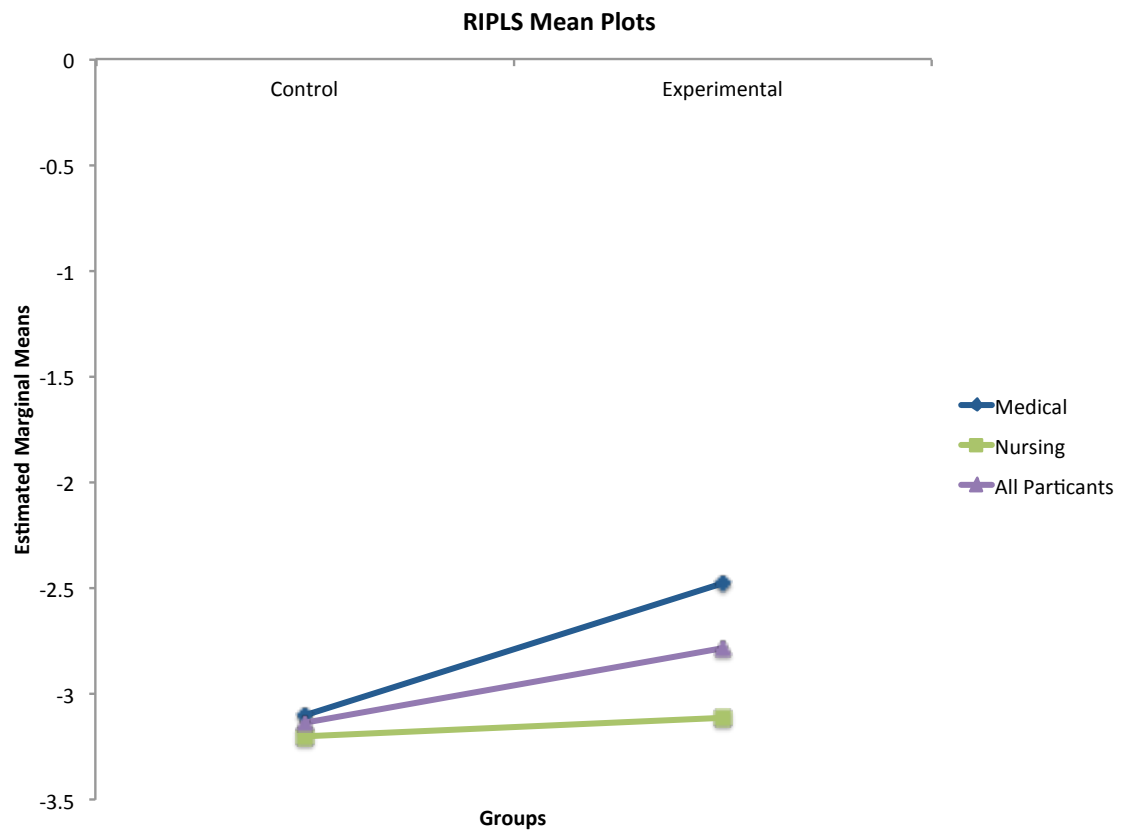


Figure 14. Mean plots of average change scores for the Readiness for Interprofessional Learning Scale (RIPLS) for a) medical students, b) nursing students, and c) participants within the experimental and control groups.

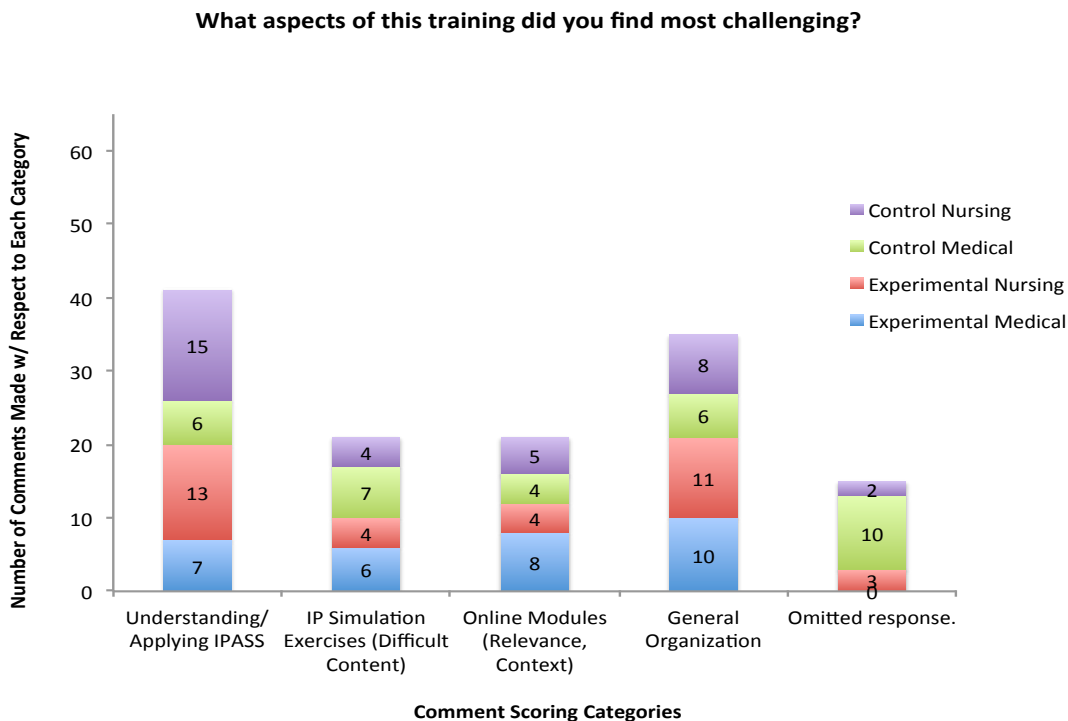
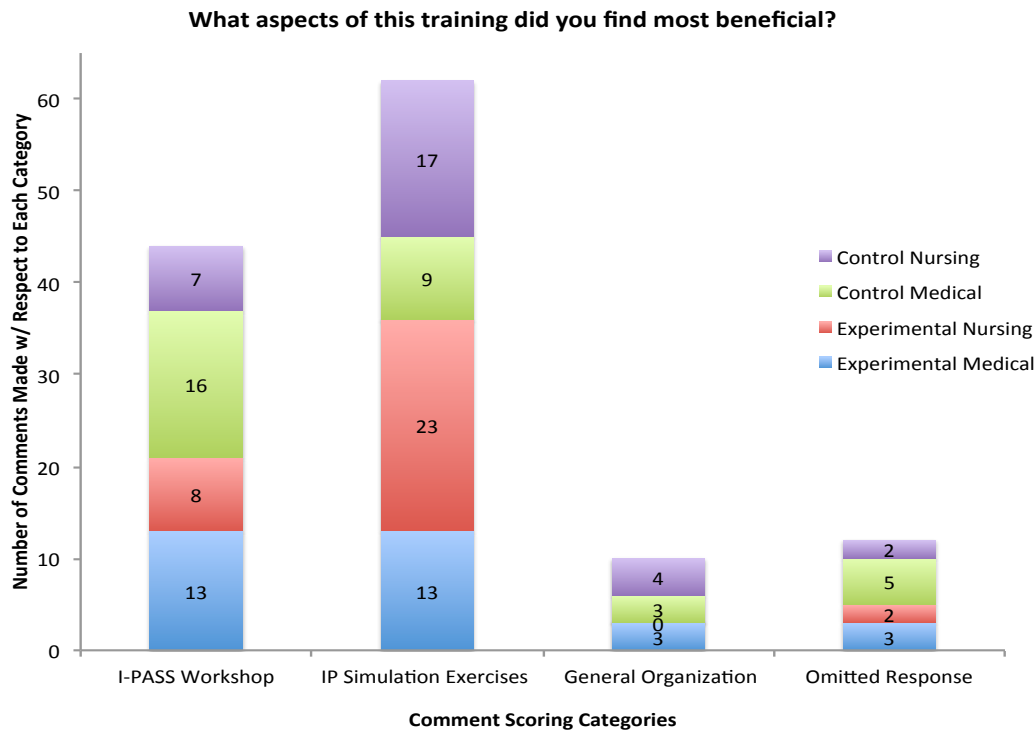


Figure 15. Social validity results: comments pertaining to most beneficial aspects (top panel) and challenging (bottom panel) of the IPE experience.

