

USING INTERACTION ANALYSIS TO EXAMINE INTERPROFESSIONAL LEARNING AMONG HEALTH PROFESSIONALS

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Health professionals work in complex environments that increasingly demand shared understanding of patients' needs, coordination of efforts to meet those needs, and effective communication. Most health professions' educational programs include curricular activities to prepare professionals to practice in these complex environments, but the processes by which learning occurs during these activities are not well understood. Research examining the relationship between the design of interprofessional curricular activities and the interactions that occur among professionals while participating in these activities can help inform and improve future design of curricula to support interprofessional practice. This paper describes interaction analysis, a research method well suited to the type of research needed in interprofessional education and practice. After providing a brief account of the origins and applications of interaction analysis, the authors describe how they designed and employed analytic procedures aligned with interaction analysis to examine learning opportunities afforded by an interprofessional simulated patient exercise.

Key words: Interaction analysis; Health professions education; Simulation; Teams; Interprofessional.

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Quality patient care increasingly relies on coordinated and collaborative efforts among multiple health professionals and staff (Berwick, Nolan, & Whittington, 2008; Ghorob & Bodenheimer, 2012). Successful coordination and collaboration requires more than structural changes in care delivery processes (e.g., co-location and allocation of resources such as time, technology, staff support). It requires health professionals (new and experienced) to develop competencies that go well beyond those acquired during prior years of training and socialization into a given profession (Interprofessional Education Collaborative-IPEC, 2016; Rosen et al., 2010; Sargeant, Loney, & Murphey, 2008). Successful coordination and collaboration in health care requires professionals to voice their own professional expertise and perspectives while attending productively to the expertise and perspectives of other professionals.

Many health care organizations and educational programs in the health professions have recognized the importance of training students, providers, and staff in core skills related to coordination and collaboration of patient care (Abu-Rish et al., 2012; Barr, 2013; Institute of Medicine, 2015; World Health Organization, 2010). Core competency frameworks for effective teamwork and interprofessional collaboration generally include role clarity; accurate and shared knowledge of roles, tasks and expertise; knowing how to work together; and conflict management and resolution (IPEC, 2016; Rosen et al., 2010; Sargeant et al., 2008). However, while all generally agree these are important competencies, little is known about how health professionals develop and use these competencies during educational and patient care activities.

Over the last decade, numerous interactive strategies have been implemented to support interprofessional learning and practice, including small-group discussion, case- or problem-based learning, simulated activities, group visits with patients, team meetings, and interprofessional rounds and conferences (Abu-Rish et al., 2012; Barr, 2013; Goldman et al., 2015; Paradis, Leslie, & Gropper, 2015). Yet little attention has been given to the relationships between the design of interprofessional activities, the types of interactions among health professionals participating in the activities, and the learning that may or may not occur through these interactions. Rather, research and evaluation have focused largely on individuals' attitudes toward interprofessional education or teamwork, knowledge of professional roles, satisfaction with experiences, and skills such as leadership or communication (Gough, Hellaby, Jones, & MacKinnon, 2012; Reeves et al., 2016).

Reviews of the literature on interprofessional education (IPE) and interprofessional collaborative practice (IPC) highlight the need for observational research that documents "what actually happens" during interprofessional interactions (Morgan, Pullon, & MacKinlay, 2015) and thereby helps to unpack the "black box" of IPE and IPC (Zwarenstein & Reeves, 2006). The few observational studies that do exist in the IPE literature tend to use ethnographic observation together with supplemental interviews to describe characteristic patterns and routines in a particular setting or context (e.g., Kent et al., 2016). However, absent an audio-visual record of interaction, they are unable to drill down to the level of specific verbal and nonverbal interaction by which interprofessional work is accomplished. To advance research in this area, appropriate methodological approaches are needed (Kitto, Nordquist, Peller, Grant, & Reeves, 2013).

In this paper, we offer video-based interaction analysis as a compelling method to advance research examining the processes that support or inhibit learning during interprofessional interactions. Specifically, we will describe interaction analysis as a method used in social science research, then explain how we employed this analytic lens to investigate novice and experienced health professionals' interactions with one another during a simulated patient encounter. We offer examples of the types of insights gained from interaction analysis and discuss some of the strengths and limitations of this approach to studying interprofessional education in simulated environments.

INTERACTION ANALYSIS AS A RESOURCE FOR THE STUDY OF INTERPROFESSIONAL EDUCATION

The growing use of simulation as an environment for professional education, coupled with the relative scarcity of observational research, makes interaction analysis a fruitful resource for the study of interprofessional education involving both novices and practicing clinicians. In a

widely cited article, Jordan and Henderson (1995) define interaction analysis as “an interdisciplinary method for the empirical investigation of the interaction of human beings with each other and with objects in their environment. It investigates human activities such as talk, nonverbal interaction, and the use of artifacts and technologies, identifying routine practices and problems and the resources for their solution” (p. 40). It is a method framed by assumptions regarding the social origins, organization, and uses of knowledge (including expert knowledge) and a method made increasingly more feasible by advances in video and video analysis technologies (Goldman, Pea, Barron & Derry, 2007; Heath & Hindmarsh, 2002; Heath, Luff, & Sanchez Svensson, 2007). It owes a particular though not exclusive debt to the sociological tradition of ethnomethodology (literally “the study of the methods of persons”) and the corresponding research methods of ethnography and conversation analysis (Garfinkel, 1967; Sacks, Schegloff, & Jefferson, 1974).

Interaction analysis, often joined to extensive ethnographic fieldwork, has been widely used in studies of “everyday” social ecologies ranging from family or neighborhood life to a wide array of institutional and workplace settings, including hospitals and other health care settings (e.g., Erickson, 2004; Heritage & Maynard, 2006; Jordan, 1989). In many of those studies, researchers concern themselves with understanding how ordinary and local workplace practices of interaction and interpretation enable the routine accomplishment of complex tasks like performing surgery (Koschmann, LeBaron, Goodwin, & Feltoich, 2011), piloting a large ship (Hutchins, 1995), or coordinating a large transportation control center (Heath & Luff, 1992). In some studies, researchers take up the question of how novices or newcomers enter into a given community or set of practices (e.g., Goodwin, 1994; Hutchins, 1995). In both instances, analysts must attend to the ways in which situationally relevant knowledge is both intimately local — the meaning of particular actions here and now in this classroom, this family, this work team — and nonlocal or “global,” as in the shared understanding of categories of disease among physicians, but also the shared understanding of tacit practices of medical decision making (for more on the local and the non-local or “global” dimensions of situated interaction, see Erickson, 2004; Powell & Colyvas, 2008).

Interaction analysis is well established as an approach to the study of physician-patient communication. As early as the 1970s, sociolinguist William Labov and psychiatrist David Fanshel (1977) teamed up to produce a detailed explication of a psychotherapeutic interview; the analysis was intended to serve as practical guidance for the conduct of such interviews as well as to make a more general contribution to discourse analysis theory and methods. Among the most widely cited early studies was Mishler’s (1984) work. In deciding an analytic approach to audio-recorded medical interviews, Mishler rejected conventional approaches to the coding of segments of transcribed text, turning instead to sociolinguistics and conversation analysis to map the unfolding interaction in ways that exposed the dominant “voice of medicine” and the secondary, often suppressed, “voice of the (patient’s) lifeworld.” By the early 2000s, studies of physician-patient interaction had multiplied steadily, as evidenced by the volume edited by Heritage and Maynard (2006).

Interaction-focused studies of professional collaboration have been slower to develop, but demonstrate the potential of such studies to deepen understanding of intraprofessional and interprofessional communication. A small but growing body of research focuses on interactions among health care professionals in the context of naturally occurring workplace interaction. For example, Måseide (2003) relies on Erving Goffman’s concepts of framing and footing to analyze the discourse among surgeons and other specialists in the weekly meeting held in the thoracic ward of a university hospital in Norway. Hindmarsh and Pilnick (2002) employ the tenets of eth-

nomethodology and the methods of conversation analysis to study preoperative anesthetic work in a British hospital. Their analysis underscores the importance of a video record that enables detailed analytic attention to situated, embodied practice, and the necessity of coupling an analysis of talk to the analysis of nonverbal communication and the use of material objects. In a study of collaboration between geographically dispersed general practitioners (GPs) and specialist physicians in Norway via videoconference, Nilsen (2011) draws on activity theory to frame the analysis of the physicians' discussion of one patient case in five videoconferences over a span of nine days. Nilsen argues that the GPs and specialists occupy different activity systems, despite all being physicians, and that opportunities for them to learn from and with one another arise when the case presents dilemmas that require the bridging of knowledge gaps (i.e., the diagnostic and treatment dilemmas cannot be understood and solved by information exchange alone).

To date, few studies use interaction analysis in formal educational contexts to explore preparation for interprofessional collaboration, meaning collaboration that occurs among individuals from different health professions. Studies that employ interaction analysis help to uncover the affordances and limitations of various educational contexts, including simulation, structured reflection activities, and supervised participation in primary care clinics. For example, simulations may be constrained not only by the students' relative inexperience in their professional roles but also by the norms governing relationships among students, especially those in early stages of preparation. Posenau and Peters (2016) recorded simulations involving second-semester nursing and midwifery students in interaction with occupational therapists, physical therapists, and a standardized (simulated) patient. Based on analysis that combined "aspects of grounded theory, discourse analysis, and ethnomethodological conversation analysis" (p. 3), they describe five aspects of communication among the novice professionals. Although the students do position themselves by employing explicit professional markers ("as a midwife, I ..."), their interactions also reflect a prevailing orientation to the positions and relationships characteristic of the student role. Thus, students demonstrate caution (evident in pauses, the phrasing of suggestions as questions, and the use of content-irrelevant adverbs) in proposing any assignment of tasks or in suggesting a course of action — caution that the authors maintain might be seen as "a typical characteristic of student group work in which suggestions about the delegation of tasks are presumably formulated cautiously and without reference to a hierarchy" (p. 5).

In summary, video-based interaction analysis offers researchers a rigorous method to examine complex social situations such as interprofessional education and practice. By focusing the researcher's attention on professionals' activities in relation to one another, the physical space in which they are situated, and the resources available to them (Jordan, 2014), interaction analysis supports a micro level of analysis that can better inform the design of interprofessional activities and faculty development than many of the methodologies more commonly used in IPE research and evaluation.

RESEARCH CONTEXT

The University of California, San Francisco (UCSF) is a top-ranked center of medical research, patient care, and health professions education in the fields of medicine, dentistry, pharmacy, and nursing. Its Office of Medical Education, founded in 1997, promotes innovation and

research targeted to improvements in medical education. Acknowledging the growing demand for effective team-based health care, UCSF has established a program for interprofessional education and practice (<https://interprofessional.ucsf.edu/>) and conducts research on the use of case-based simulation to prepare both students and experienced clinicians for effective interprofessional communication.

Simulation as a Learning and Research Context

Simulation learning, as characterized in one recent review, is “a form of experiential learning that is learner-centered, integrates many facets of learning (e.g., cognitive, motivational, affective, psychomotor, social) and has a high degree of authenticity” (Breckwoldt, Gruber, & Wittman, 2014, p. 674). From an educational standpoint, simulation provides opportunities to target specific IPE communication and teamwork skills that are difficult to address directly in the clinical workplace for multiple reasons. The pace of real-time practice limits opportunities for observation of and feedback to novices; some crucially important skills or communication routines are required only infrequently in practice, but are consequential when needed; and ethical and safety considerations may limit opportunities for novices to gain experience in authentic settings.

Simulations target key aspects of professional knowledge and practice while reducing the complexity of fully authentic practice by stripping away selected aspects of context. At issue are the choices represented by the simulation design regarding degrees of authenticity in context and in the tasks to be undertaken (Hamstra, Brydges, Hatala, Zendejas, & Cook, 2014). Such choices constitute what Grossman et al. (2009) term a “decomposition” of practice that highlights certain salient aspects of knowledge and performance, as well as decisions about how simulated experiences will provide “approximations of practice” (p. 2056).

From a research perspective, simulated environments prove conducive to the in-depth qualitative study of professional learning experiences. Simulation facilities more readily accommodate high quality audio and video recording than fast-paced, dynamic clinical settings in which much of the interaction among professionals occurs episodically (in the moment), asynchronously (through the electronic medical record), or through technology rather than in person (by phone or instant messaging). Simulated environments thus provide access to the type of data necessary for observation and analysis of interprofessional interactions, even while some authenticity, or physical and social resemblance to practice, may be lost (Hamstra et al., 2014). For example, in simulated environments the range of opportunities for health professionals to identify, discuss, and negotiate aspects of patient care where their professional contributions intersect may be limited. Also, the relationships among participants are generally temporary, rather than ongoing as they would be in many clinical settings where professionals may interact multiple times throughout the course of a diagnostic workup or delivery of treatment. Yet, simulation has the advantage of allowing observers to compare how individuals and groups make sense of and respond to the same content and structure. Using a simulated interprofessional activity also provides an opportunity for researchers to consider how factors such as leadership, communication processes, interpersonal dynamics, gender composition, professional composition, and experience may influence team member interactions.

Finally, video-based interaction analysis permits an examination of how the design of a

simulated professional activity relates to its enactment. Designers often expect that what they have designed will yield the desired learning; they employ assessments of individual knowledge, attitudes or behaviors to confirm their expectations. However, recent critiques of the IPE literature highlight the need for closer attention to the relationship between specific design features of IPE activities (e.g., structure, case content, physical space, resources) and participants' interactions during these activities to better understand what learning occurs (Fenwick & Dahlgren, 2015; McMurtry, Rohse, & Kilgour, 2016). Correspondingly, our study focuses on the interaction between components of a simulated experience intended to foster discussion of roles and perspectives, participants' engagement with one another and with these components.