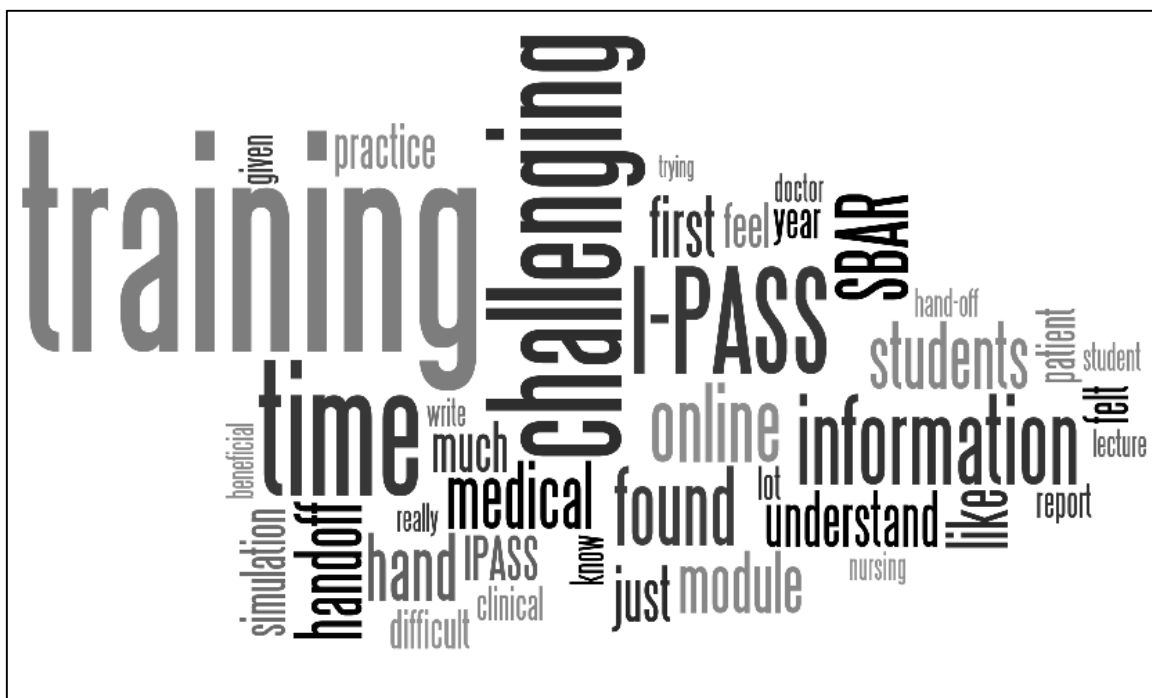
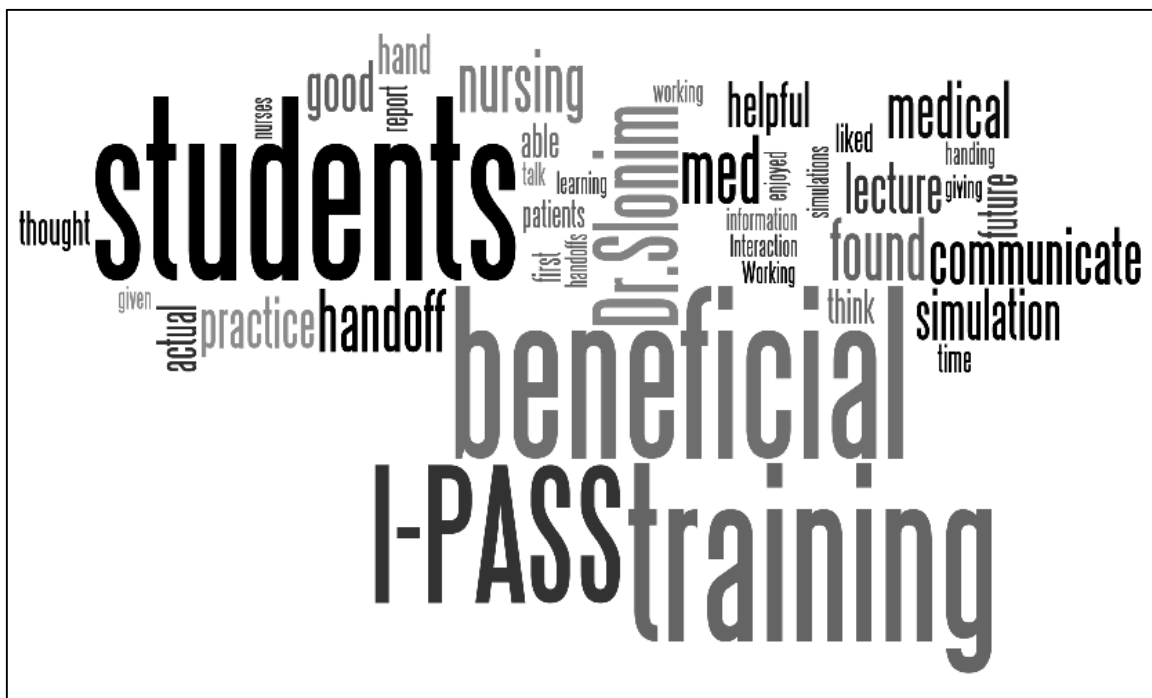


Figure 18. Word cloud generated with the top 40 words that participants used to describe the most “beneficial” (top panel) and “challenging” (bottom panel) aspects of the IPE experience.

Appendix A

Values and Perspective Taking Module Script

**Note: Materials adapted from Chase et al. (2013) and Ward & Houtmanfar (Under Review)
See Page 117 for Full Resource List.**

BEGIN: VALUES INTRO

This module will teach you about a technique derived from the Acceptance and Commitment Training (ACT) literature called Values Clarification. Values clarification is a process by which we come to know what matters to us most, in both our personal and professional lives. In order to complete this process, let us first *clarify* what “values” are. Then, we shall review and discuss an example of how values may influence our daily choices in life and practice.

WHAT ARE VALUES?

Values can be defined as areas of your life that have meaning to you. This meaning can be unique to you or learned from peers, friends and family members. Once identified, values can help direct your behavior over long periods of time – say throughout your education or beyond. Knowing what matters to *you*, as you encounter various situations beyond the confines of relationships, achievements, or morals will help you to make better choices in life. Clarifying your values is a tool to help to guide these choices across various situations and circumstances that you will encounter.

Take a moment to think of a time, maybe recently, when you felt that you were living your life with meaning or purpose. Perhaps a time when you felt really alive... it could have been school related, something with a friend or family member, or completing an activity you enjoy... there might have been a feeling of excitement, complete engagement, pure enjoyment, even if the task was somehow challenging... These qualities of feeling alive, engaged, meaningful, etc.... THIS is what we mean by a value.

Let us examine the different aspects of values to help you identify, clarify, or strengthen what matters to you most in your life.

Values are Chosen Life Directions: Like a Road Map

When we think about values, the idea of direction is useful. Working towards a valued direction in one’s life is like having a route on a map for a road trip. Even if you don’t know where you want to end up, you do have a sense of the direction in which you’d like to travel. Having this sense of direction when you travel, allows you to continue moving forward, no matter whether or not you stay on course. If you are traveling west, for instance, you can reach the Pacific Ocean and *still continue* heading *west*. West is never the final destination, it is the direction in which you choose to travel. When does someone ever fully arrive at *west*?

QUESTION 1: Values are like:

- a) Arriving somewhere.
- b) Taking a vacation.

- c) Achieving your personal goals.
- d) Traveling in a direction.

Values are Choices

Values are free choices, meaning that you can make a choice about what matters to you that is just for your benefit. You can make choices about your valued directions by looking at the most meaningful areas of your life. Or, you can simply choose what you want to be about – and that can be your valued direction. A valued direction is not about making someone else happy, trying to do the right thing, trying to be a good person, or avoiding doing bad things. Your valued direction is your choice, and can help you find meaning in what you do on a daily basis.

QUESTION 2: Values are:

- a) Chosen directions that help you avoid meaning in your life.
- b) Chosen directions that allow you to be a good person.
- c) Chosen directions that help you seek meaning in your life.
- d) Chosen directions that help you make someone else happy.