The Interprofessional Standardized Patient Exercise (ISPE)

The Interprofessional Standardized Patient Exercise (ISPE) is a four-hour simulation exercise in which groups of health professionals interview a standardized patient¹ in an outpatient setting and develop a follow up plan of care (Rivera et al., 2013). The stated purpose and objectives of the ISPE are displayed in Table 1. The ISPE was developed by a team of faculty members from five professions: dentistry, medicine, nursing, pharmacy, and physical therapy. This is the sixth year the ISPE has been offered.

TABLE 1
Purpose and specific objectives of the ISPE
(excerpted from the Instructor's Guide; Rivera et al., 2013)

The overall purpose of this Interprofessional Standardized Patient Exercise (ISPE) is to provide health professionals with a structured learning experience working as an interprofessional healthcare team. The specific learning objectives are as follows:

1. Participants will demonstrate the ability to effectively communicate and collaborate with participants from other health professions.
 2. Participants will demonstrate the ability to efficiently interview and assess a patient with multiple chronic illnesses, showing sensitivity to a patient's needs and resources.
 3. Participants will develop a comprehensive care plan in collaboration with other health professionals to meet the patient's healthcare needs.
 4. Participants will describe the role of other health professionals in caring for a patient with multiple chronic illnesses.
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Participants receive initial information in the form of a one-page summary and supplemental online resources (e.g., dental ex-rays) about "Elsie Smith," an elderly woman who had a recent fall followed by a visit to the emergency department. The simulation exercise is framed as a follow up visit at an interprofessional outpatient clinic two weeks later. The patient describes knee and jaw pain and has multiple chronic conditions (diabetes, hypertension, osteoarthritis, glaucoma, and anxiety). Case developers noted that Elsie Smith closely resembles many elderly patients; she has multiple problems that are medically and psychosocially complex, could have multiple causes, are likely interconnected and would require engagement of multiple health professionals.

The patient case is a central part of the ISPE and the content of the case has significant implications for the role and contributions of participants. The geriatrician on our research team wrote most of the case, with input from other professionals, and was able to explain many of the decisions about the content. The case developers selected problems such as falls, diabetes, and jaw pain that could engage members of the several professions participating in the ISPE, thus maximizing the likelihood that all participants could make contributions and share perspectives. There was no intentional effort to include content that might cause conflict or dilemmas, but two of the key issues, falls and diabetes, are nonetheless issues that the professions might approach differently.

Upon arrival at the simulation center, participants receive a brief orientation to the goals and structure of the ISPE. Then, in assigned teams, they go to an exam room and begin a 15 minute “huddle”² in which they review the case and plan their approach to the patient. This first huddle provides participants time to meet one another, discuss the information presented in the one-page case summary, and decide their approach to interviewing the patient. Participants do not receive the case summary prior to entering the first huddle. The ISPE developers made this decision so participants would share the experience of making sense of the case and, ideally, work together to develop a shared understanding of the case. After the initial huddle, participants individually interview and examine the patient for 12 minutes while their other team members observe. They have five-minute breaks in-between to prepare for the next interview. After all interviews are complete, participants regroup in a second huddle for 15 minutes to develop and write a plan of care on a template that includes three columns: Problem, Assessment, and Plan. The ISPE designers provided the template to help participants organize their discussion. Each team then presents their care plan to the patient. The exercise ends with a 30 minute debrief facilitated by a faculty member. Group size is limited to four participants to encourage participation. All parts of the exercise are video-taped except the orientation and the debrief (Figure 1).

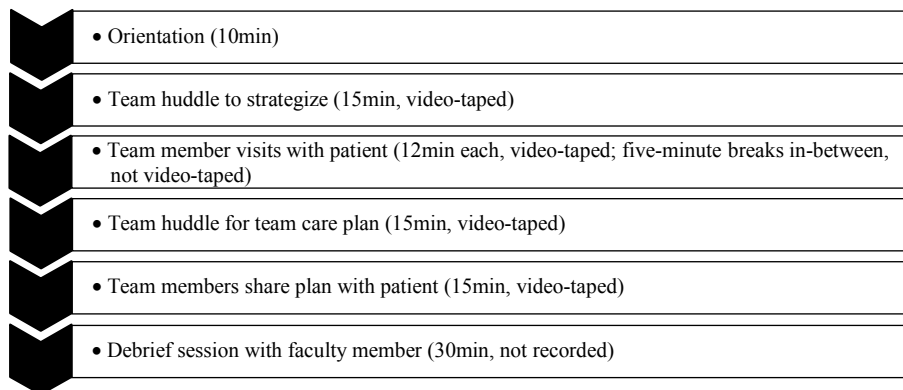


FIGURE 1
Structure of the ISPE.

Participants

Novice Health Professionals and Experienced Clinical Faculty

The ISPE exercise was employed with two kinds of interprofessional groupings. Students from dentistry, medicine, advanced practice nursing,³ pharmacy, physical therapy, and social work

programs comprised the first set of groups; the student groups resulted in 136 video-taped simulation encounters. The second type of grouping involved faculty — experienced professionals who were enrolled in a faculty development program to prepare them to deliver quality care to older adults; the faculty groups yielded 13 video-taped sessions. Consistent with requirements regarding the protection of human subjects, all participants in the ISPE had an opportunity to opt in or opt out of our research study. Our analysis only includes videos from teams in which all participants provided consent, resulting in a corpus of 82 videos from the student teams and all 13 videos from the faculty teams.

The Video Corpus and Supplemental Data Sources

Interaction analysis requires adequate records of unfolding interaction (i.e., audio and video records of sufficient quality), but may also be informed by multiple sources and types of supplemental data. Table 2 displays the data elements available in the ISPE, what information they provide, and in what format. In this paper we focus primarily on video analysis, supplemented with information from the case summary, the care plan template, and participant surveys. Interaction analysis can involve interviews with study participants to gain access to perceptions that cannot be directly observed through video, but this was not possible in our study due to time constraints during the ISPE. As an alternative, the principal investigator (PI)⁴ worked with other members of the research team and consulted with the developers of the ISPE to create an open-ended survey for participants to complete during the initial huddle (after reading the case, before interviewing the patient) and at the end of the care planning huddle (after interacting with the patient and developing a plan for her care). The survey asked participants about perceptions of their role, their contributions, the patient's needs, the design of the activity, and the team dynamic.

METHODS

USING INTERACTION ANALYSIS TO STUDY THE ISPE

In this section, we describe how our multi-disciplinary research team constructed an analytic approach based on interaction analysis method. As described by Jordan and Henderson (1995) and Engle, Conant, and Greeno (2007), the process is an iterative one that involves progressive refinement of questions, hypotheses, and analytic foci by a multi-disciplinary team.