Values Orient You to the Stops You Can Make Along The Way

The great thing about values is that we can choose to live in a valued direction in every moment. And you can see if your behavior takes you in your chosen direction, or if it takes you toward a different route. Let's say that one direction you cared about was learning. In each moment, you can choose to do something in the service of learning. These choices are like places you would visit on a road trip – truck stops, farms, towns, or cities. Going to school, reading a book, traveling, and meeting new people are all examples of ways to live in the valued direction of learning – and there are many more. Each of these has the potential to move you along your learning road map. You get to make these choices every day.

QUESTION 3: Going to school is an example of:

- a) A specific value.
- b) One way to live in a valued direction of learning.
- c) Doing something for someone else.
- d) One way to avoid the valued direction of learning.

Values Help You to Be Present in What You Do Along the Way

It's not about how many stops you make during your "travel;" rather, it's about the attention you pay to your actions with respect to living in your valued direction. Ever feel like you were just doing something mindlessly, like walking around and not paying attention to anyone around you, or driving home but thinking about something else? Living mindlessly is the *opposite* of being present or aware of living with respect to your valued direction. Instead, what if you could really pay attention to the process of living your valued direction each moment of each day? It's a little like skiing – the activity itself is what you came for, not the outcome of reaching the bottom of the hill.

QUESTION 4: Which of the following statements is TRUE?

- a) When you are driving without paying attention, you are living your value.
- b) When you go skiing, the most important thing is getting to the bottom of the hill.

- c) When you live in a valued direction, it is helpful to attend to the process of doing so.
- d) When you live mindlessly, this is the best way to live in your valued direction.

LOOKING AT WHAT VALUES ARE NOT

Maybe values seem pretty simple so far – but in our experience, values can easily become confused. Let us next consider what values are NOT.

Values are NOT: Successful Outcomes or Achievements

Remember, values are directions; they can never be fulfilled. Outcomes and achievements are things you can check off of a list as completed. Remember the example we used before about traveling West? Traveling “West” can never be accomplished. It is a direction that one may continue to strive towards.

Striving toward outcomes is not entirely a bad thing – in fact, doing well in school or being able to provide for your family may very well be in line with a career value. However, we do not want to confuse the two. For example, when asked about intimacy as a value, someone might say they care about getting married. Getting married is an outcome – it happens or it doesn’t. And think about this – would someone say that they stopped caring about their partner once they got married? Intimacy, as a value, extends beyond outcomes such as marriage, and may continue to extend even if that particular relationship ends.

QUESTION 5: Intimacy is an example of:

- a) Something people should avoid, because they might get hurt.
- b) A valued direction that extends beyond any particular relationship.
- c) Something everyone should strive for.
- d) A valued direction that is accomplished when someone gets married.

Values are NOT: Feelings

Values are also not FEELINGS. Why? Well, feelings come and go, but values stay pretty constant throughout our lives. For example, you can be upset with someone in one moment and feel happy with someone else in the next. You might also feel bored during a lecture, excited for dinner plans, and/or exhausted after a long day. Throughout all of these different feelings, your values remain constant and present.

Consider exercising for instance. When you exercise after having not done it in a while, you may feel pain in your muscles, but you may also care about working towards health and fitness. Living consistent with your values is NOT the same as feeling good. Feelings of all kinds (both ‘good’ and ‘bad’) come along for the ride.

QUESTION 6: Which statement is TRUE about the relationship between values and feelings?

- a) Feelings do not change very often, but values do.
- b) We feel happy or excited every time we live in a valued direction.
- c) Values may stay pretty much the same throughout our lives, but our feelings change all the time.
- d) Feeling uncomfortable is a sign that we are not living in a valued direction.

Values are NOT: Based On What Others Do

Now think about what matters to you when caring for someone close to you. You may know what you like about how these people behave towards you, and that is helpful. But what we mean by personal values are qualities of our OWN behavior that we care about, not judgments about how other people should or shouldn't act towards you. In other words, values are about how you want to be as a person, not how you would like other people to be.

For example, what matters or has mattered to you in close relationships? Connection? Understanding? Openness? Honesty? As you can see, these qualities of your relationships are not tied to one person, relationship, or situation. In fact, you could care about these qualities even if you didn't see anyone you cared about for a long time. And maybe the people you care about behave in ways that are consistent with these qualities, and maybe they do not. You can choose to care about these qualities and seek to live consistently with them, no matter what the circumstance or how others behave towards you.

QUESTION 7: Which of the following statements is TRUE?

- a) The best way to live your valued direction for relationships is to treat others the same as they treat you.
- b) Making a list of the good things and the bad things other people do helps you choose your valued direction for relationships.
- c) Values direct how you want to be, not how you want others to behave.
- d) Having a value of connection means that you should always stay in relationships, even if others treat you poorly.

Fine-Tuning the Path

As you travel in your direction, you might fine-tune or modify your path. As you continue to move in the direction of learning, you may start noticing more about the direction that is important to you. Perhaps you notice that you like learning about topics that can help you move in another direction such as helping others. Perhaps you enjoy learning as a way to move in the direction of personal growth, and for pure enjoyment of doing so. As you notice these things, you may start creating your own path from this broad direction. Even if you started off with a direction you learned from others, your meaningful path is unique to you.

END: VALUES INTRO

BEGIN: VALUES EXERCISE

This is an exercise to help you get a sense of what you value most in your life. Let's begin by closing your eyes such that you are able to notice and attend to different aspects of your experience. Then, I will ask you some questions. During these questions, notice what comes up for you. There are no right or wrong answers— it's all about noticing what comes to mind. Are you ready?

Okay, start by closing your eyes. Take a moment to get centered by noticing your breath and the sensations throughout your body. If you find yourself getting distracted or notice your mind wandering, that's okay. Just notice that the distraction is happening and gently bring your attention back to the exercise.

Now, imagine moving forward through time. Imagine yourself aging and growing older as you move throughout your life. And finally, imagine turning 80 years old; and that, for your birthday, all of your closest friends, family, and coworkers have gathered to celebrate.

Picture what you look like on this special day. Think about your hair, your face, and your smile. Next, imagine who you would *most want* to be there celebrating your 80th birthday with you—even if that means they would be very old. This could even include people you haven't met yet. Try to really picture who would be there. What are they wearing? What are they doing during the party?

Now the time has come where people are starting to give speeches. They are taking turns standing up and speaking about what you have meant to them. They are speaking about what you have stood for as a person, the impact you have had on their lives, etc. If you were to be bold in this moment, what you would *most want* them to say, not just what you think they'd likely say. Deep down in your heart, imagine what you would most want others to say about what you've meant to them and their lives.

It is time for the first person to speak. Imagine it's someone very close to you. What you would most want them to say about the impact you've had? Try to really hear them saying that. Now, imagine the next person standing up to speak. This could be someone from a different part of your life – perhaps a coworker or neighbor. And for them too, imagine what you would most want for them to say about what you have stood for in your life.

Now thank your mind for this experience, and gently bring your attention back to the present moment. Take a moment to get centered here, noticing your breath and how your body feels. And when you're ready, you can open your eyes.

Question 1: What came up for you?
[Open-ended answer]

Question 2: Who did you first imagine speaking?

- Name
- Relation

Question 3: What did you most want them to say about you?
[Open-ended answer]

Question 4: What other thoughts/feelings did you notice?
[Open-ended answer]

END: VALUES EXERCISE

BEGIN: PT INTRODUCTION

This module will teach you about a technique called perspective taking. Perspective taking is a process by which we may enhance our own self-awareness and empathy with respect to others. By being able to view our situations, and those of others, from a different perspective, we are more likely to *understand others and ourselves*. To begin, we will discuss two perspectives one can take with respect to the “self” to increase self-awareness—the “participating” and “observing” self. And, following, we will discuss why this skill is important to facilitate empathy by better understanding the perspectives of others.

PARTICIPATING SELF

From the participating perspective, we tend to be driven by scripts or rules that we create for/about our selves, our lives, and our histories. Consider the statement: “I am a driven professional.” What does this mean to you? Now, consider the statement “I am a loving partner.” Depending on the meaning we “script” for each statement, verbal constructions about each may draw us into an “unworkable trap.”

As an example, one may generate the rule that driven professionals must work long hours, and loving partners must spend a lot of time together. When taken literally, this means that one simply cannot be both! A problem arises, though, when being a loving partner and driven professional are both important values, but one’s life choices are determined by an attachment to the thoughts, feelings, and rules generated about being a dedicated professional and/or loving partner.

1min 45sec

QUESTION 1: The participating self perspective tends to be driven by:

- e) scripts or rules we create for/about ourselves.
- f) a stable, unchanging perspective.
- g) one’s life choices.
- h) both a and c.

OBSERVING SELF

While the participating self is made up of ever-changing thoughts, feelings, memories, and the like, the observing self, takes on more of a stable, unchanging perspective. From this perspective, we aren’t defined by our thoughts, sensations, emotions, and memories; rather, we are simply the vessel that contains them. In other words, you are not your thoughts and feelings alone; rather, you are the field in which your thoughts, feelings, and roles unfold.

Let’s return to the example of being a “driven professional.” After a long workweek, a colleague asks you to join them at a conference that would require you to be out of town for an extended period of time. Attending this conference would be great for your professional development, but would also require time away from your partner. If you were to remain attached to your participating self, you would probably say no—firmly and without discussion. This would mean that you are not a loving partner, right?

Wrong! If you were to shift your perspective to that of the observer, then, rather than getting hooked by the content of not being a loving partner, and allowing it to drive your behavior, you would be able to make a choice in the service of *one* of your *other* values: being a driven

professional. Interestingly, your answer may still be “no”, but the interaction with your coworker would probably look much different.

1min 30sec

QUESTION 2: From the observing perspective, we aren’t defined by our thoughts, sensations, emotions, and memories; rather, we are simply:

- a) unstable and changing.
- b) interacting with coworkers.
- c) the vessel that contains them.
- d) driven professionals.

One purpose of this training is to help foster a shift from the participating self to the observing self, such that we can experience life as it unfolds. In other words, the goal is to reduce attachment to the participating self, creating the flexibility necessary for choosing actions based on values, rather than based on thoughts and rules generated about the self. With this perspective, we *notice* thoughts and feelings; we don't *create* them. Thus, there is no need for self-criticism or judgment. Instead, we can choose our actions based on our values, rather than based on the thoughts and rules *we create* about our self, actions, and roles.

0min 30sec

TAKING THE PERSPECTIVE OF OTHERS

The observing self can be used for many different situations. Not only can it be helpful for creating self-awareness, or noticing our thoughts and actions in the present moment, but we can also use the observing self to take the perspective of other people.

Have you ever been in a situation where someone did something that was frustrating or annoying, and that part of what frustrated you was that you didn’t understand why that person did what they did? Practicing perspective taking can help you empathize, if not understand, why people do what they do. By taking a more considerate, and less judgmental, approach to how people act around you, you will be able to act more flexibly with others in a more productive way.

Just like with thoughts and feelings, we cannot really control how other people behave. But! We can change how we respond to those people. Taking an aggressive and defensive approach to people who offend us many times make the situation worse. By using perspective taking skills, you will have a better idea of what other people are going through, so you can work with them, rather than against them.

END: PT INTRODUCTION

BEGIN: PT EXERCISE

The following exercise is designed to encourage you to “take the perspective” of others. Whether you are leading, or following the lead of another, trying to see the same situation from someone else’s position can be helpful for working with others and coming to a sound solution in times of difficulty. In other words, try to put yourself in their shoes. Try to think about the situations and challenges that may be having an impact on how that person is behaving.

Imagine you are the leader of a small expedition with hopes set on climbing a mountain, standing at 20,310 feet. You and your group have been training for years to get such an incredible opportunity, and while you are all in peak health, you are the only one who has experience mountaineering in this region. The tension surrounding the team is one of nervous excitement about the upcoming 20-day journey.

Now the time has come for your journey to begin.

You leave Base Camp, and begin your ascent in what feels like the middle of the night. Even from the beginning the hike the first day is fraught with hardships. You and your team are adjusting to the constantly changing elevation, and slipping on unseen rocks along the narrow path you are following, alongside a near vertical mountain slope. This wreaks havoc on your body. Your legs ache, your feet have blistered, and your lungs gasp for air in the thin high altitude air. At night you're busy thinking about how you will lead your team efficiently to the summit, which makes for a restless night with little sleep.

As dawn approaches, your team packs up for their first full day of climbing that will bring them closer to dangerous altitudes and challenging obstacles. Although everyone takes precautions to stay safe, someone slips on a rock and slides several feet down the mountainside near a steep embankment. Without a moment's hesitation, another group member reaches out to clasp arms, and is pulled down too. You can hear the fallen team members breathing heavily, straining against the loose gravel and grunting. The two other group members are starting to yell out and are pacing back and forth looking for anything that might help their friends. Suddenly you realize that your group is depending on you to figure out how to get the two sprawling figures back to safety. A wrong move could mean one or more people falling and risking traumatic injury, if not death.

Take a moment to really put yourself in this situation. Imagine the sounds of your frightened team: the people bracing themselves against the rock to prevent further sliding, and the helpless members wanting desperately to retrieve their buddies. Imagine seeing the eyes of the first person who fell, and the rigid frame of the friend laying prone, each hand tightly grasping the others wrist. Imagine the facial expressions of your teammates as they look to you, their leader, for guidance. Imagine what the different teammates see. What do they see when they look into your eyes? What do they see when they look at the possible fate below? What will they hear when you start to speak?

Now, take some time to answer the following questions. Before you answer each question, take a moment to close your eyes and really put yourself into this scenario. The more thoughtful your answers, the more you are likely to benefit from this exercise.

Question 1: What kind of emotions are your teammates likely experiencing in this moment? What possible feeling might they have about this moment? about you?
[Open-ended answer]

Question 2: What kind of emotions are you, as the leader, likely to experience in this scenario? How are you likely to feel?
[Open-ended answer]

Question 3: What is important for you, as a leader, to say, think, feel, or do in this situation that will enable your team to get everyone back to a safe place with minimal injuries?
[Open-ended answer]

Question 4: As a leader, what would you imagine your teammates saying, thinking, feeling, or doing to enable your team get everyone back to a safe place with minimal injuries?
[Open-ended answer]

END: PT EXERCISE

BEGIN: APPLICATION

The following exercise will help you to look at the consistency between your *activities* you currently engage in and the *values* you care about most in your life. It is designed to monitor your progress towards living the kind of life you want. Part A will look at where you are in relation to your most important values; Part B will help you identify what might be standing in the way.

Part A

During this section, you'll have space to explore your activities in three chosen value areas over the last two weeks. In this space, please write down an important value in your life. Then, in the additional space provided, try to sum up in a few sentences why this value is important to you. If you were really living this value, how would your education/life/relationships be different? If you were living in line with this value, what would you be getting out of it?

Next, mark an "X" in the area of the dartboard that represents where you have been *overall, over the last two weeks*, in relation to your chosen value. The center of the dartboard – the so-called *bull's eye* - represents *exactly where you want to be* with living in line with this value. The outer circle represents feeling very far from living your chosen value.

Finally, identify some moves/actions/behaviors over the last two weeks that moved you either towards or away from the bull's eye. It doesn't matter if the moves were small or large – everything counts.

Value 1

Question 1: The first value that I really want to be living is: [Open-ended answer]

Question 2: This value is important to me because: [Open-ended answer]

Question 3: How close was I to totally living this value in the last two weeks? Place an X:

Question 4: Actions that moved me *towards* the bull's eye over these two weeks were: [Open-ended answer]

Question 5: Actions that moved me *away* from the bull's eye over these two weeks were: [Open-ended answer]

Value 2

Question 1: The first value that I really want to be living is: [Open-ended answer]

Question 2: This value is important to me because: [Open-ended answer]

Question 3: How close was I to totally living this value in the last two weeks? Place an X:

Question 4: Actions that moved me *towards* the bull's eye over these two weeks were: [Open-ended answer]

Question 5: Actions that moved me *away* from the bull's eye over these two weeks were: [Open-ended answer]

Value 3

Question 1: The first value that I really want to be living is: [Open-ended answer]

Question 2: This value is important to me because: [Open-ended answer]

Question 3: How close was I to totally living this value in the last two weeks? Place an X:

Question 4: Actions that moved me *towards* the bull's eye over these two weeks were: [Open-ended answer]

Question 5: Actions that moved me *away* from the bull's eye over these two weeks were: [Open-ended answer]

Part B

Think about the values you identified, your descriptions of why those values are important, and the actions influencing whether or not you are living in alignment with those values. Combine those three values and think of them as representing the life you want.