A Multi-Disciplinary Research Team

Interaction analysis benefits from the contributions generated by a multidisciplinary research team (Jordan & Henderson, 1995). Each member of the team brings a perspective to the analysis that influences their own interpretation of data and their contribution to group decisions and interpretations. Collectively, they provide a corrective to the bias that might result from a more homogeneous research team. For our analysis of the ISPE, the principal investigator invited colleagues who could offer a range of expertise and perspectives. One team member is a physician

TABLE 2
 Possible sources of data from the ISPE

Data elements	Tells us	Format/Type of data
Formal/informal discussions with case developers	What factors case developers considered when developing the case	Transcripts and written notes from meetings
Instructors' guide	What information faculty receive about the exercise, including learning objectives and tips for facilitating the debrief	Document
Standardized patient (SP) training guide	How patients are trained for their role, what information they will share with students when prompted	Document
Orientation	How faculty frame and explain the exercise to participants	Document (powerpoint) and observation (field notes)
Case (one-page summary)	What information learners receive about the patient at the beginning of exercise	Document
Audio and video recording of initial huddle	What verbal and nonverbal communication occurs among participants as they interpret the case and decide how to approach the patient; how participants interact with artifacts, tools, and one another; how participants position themselves in the room	Transcript of audio (full or select segments) Video (coded and summary of activities)
Audio and video recording of care planning huddle	What verbal and nonverbal communication occurs among participants as they discuss the patient and develop a plan of care; how participants interact with artifacts, tools, and one another; how participants prioritize issues	Transcript of audio (full or select segments) Video (coded and summary of activities)
Care plan template (blank and filled in by hand by participants)	What structure participants are given for the care plan; how participants interpret the care plan based on notes written in each section	Document (initially blank, then filled in by participants)
Sample completed care plan template (provided to participants after exercise)	What case developers considered significant problems, assessment of the problems, and potentially appropriate plans to address the problems; which professions case developers anticipated contributing to or taking responsibility for plans for each problem	Document
Audio and video recording of team sharing plan with patient	How participants interact with the patient; how participants decide to deliver the plan to the patient	Transcript of audio (full or select segments) Video (coded and summary of activities)
Surveys completed by students during exercise	What participants identify as problems prior to discussion with colleagues and after discussion with colleagues; how participants perceive their role and contributions to the patient's care	Survey responses – written text, coded for descriptive analysis
Student evaluations of the exercise	How satisfied participants' were with the experience	Quantitative ratings of the exercise and written text

specializing in geriatrics who led the development of Elsie Smith case. She provides an in-depth understanding the case content, the learning objectives, and the decisions made throughout the development of the case. Her clinical expertise also plays an important role in the analysis by

helping the other members of the research team understand terminology, identify misconceptions or incorrect information, and make sense of complex clinical discussions. Another team member is a sociologist experienced in interaction analysis in both educational workplace environments and in formal settings focused on the professional development of teachers. She provides methodological expertise and brings a perspective on education outside of the health professions. She asks valuable questions and calls attention to interactions that expose processes and practices that other team members take for granted. Her contributions also highlight the importance of providing evidence to support and verify interpretations where it may be easy for other team members to make assumptions or inferences based on experience rather than actual data. The principal investigator has expertise in health professions education research and qualitative methods. She takes responsibility for organizing all aspects of the project, documenting all steps and decisions throughout the project, synthesizing discussions during team meetings and developing plans to move the team forward. The team also includes a research assistant with a background in anthropology who plays a key role in the project including collecting, entering, and cataloguing data; taking notes during each meeting; and coding and transcribing video. The principal investigator and research assistant have the most in-depth knowledge of the data since they are the primary analysts on all data.

Our research team consults with several additional individuals from medicine, nursing, pharmacy, physical therapy and dentistry who contributed to the development and delivery of the ISPE. These individuals enable our team to confirm, disconfirm, and explore alternative interpretations of data to enhance the trustworthiness of our findings.

Defining and Refining the Phenomenon of Interest

Our study began with a general interest in how health professionals navigate and negotiate patient care activities in which their professional roles and expertise intersect. As described in the introduction, this is a phenomenon of growing importance as safe, effective health care increasingly relies on coordination and collaboration among a variety of health professionals. Mindful of the simulated environment in which we examined this phenomenon, we recognized the importance of analyzing not only the interactions among participants, but also the context in which those interactions are situated. This framing of the phenomenon aligns with growing attention in the IPE literature to constructivist, sociocultural and sociomaterial theories that view space, place, interpersonal relationships, and material resources as important design elements in IPE (Barr, 2013; Hean, Craddock, Hammick, & Hammick, 2012; Kitto et al., 2013; Nyström, Dahlberg, Hult, & Abrandt Dahlgren, 2016; Reeves & Hean, 2013). Attention to these elements means recognizing that what is designed may nonetheless yield unanticipated or unintended interactions as participants in activities construct meaning through their interactions with one another and with resources in the environment.

Development of Analytic Procedures

Interaction analysis typically requires an iterative process of data selection and data analysis (Jordan & Henderson, 1995). One of our primary tasks was to determine which sources best

informed our understanding of the phenomenon of interest and then how best to analyze and synthesize each of these sources. Our process evolved as we refined our focus.

1. Familiarization with ISPE and data sources: a critical first step was to familiarize ourselves with the structure and materials associated with the exercise. All members of the team reviewed the orientation materials, the case, the instructors' guide, the standardized patient training materials, and the care plan template. All also attended at least one full ISPE session to observe the experience "live," including components not captured on video. In addition, we sought information about the design of the ISPE and the Elsie Smith case from the developers. Having one of the developers on our research team made it possible to do this throughout our analysis.

2. Identifying interactional "hot spots": once familiar with the structure, process, and content of the ISPE, our team began the process of identifying events or types of interaction where we might focus our attention. Jordan and Henderson (1995) describe a process of selecting interactional hot spots, or "sites of activity for which videotaping promises to be productive" (p. 43), through a combination of ethnographic fieldwork and consideration of the phenomenon of interest. In our project, many portions of the ISPE are videotaped, so we needed to identify which segments of the videos would be most informative to understand how participants communicated about and negotiated roles and contributions. We did this by talking with the developers of the ISPE and reviewing videos together as a research team.

The team huddles were identified as the hot spot for these conversations, based on both the design of the exercise and observation from prior years. The ISPE designers explained that the first huddle provided a forum for these discussions because participants were told they would each have 12 minutes to interview or examine the patient while the other participants observed. This meant the participants needed to decide how to order or sequence the interviews. The designers anticipated that participants would explain their approach (e.g., interview format, exam skills) and perspectives (e.g., concerns about the patient, additional information needed) to decide an order and divide up tasks. The ISPE designers also identified the second huddle, the care-planning huddle, as a place where they expected participants' contributions to overlap and potentially require negotiation of different recommendations for the patient.

3. Group video review sessions: we began analyzing hot spots through group video review sessions (Jordan & Henderson, 1995) which involved watching videos and looking at material artifacts used by participants (the one-page case summary, the care plan template). The process entailed the successive review of videos selected on both substantive grounds (student vs. faculty group type; group composition in terms of designated professions) and pragmatic considerations (video and audio quality). For the first video review session the principal investigator selected a student group video based on video quality (good audio; all students were visible although one had his back to the camera) and composition of the group (physician, nurse practitioner, dentist, and pharmacist, which was the most common composition of groups). In these early stages of analysis, a transcript of all dialogue in both huddles made it easier for members of the research team, several of whom are not clinicians, to process the discussion. Given the rapid pace of many conversations and the amount of overlapping talk among participants, the transcript also provided a useful reference during our team discussions.

In the first video review session, all members of the research team watched the full video together, stopping the tape at any point when a member of the team wanted to call attention to an interaction. We each discussed our interpretation of these interactions and the learning opportuni-

ties they might provide. These discussions helped us formulate a shared understanding of the phenomenon of interest (communication about roles, perspectives, contributions). The physician on our team, who was involved in the development of the case, helped explain clinical content and make connections between the design of the case and participants' interactions. The PI and research assistant took notes on the discussion during the meeting, which helped to document our analytic process.

At the end of the first video review session, we selected two more videos for review, a second student group containing students from the same professions, and a practitioner group containing many of the same professions as the student group (dentist, physician, advanced practice nurse). We each reviewed these videos independently and came to the meeting prepared to discuss examples of how participants discussed roles, perspectives, and contributions during the ISPE. As we discussed specific examples from the videos and excerpts from transcripts of the videos, we noted some common types of interactions and some parts of the exercise that seemed to lend themselves to discussion, clarification, debate, joint problem-solving, or explanation of content and/or roles and perspectives. These are types of interactions that our team and other investigators (e.g., Kent et al., 2016) associate with interprofessional learning opportunities. We continued this process in two additional video review meetings, adding one additional video and transcript from a practitioner group.

4. Selection of analytic foci: through several rounds of discussion in which we reviewed our guiding research questions, considered the design and objectives of the exercise, and compared similarities and differences in interactions among the four groups, we selected four key foci for analysis (Table 3). Two foci pertain to structure and process. In Huddle 1, participants consider how and in what order to approach the patient interview, given the information in the case summary. In Huddle 2, they make use of the case summary and the new information they derived from their interviews with the patient to propose a treatment plan. We reasoned that these processes might be influenced by the design of the ISPE, the instructions provided to participants, and participants' prior experience with other students or professionals.

Two additional foci — how the participants discuss the patient's fall and diabetes — pertain specifically to the medical and psychosocial content of the case. Attention to these foci permit us to examine how members of the interprofessional group interpret and respond to presenting problems that were conceived to be multifactorial in nature.

Multiple and Iterative Approaches to Analysis

Video records lend themselves to multiple analytic passes, enabling analysts to take up a series of research questions in succession or to employ different means for gaining analytic purchase on key questions. As our research team pursued an initial analysis centered on six videos (four student groups and two faculty groups), we employed three main approaches to further our analysis in the four areas of focus. We used a combination of tools and techniques that serve the purpose and focus of our analysis, including an analytic template (see the Appendix), Dedoose (a web-based platform that allows users to create and apply codes to video, audio, and text) and annotations in MS Word. As our analysis unfolds, new and refined insights may call for additional approaches and tools.

TABLE 3
Key foci, data sources, analytic questions

Key foci	Data sources	Analytic questions
Discussion of order and approach to the patient	<ul style="list-style-type: none"> • Video of first huddle • Instructions provided to groups (orientation materials) • Information from ISPE developers about design 	<ul style="list-style-type: none"> • How do participants decide the order in which they will interview the patient? • Is there a guiding logic? (e.g., begin with broadest perspective, begin with priority issue, avoid redundancy/maximize efficiency) • Do participants identify areas overlapping roles, expertise? How do they handle this? • Do participants make assumptions about what others know and/or can do? How does the target person respond?
Discussion of how to deliver the plan to the patient **Not part of exercise for practitioner groups	<ul style="list-style-type: none"> • Video of second huddle (also have video of actual delivery) • Instructions provided in orientation (minimal instructions) • Information from ISPE developers about design 	<ul style="list-style-type: none"> • How do participants decide the how to deliver the plan of care to the patient? • Is there guiding logic? If so, provide supporting evidence. • Do participants identify areas overlapping roles, expertise? How do they handle this? • Do participants make assumptions about what others know and/or can do? How does the target person respond?
Discussion of fall	<ul style="list-style-type: none"> • Video of first and second huddle • One-page summary of patient case • Care plan template • Information from case developers 	<ul style="list-style-type: none"> • How does the group discuss the fall? • What questions arise during the group's discussion of the fall? (what types, who asks, who responds) • What conjectures do participants make when discussing the fall? (who makes them) • How do participants incorporate the patient's perspective (if at all)? (who does this) • Does the group get stuck on one dimension/ professional perspective? (e.g., medications that might cause the fall-pharmacy; mobility/ weakness issues-physical therapy) • Does the group incorporate multiple dimensions/ professional perspectives?
Discussion of diabetes	<ul style="list-style-type: none"> • Video of first and second huddle • One-page summary of patient case • Care plan template • Information from case developers 	<ul style="list-style-type: none"> • How does the group discuss diabetes? • What questions arise during the group's discussion of the diabetes? (what types, who asks, who responds) • What conjectures do participants make when discussing diabetes? (who makes them) • How do participants incorporate the patient's perspective (if at all)? (who does this) • Does the group get stuck on one dimension/ professional perspective? (e.g., medications, diet) • Does the group incorporate multiple dimensions/ professional perspectives?

The first approach uses a set of *descriptive organizing questions* that reflect our substantive interests about the four key foci in the ISPE described in the previous section. These questions, shown in Table 3 and in the middle section of the analytic template (see the Appendix),

treat the ISPE simulation holistically as a learning environment, and allow for narratives or judgments based on evidence drawn from the first and second team huddles (while also being attentive to disconfirming evidence). Although the first two questions (about the orchestration of the interview and the development of the treatment plan) are temporally linked to the first and second huddle, the other two questions may require assembling conversational instances that span the entire ISPE event. The descriptive organizing questions ensured that we would attend to the features of the ISPE as designed and to the particularities of the ISPE as enacted by each team.

The second approach involves *coding common dimensions of team interactions and interprofessional communication*. This coding, which is summarized in the top section of the analytic template (see the Appendix), presents an opportunity to consider interactions during the ISPE as more general instances of team interaction or interprofessional communication, and thus can form the basis for connecting our analysis and finding to related research in health care delivery and health professions education. Coding along common dimensions allows for comparisons across groups with regard to selected aspects of the interaction (e.g., group dynamics or the sharing of expertise across professional boundaries) and particular aspects of the case (the falls, diabetes, dental issues, etc). It also allows us to examine whether aspects of the case are associated with greater or lesser coordinated and collaborative involvement by particular professionals.

The third approach involves *mapping sequences of interaction and tracing group discussion and decision trajectories* as they unfold during the ISPE, particularly in relation to each of the four key foci. For example, by tracking who contributes to the discussion of falls, how and when participants respond to one another's contributions, and whether these moves open up or close off consideration of diagnostic or treatment options and the patient's or other professionals' perspectives, we are able more directly attend to the ISPE as a learning environment. These sequences are captured first in a "segment flow" in which segments are marked primarily by major shifts in topic, linked to video time stamps and transcript line numbers. The first section of the segment flow establishes the overall activity structure of the session and traces the development of the discussion with respect to the patient case and proposed care plan; a separate section locates the periodic display of participants' orientation to the simulation environment (e.g., noting where in the interaction participants remark on the differences between the simulation environment and typical workplace arrangements). The segment flow, in combination with the data points detailed in the analytic template, will shape decisions about where to concentrate a more fine-grained analysis of participants' moves as the discussion shifts from an initial consideration of the patient case information to the development of a plan of care.