Now think about where your X marks were placed on the three dartboards. Overall, how are you doing?

Question 1: At this moment in time, over the last two weeks, how close or far away are you from living the kind of life you want, to being the kind of person you want to be? Write down some of your observations below: [Open-ended answer]

Now, think about what is standing in the way of moving those X marks towards the bull's eyes. Anxiety? Insecurity? Hopelessness? Lack of motivation? Lack of self-belief? Barriers to do with your environment, with other people? Other factors?

Identify a move or two you can make during the next two weeks towards *each* of your valued directions. Be specific and be realistic, but also be courageous and bold! Just think: what would it mean for your life if you were to move closer to the bull's eye?

Question 2: My First identified Value was: _____. A move or two I can make during the next two weeks is/are: [Open-ended answer]

Question 3: My Second identified Value was: _____. A move or two I can make during the next two weeks is/are: [Open-ended answer]

Question 4: My Third identified Value was: _____. A move or two I can make during the next two weeks is/are: [Open-ended answer]

END: APPLICATION

Full Resource List

- Chase, J. A., Housmanfar, R., Hayes, S. C., Ward, T. A., Vilaridaga, J. P., & Follette, V. M. (2013). Values are not just goals: Online ACT-based values training adds to goal-setting in improving undergraduate college student performance. *Journal of Contextual Behavioral Science*, 2(3-4), 79-84.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy, second edition: The process and practice of mindful change*. New York: Guilford Press.
- Kasket, E. (n.d.). Modification of Lundgren bulls eye exercise. Retrieved from https://contextualscience.org/modification_of_lundgren_bulls_eye_exercise
- Long, D. (n.d.). 80th birthday exercise for values exploration. Retrieved from https://contextualscience.org/80th_birthday_exercise_for_values_exploration
- Stoddard, J. A. & Afari, N. (2014). *The big book of ACT metaphors: A practitioner's guide to experiential exercises & metaphors in acceptance & commitment therapy*. Oakland: New Harbinger Publications, Inc.
- Ward, T., & Housmanfar, R. (Under Review). The additive effects of values clarification and perspective taking on team adaptation in a computerized combat simulation. *Journal of Organizational Behavior Management*.

Appendix B

Interpreters in Healthcare Module Script

**Note: Information based on that provided on the Certification Commission for Health Care Interpreters' and The National Board of Certification for Medical Interpreters' Websites
See Page 129 for Full Resource List.**

BEGIN: INTERPRETER INTRO

According to the most recent U.S. Census Bureau data, 60,577,020 people over the age of 5 years in United States households speak a language other than English at home. That is 20.8% of the country's population. In Nevada and California, the percentages are even higher: 29.7% and 43.8%, respectively. Nationally, 38.6% of the people who speak a language other than English at home also report that they speak English "less than very well."

It is of critical importance that health care workers provide their Low English Proficiency (LEP) patients with an appropriate form of interpretation in order to maintain a quality level of care. There are some federal regulations regarding of providing adequate interpretation services for LEP patients. Title VI of the Civil Rights Act of 1964 and President Clinton's Executive Order 13166 require that patients with LEP have access to a qualified interpreter in the health care setting. The U.S. Department of Health and Human Services has also issued the National Standards for Culturally and Linguistically Appropriate Services, mandating that any health care organization receiving federal funds must:

- 1) Offer language assistance for LEP patients as well as deaf patients at no cost to the patient.
- 2) Notify patients of the availability of an interpreter both verbally and in writing, both in their preferred language.
- 3) Ensure the competence of the interpreters, avoid the use of untrained interpreters, and especially avoid the use of minors as interpreters.
- 4) Easy-to-understand signage and print materials should be available in languages commonly used in the service area.

Failure to use qualified interpreters results in increased numbers of unnecessary tests being performed and higher hospital re-admission rates, as well as misdiagnosis and improper treatment resulting in increased litigation. This module will teach you ways to avoid these issues by appropriately utilizing interpreters for LEP patients.

QUESTION 1: Interpretation for LEP patients should be provided:

- a) **At no cost to the patient**
- b) At no cost to the provider
- c) At no cost to the government
- d) At no cost to the insurance company

What is Interpretation?

This module will teach you about the role and proper use of interpreters in health care. In order to understand the proper use of interpreters, it is important to first clarify a few points. Occasionally, confusion arises when distinguishing the term “interpretation” from “translation.” Translation occurs when a person changes the written word from one language into the written word of another language. Interpretation is what happens when a person verbally changes the spoken word from one language to another language. The National Council on Interpreting in Health Care (NCIHC) specifically defines interpreting as “The process of understanding and analyzing a spoken or signed message and re-expressing that message faithfully, accurately, and objectively in another language, taking the cultural and social context into account.” It is important to note that interpretation rarely involves a literal word-for-word rendition of what the original speaker said; instead it focuses on clearly conveying the meaning of what was said in real-time.

There are 3 types of interpretation that are typically used. The 1st type is sequential or consecutive interpretation. This is the mode employed in health care. In sequential interpretation, the interpreter begins to speak only after the source-speaker has finished. The 2nd type of interpretation is simultaneous interpretation, which can be thought of as “the UN style.” In this type, as soon as the source-speaker begins to talk, the interpreter starts to interpret what they are saying with only a few seconds delay. The last type, summary interpretation, isn’t always considered interpretation. This is because only a summary of what the speaker said is offered, and there is a great risk that important information will be lost from the summary. We will revisit this in a later section.

QUESTION 2: Interpretation is:

- a) Converting written words from one language to another
- b) Using a translating app to interact with an LEP patient
- c) **Verbally changing the spoken word faithfully, accurately, and objectively from one language to another**
- d) Word-for-word translation of a message

QUESTION 3: Sequential interpretation is preferred in the health care setting. This is when:

- a) The interpreter summarizes what the source speaker says.
- b) The interpreter interprets at the same time as the source-speaker is talking, with only a few seconds delay.
- c) **The interpreter waits for the source speaker to finish before beginning to interpret.**

What Constitutes a Qualified Interpreter?

Being a qualified interpreter does not simply mean being bilingual in two languages. Although a qualified interpreter must be a person who has a high level of fluency in at least two languages, they also must be assessed for professional skills, and undergo training to learn to interpret with skill and accuracy. Health care interpreters must have a strong working vocabulary of medical terminology in both languages. They must be very knowledgeable of terms and concepts related to the human body, including anatomy, medications, disease names, symptoms, and testing.

In the health care field, the most qualified interpreter is a certified interpreter. Certification for interpreters refers to a process by which a government, academic or professional organization attests to or guarantees that an individual is qualified to provide a particular service. The standardization of certification for health care interpreters is a relatively new and evolving field; historically, certification has varied state by state. There are now two groups that provide national certification for health care interpreters: The Certification Commission for Health Care Interpreters and The National Board of Certification for Medical Interpreters. The NCIHC has led the effort to standardize health care interpretation and its certification. They have developed competency standards that a certified health care interpreter must possess, some of which include:

- *Accuracy*. Accurate interpretation means rendering all messages accurately and completely, without adding, omitting, or substituting information. It should replicate the register, style, and tone of the speaker as much as possible. Interpreters will advise each party that everything said will be interpreted.
- *Confidentiality*. The interpreter does not disclose any information to anyone outside of the involved parties. It is appropriate for the interpreter to let the patient know that they maintain confidentiality in all encounters.
- *Impartiality*. The interpreter maintains a position of neutrality during the encounter, and does not contribute to treatment decisions.
- *Cultural awareness*. Interpreters should be aware of the cultural differences associated with the languages of which they interpret.
- *Role Boundaries*. The interpreter limits their professional activity to interpreting within the encounter. This means that they would never advise a patient on health care questions, but rather redirect the patient to ask the provider.
- *Professionalism*. The interpreter is prepared, accountable for their performance, and acts in a manner appropriate to the setting. They are honest about any limitations they may have during an assignment. For example, they will ask the health care provider for an explanation of a highly technical medical term that they are unfamiliar with before continuing to interpret.
- *Professional Development*. The interpreter continues to develop language and cultural knowledge, staying up to date on slang and changes in medical terminology.

QUESTION 4: Which of the following statements regarding interpreter competency standards is FALSE?

- a) Interpreting with *accuracy* means rendering all messages without adding, omitting, or substituting information. Replication of the speaker's tone, style, and register should be done as faithfully as possible.
- b) An interpreter exhibiting *professionalism* should appear well adept for their job. If the nurse or doctor uses a term they are unfamiliar with, they should make their best guess to prevent any parties involved from doubting their abilities.**
- c) Interpreters must respect *role boundaries* by limiting their activity to interpreting within the encounter, and refrain from advising a patient on health care questions.
- d) *Confidentiality* refers to the fact that interpreters do not disclose information from their encounter.

When is it Necessary to Use a Health Care Interpreter?

Any time there is a language barrier between a patient and a provider, the use of a health care interpreter should be offered to the patient. This is especially important when you are obtaining informed consent, explaining procedures, tests, or any treatment, completing discharge teaching, discussing code status, or discussing the patient's symptoms, diagnosis, progress, and prognosis. Some health care professionals are bilingual themselves, and may speak the preferred language of their LEP patient. It is the ideal situation that the health care professional is truly fluent in the patient's preferred language, and no interpreter is needed. It is often the case, however, that barriers may still exist (even for bilingual health care providers) that necessitate the use of an interpreter.

It is important to recognize your own limitations. Research has shown that individuals with exposure to a second language, even those raised in bilingual homes, frequently overestimate their ability to communicate in that language, and make errors that could affect complete and accurate communication and comprehension. Remember, it is much easier to ask questions in a different language than to understand the patient's response in that language. Occasions on which a bilingual health care provider should consider using an interpreter include when:

- The provider only has a conversational vocabulary in the patient's preferred language.
- The provider is unable to understand the patient's accent, or the patient cannot understand the provider's accent.
- The provider has some confusion regarding a patient's behavior; it is possible that there is something of cultural significance that is not understood.
- The provider is uncomfortable with providing instructions or obtaining informed consent in the patient's preferred language.

A good way to assess whether the patient understands what you have said in their language is to ask them to repeat back what you have told them; if they cannot, you should provide them with a qualified interpreter. Remember, the responsibility always lies with the health care provider, NOT with the patient, to offer the use of an interpreter.

QUESTION 5: A qualified health care interpreter should be provided to the patient:

- a) Only if the patient asks for it.
- b) When a language barrier exists between the patient and the health care provider.**
- c) If the patient is willing to pay the interpreter.
- d) To avoid getting reprimanded by another health care provider.

Using Untrained Interpreters

Up until this point, we have really only discussed health care interpretation in the context of using qualified certified interpreters. In practice, however, untrained, otherwise known as ad hoc, interpreters are commonly used. Let's discuss the different types of ad hoc interpreters.

The first type is the family member or friend as interpreter. It is very common for LEP patients to have English-speaking family or friends accompany them on health-care related visits. However, these family members may not know enough medical terminology to interpret what is being

said. There is no guarantee of confidentiality when family members are used to interpret. Patients may feel embarrassed discussing certain topics in front of their family. In addition, family typically employ the summary form of interpretation, and are more likely to censor what is said or add their own opinion while interpreting, possibly having their own personal agenda. One advantage of this form of interpretation is that some patients may feel more comfortable relating their medical concerns through a trusted family member, rather than through a “stranger” like a trained interpreter. However, most patients will agree to use a non-family interpreter after receiving information about their legal rights to a qualified interpreter and reassurance about confidentiality. Occasionally, a patient will still insist on using a family member as the interpreter. In this event, you first need to ensure that there is no coercion on the part of the family member, and once this is done, document the patient’s choice. It is important to note that children should NEVER be used as interpreters, unless in the case of serious emergency.

The next type of untrained interpreter is the bilingual staff member. While this is a more preferable option than the use of a family member, it still comes with many disadvantages. Again, just because the staff member is bilingual does not mean they have the appropriate level of medical vocabulary in either language, and may feel embarrassed to admit that to the health care provider, instead making their best guess at terms. In a recent study, bilingual staff members were tested for language competence in their non-English language. 2% did not pass, 21% passed at the basic level, and 77% passed at the medical interpreter level. While these are likely higher competency levels that would be seen if family interpreters were studied, it still means that 1 in 5 bilingual staff members are not able to interpret sufficiently. Using staff members in both their primary role and in the role of interpreter can cause role confusion for patients, especially in a hospital setting. Like family interpreters, staff members will often employ the summary technique, and editorialize what is being said. Confidentiality is still a concern when using non-treatment team staff members as interpreters. Although steps can be taken to teach a bilingual staff member how to appropriately interpret, it is preferable to use a certified interpreter whenever possible.

QUESTION 6: All of the following are disadvantages of ad hoc interpreters EXCEPT:

- a) Confidentiality cannot be ensured, especially when using family or friends.
- b) Ad hoc interpreters frequently editorialize and summarize what has been said.
- c) Ad hoc interpreters often lack a sufficient medical vocabulary to interpret health care encounters.
- d) Patients always prefer trained interpreters over family member interpreters.**

END: INTERPRETER INTRO

BEGIN: HOW TO USE INTERPRETERS

In the health care setting, we typically use two types of qualified interpreters. The first type is the on-site type, where the interpreter is physically present in the room with the health care provider and patient. The second type is remote interpretation. This kind of interpretation uses a phone or video method of communication. We will explore these two types of interpretation

in more depth shortly. For now, let us consider general issues that apply to both types of interpretation.

It is always important to remember when using any interpreter that you, the health care provider, are solely responsible for the content of your message. The interpreter is there only to convey your message faithfully and accurately in another language. Additionally, remember to plan to spend more time during this encounter than you would in during an encounter with an English-speaking patient. Beyond this, there are several general guiding principles to keep in mind when using an interpreter.

- *Speak directly to the patient, and NOT to the interpreter.* Unfortunately, it is not uncommon for health care professionals to speak directly to the interpreter (“Please ask the patient if they have any pain”), instead of directly to the patient (“Mrs. Lopez, do you have any pain?”). Statements and questions in the 3rd person can create a barrier between you and your patient, and prevent the interpreter from melting into the background. A good interpreter will often advise both you and the patient to speak in the first person at the beginning of the encounter.
- *Speak in short sentences, use simple syntax, and avoid medical jargon when possible.* This allows for a more accurate interpretation, and will also allow you to establish a more fluid, conversational rapport with your patient.
- *Ask only one question at a time.* This ensures neither the interpreter nor the patient miss any relevant question.
- *Listen without interrupting.* When the interpreter is conveying what the patient said to you, do not interrupt unless you are unclear on what a term means.
- *Avoid discussing multiple issues at a time.* As with any patient, discussing too much at once often means that the patient ends up getting nothing at all from the conversation. Try to limit yourself to 3 topics or less, and don’t feel pressured to include everything in one conversation. If you need to discuss more than 3 topics, plan for separate encounters with interpreter.
- *Ask the patient to repeat their understanding.* Again, this is useful for all patient encounters, not just those with LEP patients. However, in this situation, it is an especially helpful way to judge whether the interpretation was accurate and sufficient for the patient’s understanding.
- *Assure the patient of the interpreter’s commitment to confidentiality at the beginning of the encounter.*
- *Always assume that your patient knows some English,* so do not discuss things or make comments that you do not want them to know. This should go without saying for any patient, LEP or English speaking, alert & oriented or comatose. Remember – in an interpretation encounter, you and the patient should both expect that everything said will be interpreted.

Now that you know the general rules on how to use an interpreter, we will look at the two types of qualified interpreters used in the health care setting and consider special issues related to each one. First, let’s check your understanding of what we just covered.

QUESTION 7: Which of the following statements are true regarding using an interpreter?

- a) Health care providers should speak in the 3rd person (i.e., to the interpreter and not to the patient).
- b) It is okay to use medical jargon whenever you want; a good interpreter should know it all anyway.
- c) Try to speak in short sentences and use simple syntax to allow for ease of interpretation.**
- d) Since you are using an interpreter, it is safe to assume that your patient doesn't understand any English, so it is okay to discuss things in front of them that you don't want interpreted.