Together, the three approaches illuminate how the composition of the group affects the learning environment (e.g., if the group does or does not have a pharmacist, social worker, or dentist), the dynamics of the group interaction, and whether there are differences between the student groups and the groups of experienced clinicians.

EMERGING FINDINGS

Although our analysis is still underway, we present some emerging findings to illustrate the insights afforded by our approaches to interaction analysis. These emerging findings derive principally from the analytic approach grounded in a series of organizing questions (described

above). They are based on information about the design of the ISPE and on data collected in six analytic templates, which we compared across groups to look for potential patterns. We developed an understanding of the ISPE as a simulated learning environment that has both intended and emergent affordances for interprofessional learning. We use these concepts to frame our findings.

Intended affordances are designed into the exercise. They are reflected in the learning objectives (Table 1) and in the structure, materials, and activities that created for the ISPE. Emergent affordances occur as participants engage in the simulation activities and co-construct meaning through their interactions. Our understanding of the intended affordances of the ISPE is based on review and discussion of documents (orientation materials, instructor's manual, which included the objectives of exercise, training manual for standardized patients) and artifacts (the case information summary, the care plan template) and on conversations with the developers of the ISPE. We identify emergent affordances primarily through analysis of video and transcript segments captured in our analytic template, described above. These two strands of analysis were concurrent and closely connected. In the sections below, we present preliminary findings for two *descriptive organizing questions*, both of which relate to our primary interest in how participants navigate and negotiate roles and perspectives during the ISPE. The first of the questions centers on the first of our analytic foci: the structural or procedural aspect of the ISPE. The second question takes up the second analytic focus: the substantive consideration of the presenting problem of the patient's falls.

Descriptive Organizational Question: How Do Participants Prepare for the Interview
with the Patient and Decide the Order in Which They Will Interview the Patient?

Intended Affordances

The first huddle was designed to encourage participants to discuss their concerns about the patient, what they would like to address in their 12 minute visit with the patient, and how to organize themselves to collect the information necessary to develop a plan of care for the patient. The ISPE designers noted that with such a limited amount of time with the patient, no one professional could collect all the information needed from the patient. Therefore, participants would need to work together to use their collective time with the patient effectively. The ISPE designers recognized this as an artificial situation — one that a similar group of professionals would not usually encounter in a primary care clinic — but noted that this portion of the ISPE was primarily designed for participants to learn about other professions and to practice communicating about and coordinating their roles and contributions since there were many portions of the interview that more than one professional could cover (e.g., medications, social history, history and circumstances surrounding the fall).

Emergent Affordances

Through our initial review of four student groups and two faculty groups, we found much variation in how participants discussed their approach and decided upon an order. Students seemed to find these discussions difficult, based on behaviors such as avoiding and delaying decisions

about order until the very end of the first huddle and reluctance to take responsibility for a particular part of the patient visit, especially when multiple professions (most often, a physician and a nurse practitioner) could cover the content. For example, physicians (MD) and nurse practitioners (NP) made timid proposals and went back and forth before deciding:

NP: I'm fine going first or unless you want to go first or I can go after you and finish PE [physical exam] (voice tapers off, bites pen)

MD: Uh, whatever's . . . [NP glances over at pharmacy student, possibly seeking his input, 1-2sec pause, no reply from NP]. I mean, I can start if you wanna like finish the physical?

NP: [nodding] Okay.

MD: Or like jump into the history of the particular stuff that you wanted to ask.

NP: Okay.

The faculty participants appeared more willing to claim and negotiate roles or propose an order, but they also spent considerable time discussing what each participant could do and what order made sense based on efficient use of time (avoiding redundancy or duplication of efforts), flow of information, and the knowledge and expertise each participant could contribute. As our analysis continues, it may be fruitful to explore similarities and differences in how students and faculty interact when planning their order and approach to the patient. Building on the findings of Posenau and Peters (2016), we can explore whether students, with limited knowledge and experience in practice, engage differently in this activity than faculty and how the differences might affect learning opportunities afforded by the ISPE.

As both students and experienced practitioners discussed their approach and order, they revealed assumptions and misconceptions about other professionals. In several groups, participants mistook the nurse practitioner for a registered nurse (RN) and made assumptions about appropriate roles, for example a social worker stating "in my experience, a nurse usually is the first contact," to which the nurse practitioner responds "But as a [nurse practitioner] we're not the first contact." Yet, despite the confusion, she agreed to go first, "but this is perfect, this is perfect for me to do this part first." Similarly, in a student group, a nutritionist said: "I feel like the nurse would respond to the patient first" to which the nurse practitioner student replied "Yeah, yeah. I can go first." These assumptions and misconceptions could be a source of learning opportunities if, for example, the nurse practitioner explained her scope of practice, but these opportunities were inconsistently taken up. Our survey data provided some confirmation of this finding, as several nurse practitioner students wrote comments such as, "I was called a nurse and not a nurse practitioner student. Not clear if my team members understand the difference between these two roles." However, we also found many comments that suggested participants recognized and took up the opportunity to teach others about their scope of practice, "I was able to teach my team about the role of a nurse practitioner as a provider and not as an RN. There was definitely some confusion in the beginning from other team members about me being an RN versus a nurse practitioner . . ."

In both student and faculty practitioner groups, participants needed to construct a logic or rationale by which to decide their approach and order of interviewing the patient. This aspect of the simulation had no direct equivalent in actual clinical practice. In some groups, this was a source of confusion, as participants were unsure if they should cover everything "as if" they were working alone. For example, one medical student wondered if she should ask the patient about medications "or should I not even bring that up?" because the pharmacy student (PH) could cover

it. The pharmacy student suggested “maximize what you can do” and explained “Medication-wise I have plenty to ask her . . . we’re gonna have to like, structure what order we ask so that way we can make sure we get all the information. If you’re good with that.” In some groups, the inauthenticity of the process opened up opportunities to discuss contributions. As participants identified overlapping roles, they had an opportunity to coordinate efforts and potentially construct a role that might differ slightly from what they would actually do in practice, but that would facilitate a team-based effort. In other groups, participants seemed to find it difficult to discuss overlapping roles and decide order, as in the following example:

PH: I guess for you guys (pointing to NP and MD) do your roles kind of overlap?

MD: I think so. Do we want to have them (pointing to Nutrition & PH) get information first and then see what else we need to get? (PH talking at same time) Or should we just do it first? I don’t know (look confused, open)

PH (talking at same time): Or should you guys do it first? Or do you think I should I go first because mine is like a general . . .

(cross talk, all seem a bit uncertain)

PH (pointing to NP & MD): I feel like one of you guys should go first.

In these types of interactions, learning opportunities may have been lost as participants made assumptions about one another’s contributions rather than asking and as time constraints prevented some participants from sharing their perspectives.

Descriptive Organizational Question: How do Participants Discuss the Fall?
Do They Incorporate Multiple Perspectives?