On-site Interpretation

As previously mentioned, on-site interpretation means that you have the interpreter physically in the room with you. Some health care organizations will have on-site interpreters for one or several of the most common non-English languages in their area. On-site interpreters can also be hired on an as-needed basis. If they are available, they should always be the preferred choice over a remote interpreter, unless the planned encounter is expected to last less than 10 minutes. On-site interpretation allows for optimal communication, as the interpreter is able to see behavior, body language, and physical characteristics of both participants. Research shows that it provides the most accurate form of interpretation. For some patients, there is an increased feeling of security when they are able to see the interpreter. The main disadvantages to on-site interpretation are the cost, and the fact that it is not possible to cover every language that could be encountered. Things to keep in mind when using an on-site interpreter include:

- *The interpreter should be physically transparent, but not obtrusive.* Avoid the triangle set up, where each party is oriented toward one other as if they were positioned at the corners of a triangle. Instead, the interpreter should sit either next to or slightly behind the patient. Often, they will keep their eyes directed at neither the patient nor the health care provider.
- *Place yourself at eye level with your patient when possible,* and maintain eye contact with the patient. This facilitates rapport-building between patient and provider, and allows the interpreter to melt into the background.
- *Have a physical sign, such as raising your hand, if you need to interrupt.* Something like raising one's hand to indicate "stop" can be less obtrusive to the conversation than saying "stop."

Remote Interpretation

Remote interpretation uses either a video conferencing device, such as a tablet, or a special phone with 2 receivers, where the patient uses one and the provider uses the other. These special phones are often called *language lines* and are the most common way to utilize remote interpretation. Both the health care provider and the patient are able to hear the interpreter speaking in both languages. The major advantage of remote interpretation is that there are a much wider variety of language interpreters available than would be practical for an organization to directly employ. Using the language line phones also removes the physical presence of the interpreter, which can facilitate communication. It can also provide greater privacy for the patient during physical examination. The obvious disadvantage of remote interpretation is that the interpreter cannot observe physical cues from the provider or the

patient. Another disadvantage is that for some patients, the idea of having a person in some remote location whom they've never seen before listen to their health problems can be unsettling. Though qualified interpreters should state their policy of confidentiality at the beginning of the encounter, it is always good to ensure this yourself. Other rules regarding remote interpretation are:

- *Setting the stage.* Since the interpreter does not know where you are, it is a good idea to give a brief introduction of the clinical situation (i.e., "This is a hospital, and I am the patient's nurse. She is 35 weeks pregnant.") That being said, a good interpreter does not need too much information, and is typically able to interpret the conversation without much background.
- *Maintain eye contact with the patient.* This is important to remember, even though the temptation to look at the interpreter is removed. The interpretation device can still feel intrusive; so all efforts to minimize its presence should be undertaken.

QUESTION 8: Which of the following statements is false?

- On-site interpretation offers the advantage of the interpreter being able to read the body language of both the patient and the provider, resulting in a more accurate interpretation.
- Regardless of the interpretation modality used, the health care provider should maintain eye contact with the patient as appropriate.
- When using an on-site interpreter, try to use a triangle set up to make sure they feel included.**
- Language lines offer the advantage of hosting a wider variety of language interpreters than would be practical for an organization to directly employ.

END: HOW TO USE INTERPRETERS

BEGIN: APPLICATION

You are now going to view a series of videos that will be used to apply your new knowledge regarding proper health care interpretation. Please note, that while the health care provider featured in these videos is a physician, the same principles apply to nurses. In nearly all of the videos, a nurse could be found asking the same questions as the physician. The one exception is the Haitian Woman video, where the physician provides a medical diagnosis.

Russian Woman #1

QUESTION 1: List three pitfalls to obtaining a medical history when using a family member as an interpreter.

Potential answers:

All family members:

- *may have their own emotional issues and fears which interfere with their ability to interpret accurately.*
- *may not preserve confidentiality.*

- *may not know medical terminology.*
- *may filter out cultural data.*
- *may make it difficult to obtain accurate reports about sensitive issues.*

When children are used the following are additional concerns:

- *the cognitive ability of a child to handle the content of the interview.*
- *the effect on child parent role dynamics.*
- *children may be kept out of school to accompany adults to the doctor.*

QUESTION 2: After watching the clip, what do you know about the patient's medical complaints (assuming you are the health care provider)?

Potential Answers:

- *We know she is very anxious and has chest discomfort, but no other detail is available.*
- *She may or may not have allergies and/or a history of a heart attack.*

Russian Woman #2

QUESTION 1: After watching this clip, what additional information about this woman's medical history is known to the physician? What was not communicated by the well meaning, but untrained, interpreter?

Potential Answers:

- *The physician hears only that she has been taking a medicine to regulate her heartbeat, but not the name of it.*
- *He knows that her uncle had a heart attack*
- *The quality of the information is poor. The interpreter does not interpret at all. The interpreter and patient have a lengthy side conversation, which is completely unavailable to the physician.*
- *She intervenes to calm the patient with false reassurances.*
- *She did not communicate the name of the medication*

QUESTION 2: Comment on the quality of the rapport between the healthcare provider and patient. What problems arise when the interpreter arrives?

Potential Answers:

- *While the physician attempts to speak directly to the patient initially, he is no longer in the conversation after the "interpreter" arrives.*
- *The interpreter and the patient develop rapport with each other.*
- *In fact, the interpreter switches roles and begins to conduct the interview herself.*

QUESTION 3: List 3 ways potential pitfalls in using an untrained bilingual staff member as an interpreter.

Potential answers:

- *may not preserve confidentiality.*

- *may not know medical terminology.*
- *may filter out cultural data.*
- *may make it difficult to obtain accurate reports about sensitive issues.*
- *may offer advice*
- *may engage in side talk*

Russian Woman #3

QUESTION 1: In what ways is this different? Comment on specific behaviors of the interpreter and the physician that improve the quality of the information obtained by the physician.

Potential answers:

- *The physician spoke directly to the patient and maintained eye contact.*
- *The interpreter interpreted faithfully and accurately, using word for word interpretation when possible*
- *The interpreter was there purely to facilitate the information exchange between the physician and the patient.*
- *This enabled a rapport to develop and allowed an accurate and reliable history to be obtained.*
- *The physician facilitated this by maintaining eye contact with the patient, speaking in the first person, and asking one question at a time.*

QUESTION 2: What else could the interpreter or healthcare provider have done to better facilitate the interview?

Potential Answers:

- *It would have been better to position the interpreter behind the patient or to her side. This would have helped prevent the patient from talking to the interpreter instead of the doctor.*

QUESTION 3: What do we know about this woman's history? What is the emotional state of this woman? Comment on how the information is different from the first two clips.

Potential Answers:

- *She has a stabbing, sharp pain, nausea, and tingling in her left arm.*
- *She has had 2 previous episodes of these symptoms and was hospitalized 1 year ago.*
- *She has recently had a cardiac procedure at St. Mary's Hospital.*
- *This data is very specific.*
- *It allows the physician to establish an initial assessment, make a decision and obtain objective information from other sources.*
- *In addition, he is able to calm her and establish rapport.*

Mr. Chan #1

QUESTION 1: What observations did you make about the limits of working with an ad-hoc interpreter – in this case, a medical student?

Potential Answers:

- *The interpreter filters out important information, especially the patient's cultural beliefs and his concerns about his medication.*
- *She acts as the practitioner herself when she gives advice regarding use of the medications.*
- *The physician should instruct the interpreter to avoid side conversation with the patient.*
- *Personal conversations between patient and interpreter should be discouraged*
- *Using untrained interpreters, even other health professionals, confuses role function, and impedes the relationship between doctor and patient.*
- *Untrained interpreters can mistakenly edit, omit, or substitute information.*

QUESTION 2: What could the healthcare provider have asked the student to do in order to perform the quality of interpretation?

Potential Answers:

“Pretend you are a professional interpreter.”

- *Interpret every word said including cultural beliefs.*
- *Stop the patient or me if you don't understand or if we are going on for too long.*
- *Don't say anything to either of us that the other has not said.*
- *Do not make eye contact with the patient (if possible situate yourself out of the patient's direct view).*
- *For the physician: If there is information you don't understand, ask the patient for clarification.*

Mr. Chan #2

QUESTION 1: What did the trained interpreter do differently than the medical student? How did this affect the interaction?

Potential answers:

- *He positioned himself slightly behind the patient*
- *He did not engage in side conversation*
- *He faithfully and accurately relayed messages between parties*
- *Even though he was not always able to do word for word interpretation, he did not omit or add any information*
- *His actions established better rapport between doctor and patient*
- *The patient spoke to the doctor, and not to the interpreter*

Haitian Woman:

QUESTION 1: Comment on specific behaviors of the interpreter that improve the quality of the interaction between the physician and patient.

Potential answers:

- *She interprets the spoken word as closely to word for word as possible, and includes tone and register.*
- *She does not refrain from translating what may be seen as “side comments”*
- *She allows the physician and the patient to develop their own relationship despite the language difference.*

QUESTION 2: In what ways did the physician maintain rapport with the patient?

Potential answers:

- *The physician enabled the patient to express her worries and concerns.*
- *He called an interpreter despite his rudimentary knowledge of Creole.*
- *He used excellent non-verbal communication skills and was attentive to her questions and need for reassurance.*

QUESTION 3: What did the physician do to maximize the patient's understanding and recall of the information? What more could he have done?

Potential answers:

- *The physician spoke in clear plain language, ensured adequate time for interpretation, listened carefully to the patient's expression of her concerns and established a careful plan for further evaluation and follow up.*
- *He could have asked for a "back translation" asking the patient to review her understanding of what he said and what the plan for follow-up was.*

END: APPLICATION

Full Resource List

- <http://www.cchicertification.org> -- Certification Commission for Health Care Interpreters
- <http://www.certifiedmedicalinterpreters.org> - The National Board of Certification for Medical Interpreters
- <http://www.ncihc.org/>
- <https://www.thinkculturalhealth.hhs.gov/content/clas.asp>
- New York University School of Medicine. *Working with medical interpreters*. Retrieved from: <http://education.med.nyu.edu/compass/category/gme/>

Appendix C

General I-PASS Coding Category Example

I Illness Severity	P Patient Summary	A Action List	S Situation Awareness & Contingency Planning	S Synthesis by Receiver
unstable	<p>65 yo with history of COPD & chronic kidney disease admitted for COPD exacerbation with pneumonia 2 days ago.</p> <p>Presented with 3 days of malaise, fever, and productive cough in acute respiratory distress requiring mechanical ventilation. He is being followed by pulmonology, nephrology, and hospitalists. Current vital signs are 88/56 (MAP 67), HR 90,</p> <ul style="list-style-type: none"> Pneumonia – pt is on vent day 2-with propofol sedation. He is receiving IV antibiotics, as well as IV normal saline. He is q4 hour breathing treatments Chronic kidney disease – BUN and Cr are elevated. Dialysis is not required at this time 	<p>Continue to assess possibility of extubation</p> <p>F/u on dietary consult to ensure nutrition is started today.</p>	<p>If SBP drops below 85 give a 2L bolus of NS, initiate Levophed, and notify hospitalist.</p> <p>If pt shows worsening wheezing or increased secretions, implement breathing treatments q2 hours.</p>	
<p>Name: Annie Santiago DOB: 9/23/1962 Code Status: Full</p>	<p>53 yo female tennis player with a history of a R MCL repair & R ACL repair admitted for a right total knee replacement.</p> <p>Pt was evaluated on an outpatient basis and admitted for surgery this morning and will be staying the night for observation.</p> <ul style="list-style-type: none"> Pain – IV morphine 2-5 mg q 4 hours, controlling pain well Not c/o nausea at this time Ambulating 3x day 	<p>Ensure outpatient PT is set up prior to discharge.</p> <p>Encourage patient transition from IV morphine to oral Norco.</p>	<p>If pt begins to develop nausea, please start PO Zofan.</p> <p>Once pt has had a bowel movement and pain is effectively controlled with PO medications, they can be discharged.</p>	

Appendix D

Attitudes Toward Health Care Teams_Adapted (ATHCT) Scale

<i>Please indicate your level of agreement with each of the following statements:</i>		<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1	Patients receiving interprofessional care are more likely than others to be treated as whole persons.					
2	Developing an interprofessional patient care plan is excessively time consuming.					
3	The give and take among team members allows for better patient care decisions.					
4	The interprofessional approach makes care delivery more efficient.					
5	Developing a patient care plan with other team members avoids errors in delivering care.					
6	Working in an interprofessional manner unnecessarily complicates things most of the time.					
7	Working in an interprofessional environment keeps most health professionals enthusiastic and interested in their jobs.					
8	The interprofessional approach improves the quality of care to patients.					
9	In most instances, the time required for interprofessional consultations could be better spent in other ways.					
10	Health professionals working as teams are more responsive than others to the emotional and financial needs of patients.					
11	The interprofessional approach permits health professionals to meet the needs of family caregivers as well as patients.					
12	Having to report observations to a team helps team members better understand the work of other health professionals.					

13	Hospital patients who receive interprofessional team care are better prepared for discharge than other patients.					
14	Team meetings foster communication among team members from different professions or disciplines.					

Appendix E

Readiness for Interprofessional Learning Scale (RIPLS; National Center for
Interprofessional Practice and Education; Parsell & Bligh, 1999)

<i>Please indicate your level of agreement with each of the following statements:</i>		<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1	Learning with other students / professionals will make me a more effective member of a health care team.					
2	Patients would ultimately benefit if health care students / professionals worked together					
3	Shared learning with other health care students / professionals will increase my ability to understand clinical problems					
4	Communications skills should be learned with other health care students / professionals					
5	Shared learning will help me to understand my own professional limitations					
6	Learning between health care students before qualification and for professionals after qualification would improve working relationships after qualification / collaborative practice.					
7	Shared learning will help me think positively about other health care professionals					
8	For small-group learning to work, students / professionals need to respect and trust each other					
9	I don't want to waste time learning with other health and social care students / professionals					
10	It is not necessary for undergraduate health care students / professionals to learn together					
11	Shared learning with other health care professionals will help me to communicate better with patients and other professionals					

12	I would welcome the opportunity to work on small group projects with other health care students / professionals					
13	I would welcome the opportunity to share in lectures, tutorials or workshops with other health care students / professionals					
14	Shared learning and practice will help me clarify the nature of patients' problems					
15	Shared learning before and after qualification will help me become a better team worker					

Appendix F

Sample Communication Observation Tool

I-PASS Medical Student Handoff Study
Form 5: Verbal Handoff Assessment Tool for Faculty and Residents

3

(For Study Staff Only) Verbal Handoff Evaluation ID#: ___V_____
MSID# _____

Observer Information:

Name: _____ Date: __/__/__ (mm/dd/yy) Obs. Start Time: __: __ am/pm Obs. End Time: __: __ am/pm

How well do you know the patients whose handoff you are evaluating? Very well Somewhat well Not at all

Medical Student Information:

Name: _____ Total number of patients discussed during the handoff: _____

Type of Handoff

1. Please indicate the type of handoff you observed: Individual Team

Situational Overview (Big Picture)

2. Was a situational overview provided by the medical student giving the handoff (e.g. description of the "big picture" of what will need to be prioritized by the receivers of the handoff): Yes No

Indicate the frequency that the specific element of the mnemonic was used throughout the handoff.

Verbal Mnemonic	Description	Never	Rarely	Sometimes	Usually	Always
3. Illness Severity	Identification as stable, "watcher", or unstable					
4. Patient Summary	Summary statement, events leading up to admission, hospital course, ongoing assessment, plan					
5. Action List	To do list; timeline and ownership					
6. Situation Awareness/Contingency Planning	Know what's going on; plan for what might happen					
7. Synthesis by Receiver	Ensures receiver summarizes what was heard, asks questions, restates key action/to do items					

Rate the frequency with which the medical student who gave the handoff did the following:	Never	Rarely	Sometimes	Usually	Always
8. Actively engages receiver to ensure shared understanding of patients (Encouraged questions, asked questions, considers learning style of receiver)					
9. Appropriately prioritizes key information, concerns, or actions					

Rate the frequency with which the medical student who gave the handoff did the following:	Never	Rarely	Occasionally	Fairly Often	Very Often
10. Miscommunications or transfer of erroneous information					
11. Omissions of important information					
12. Tangential or unrelated conversation					

13. Rate your overall impression of the pace of the handoff:

Very slow pace/ Very inefficient Slow pace/ Inefficient Optimally paced/ Efficient but not rushed Fast/pressured pace Very fast/pressured pace

14. What was especially effective about the handoff?	15. What aspect(s) of the handoff could be improved?	16. Additional comments:

17. Was the medical student given feedback within 24 hours of your observation? Yes No