Intended Affordances

The developers of the Elsie Smith case included falls as one of the key issues of concern to the patient and, presumably, all health professionals in the group. The circumstances and consequences of Elsie’s recent fall were intentionally vague in the one-page case summary so participants would need to consider possible causes and explore the falls in their interview with the patient. The designers expected all participants to have something to contribute to a discussion of falls. For example, the pharmacist could consider any medications that might make the patient drowsy or affect balance and coordination; the dentist could explore the patient’s jaw pain to see if it was caused by the fall and if there might be a fracture; the physical therapist could explore the patient’s strength and mobility and consider a home visit to assess the patient’s living environment; the social worker might consider the patient’s social support and access to resources. The physician and nurse practitioner might consider any or all of these items as well as others that could contribute to their assessment of the patient’s overall health and well-being. Many of these contributions are interconnected, which could stimulate discussion or negotiation of roles and perspectives. The designers of the ISPE provided participants with a care plan template, organized around problem, assessment, and plan. They intended for this template to help participants organize their discussion.

Emergent Affordances

In the second huddle, all four student groups listed falls as the first problem on their list. By contrast, one faculty group listed falls third on the list and the other placed falls seventh on the list, after activities of daily living and mobility. The groups varied widely in their discussion of factors that might contribute to the fall, particularly in the complexity and interconnectedness of falls and other problems. Some groups barely discussed the factors and jumped into the plan. Others focused on medications or neuropathy or mobility and strength. The nature of these discussions may have been influenced somewhat by the care plan template. Participants referred to the problem-assessment-plan structure throughout much of the discussion in the second huddle. The extent to which the template facilitated or constrained learning opportunities requires further analysis, but it is possible that the care planning template may have unintentionally taken focus away from a holistic, integrated view of the patient and the interconnectedness of her problems (e.g., falls and diabetes).

Dentists rarely spoke during the discussion of the fall. In one instance, a medical student attempted to include the dental student (D) in the discussion of the fall, but her reaction indicated surprise and confusion:

MD: Plan. So . . . You said PT [physical therapy]. I agree. Get her some physical therapy. What do you guys think? (looking at dental student)

D: For like the dental issues?

MD: No no no. Just for falls.

D: Oh. Oh. Um . . .

MD: So we're going to go by problem. And when we get to dental you can say . . .
(voice tapers off)

(dental student says nothing more)

MD (explaining to dental student): We're gonna get physical therapy. (MD looks back at dental student to see if she agrees with the plan to get physical therapy for the patient)

Survey comments revealed mixed reactions among the dental students. Some appreciated the opportunity, as noted in comments such as "Very informative and helpful to see what the other professionals do in their exam/diagnosis. This makes me feel more confident of what goes on with my patient if I was to refer them to another health professional," while others felt isolated, as noted in comments such as, "I believe that this is a very informative and productive exercise, especially for nursing, pharmacy and med students. However, as a dental student, I couldn't help but feel like our involvement with the patient is very separated from the other members." Although the dental students were the most striking example, there were other issues and discussions that had little relevance for other participants. For example, physicians and pharmacists often had in-depth discussions of medication choices while others sat quietly. While the designers of the Elsie Smith case identified ways that all professions could contribute to discussions of her problems, participants in the exercise may have had difficulty seeing the opportunities or knowing when to offer a different perspective (e.g., alternatives to medications) or ask questions so they could better engage in the discussion. The simulated context, with a diverse group of generalist (physician, nurse practitioner) and specialist (pharmacist, physical therapist, dentist) health professionals discussing the full scope of a patient's problems, raises important questions about the best way to achieve holistic, coordinated care for patients. Is there benefit for all to huddle together, even

when parts of the discussion are less relevant to a given professional's expertise? Is this a worthwhile learning opportunity? Do these groups discussion result in a more comprehensive and holistic plan of care?

DISCUSSION

We presented some examples of emerging findings that we will investigate in subsequent analyses. Even at this early stage, these findings offer three points that warrant further discussion.

Costs and Benefits of Interaction Analysis

Our detailed description of how we conducted interaction analysis reveals many important decisions and considerations associated with this method. First, interaction analysis is time, resource, and skill-intensive so researchers considering this method must carefully consider their capacity to do this type of work and, perhaps more importantly, the likely value of such efforts. Second, interaction analysis often requires a multidisciplinary team of researchers, often with different expertise and capacity to contribute to the research effort. Figuring out effective and efficient ways to work together to maximize the quality of the research is an important part of the method and requires attention throughout the project. Third, while there are helpful resources for conducting interaction analysis and similar methods, each research project and question requires some degree of customization. The research team must take care to both remain true to the method, while also developing procedures that match the goals, resources, and types of data available. Some key areas to consider include how much video to record, how much and to what level of detail to transcribe interactions occurring in the video, what additional sources of data are needed, what is not captured on video that might be affecting interactions (and how can you gain insight into that), and what technologies to use to support data management and data analysis. In our study, there is more video data available than we can realistically analyze and there are some interactions, such as brief huddles between interviews with the patient and group debriefing sessions, that are not recorded. Researchers engaging in interaction analysis need to be mindful of these limitations and carefully consider the implications for their research questions and findings. Often research questions require modification as researchers identify some of these limitations and/or discover unanticipated findings.

Practical Implications for ISPE Design

Findings from our study offer insights that may help improve the design of interprofessional educational activities within and beyond our institution. Our multi-modal analytic approach allows us to connect the simulated learning environment, which is designed to provide certain affordances for interprofessional learning, with the learning environment that participants co-construct while participating in the exercise, yielding emergent affordances for interprofessional learning. By identifying alignments as well as discrepancies between intended and emergent

affordances, we offer insights that can prompt designers of the ISPE and similar types of simulated interprofessional learning activities to consider the value or desirability of the emergent affordances as well as alterations to the design that might influence these emergent affordances. We can provide specific examples of interactions from video analysis and present them in ways that make the practice of participating in simulation visible to others. For example, specific interactions can be shared with the designers of the ISPE through transcripts, re-enactment, or role-plays and discussed in relation to desired or intended interactions and objectives. Similar strategies could be used to prepare faculty who facilitate the post-ISPE debriefing sessions to look for and address certain types of interactions. Participants in the ISPE might also benefit from seeing examples of carefully selected examples of interactions that support or inhibit learning during the ISPE.

Contributions to Research on Interprofessional Education and Practice

Our approach to video-based interaction analysis can also make contributions to the empirical literature on interprofessional education and practice. Few studies have used video-based interaction analysis to examine the processes by which health professionals learn through communication, coordination, and collaboration in real, as opposed to simulated, clinical settings. While much of this work occurs asynchronously, there are hot spots for interprofessional interaction such as interprofessional rounds, discharge planning sessions, and team huddles (Goldman et al, 2015; Paradis et al, 2015; Shunk, Dulay, Chou, Janson, & O'Brien, 2014) that could be captured on video and analyzed with methods similar to those we described in simulated contexts. Such work could both improve our understanding of interprofessional learning “in the wild” and inform the design of simulated contexts to either better approximate the challenging interactions professionals are likely to encounter in practice or to fill in gaps where learning is needed but not readily available in clinical practice.

NOTES

1. A standardized patient is “an individual trained to portray the personal history, physical symptoms, emotional characteristics and everyday concerns of an actual patient” (Kanbar Center, University of California, San Francisco, retrieved from <http://meded.ucsf.edu/simulation/become-standardized-patient>).
2. Huddles are short meetings in which a team of health professionals discuss patients receiving care that day, coordinate work that needs to be done, and address problems or challenges. Huddles are widely used in many health care settings to improve the quality and safety of care. See <https://nexusipe.org/informing/resource-center/huddle-coaching>
3. The scope of practice of advanced practice nurses is similar to that of physicians in the United States. These are registered nurses who are receiving at least two years of additional training.
4. Principal investigator is the first author of this article.

REFERENCES

- Abu-Rish, E., Kim, S., Choe, L., Varpio, L., Malik, E., White, A. A., . . . Zierler B. (2012). Current trends in interprofessional education of health sciences students: A literature review. *Journal of Interprofessional Care*, 26, 444-451. doi:10.3109/13561820.2012.715604

- Barr, H. (2013). Enigma variations: Unraveling interprofessional education in time and place. *Journal of Interprofessional Care*, 27, 9-13. doi:10.3109/13561820.2013.766157
- Berwick, D., Nolan, T. W., & Whittington, J. (2008). The triple aim: Care, health and cost. *Health Affairs*, 27, 759-769. doi:10.1377/hlthaff.27.3.759
- Breckwoldt, J., Gruber, H., & Wittman, A. (2014). Simulation learning. In S. Billett, C. Harteis, & H. Gruber (Eds.), *International handbook of research in professional and practice-based learning* (pp. 673-698). Dordrecht, The Netherlands: Springer Netherlands. doi:10.1007/978-94-017-8902-8_25
- Engle, R., Conant, F., & Greeno, J. (2007). Progressive refinement of hypotheses in video-supported research. In R. Goldman, R. Pea, B. Barron, & S. Derry (Eds.), *Video research in the learning sciences* (pp. 239-254). Mahwah, NJ: Erlbaum.
- Erickson, F. (2004). *Talk and social theory: Ecologies of speaking and listening in everyday life*. Cambridge, UK: Polity Press.
- Fenwick, T., & Dahlgren, M. A. (2015). Towards socio-material approaches in simulation-based education: Lessons from complexity theory. *Medical Education*, 49, 359-367. doi:10.1111/medu.12638
- Garfinkel, H. (1967). *Studies in ethnomethodology*. Malden, MA: Blackwell Publishers Inc.
- Ghorob, A., & Bodenheimer, T. (2012). Sharing the care to improve access to primary care. *New England Journal of Medicine*, 366, 1955-1957. doi:10.1056/NEJMp1202775
- Goldman, R., Pea, R. D., Barron, B., & Derry, S. J. (Eds.). (2007). *Video research in the learning sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Goldman, J., Reeves, S., Wu, R., Silver, I., MacMillan, K., & Kitto, S. (2015). Medical residents and inter-professional interactions in discharge: An ethnographic exploration of factors that affect negotiation. *Journal of General Internal Medicine*, 30, 1454-1460. doi:10.1007/s11606-015-3306-6
- Goodwin, C. (1994). Professional vision. *American Anthropologist*, 96, 606-633. doi:10.1525/aa.1994.96.3.02a00100
- Gough, S., Hellaby, M., Jones, N., & MacKinnon, R. (2012). A review of undergraduate interprofessional simulation-based education (IPSE). *Collegian*, 19, 153-170. doi:10.1016/j.colegn.2012.04.004
- Grossman, P., Compton, C., Igra, D., Ronfeldt, M., Shahan E., & Williamson, P. (2009). Teaching practice: A cross-professional perspective. *Teachers College Record*, 111(9), 2055-2100.
- Hamstra, S. J., Brydges, R., Hatala, R., Zendejas, B., & Cook, D. A. (2014). Reconsidering fidelity in simulation-based training. *Academic Medicine*, 89, 387-392. doi:10.1097/ACM.0000000000000130
- Hean, S., Craddock, D., Hammick, M., & Hammick, M. (2012). Theoretical insights into interprofessional education: AMEE guide No. 62. *Medical Teacher*, 34, 78-101. doi:10.3109/0142159X.2012.650740
- Heath, C., & Hindmarsh, J. (2002). Analysing interaction: Video, ethnography and situated conduct. In T. May (Ed.), *Qualitative research in action* (pp. 99-122). London, UK: Sage Publications.
- Heath, C., & Luff, P. (1992). Collaboration and control: Crisis management and multimedia technology in London Underground control rooms. *Computer Supported Cooperative Work (CSCW)*, 1, 69-94. doi:10.1007/BF00752451
- Heath, C., Luff, P., & Sanchez Svensson, M. (2007). Video and qualitative research: Analysing medical practice and interaction. *Medical Education*, 41, 109-116. doi:10.1111/j.1365-2929.2006.02641.x
- Heritage, J., & Maynard, D. W. (Eds.). (2006). *Communication in medical care: Interaction between primary care physicians and patients*. Cambridge, UK: Cambridge University Press.
- Hindmarsh, J., & Pilnick, A. (2002) The tacit order of teamwork: Collaboration and embodied conduct in anaesthesia. *The Sociological Quarterly*, 43, 139-164. doi:10.1111/j.1533-8525.2002.tb00044.x
- Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.
- Institute of Medicine. (2015). *Measuring the impact of interprofessional education on collaborative practice and patient outcomes*. Washington, DC: The National Academies Press.
- Interprofessional Education Collaborative (IPEC). (2016). *Core competencies for interprofessional collaborative practice: 2016 update*. Washington, DC: Interprofessional Education Collaborative.
- Jordan, B. (1989). Cosmopolitical obstetrics: Some insights from the training of traditional midwives. *Social Science Medicine*, 28, 925-944. doi:10.1016/0277-9536(89)90317-1
- Jordan, B. (2014). Technology and social interaction: Notes on the achievement of authoritative knowledge in complex settings. *Talent Development & Excellence*, 6(1), 95-132.
- Jordan, B., & Henderson, A. (1995). Interaction analysis: Foundations and practice. *The Journal of the Learning Sciences*, 4, 39-103. doi:10.1207/s15327809jls0401_2

- Kent, F., Francis-Cracknell, A., McDonald, R., Newton, J. M., Keating, J. L., & Dodic, M. (2016). How do interprofessional student teams interact in a primary care clinic? A qualitative analysis using activity theory. *Advanced in Health Sciences Education and Practice, 21*, 749-760. doi:0.1007/s10459-015-9663-4
- Kitto, S., Nordquist, J., Peller, J., Grant, R., & Reeves, S. (2013). The disconnections between space, place and learning in interprofessional education: An overview of key issues. *Journal of Interprofessional Care, 27*, 5-8. doi:10.3109/13561820.2013.801410
- Koschmann, T., LeBaron, C., Goodwin, C., & Feltovich, P. (2011). "Can you see the cystic artery yet?" A simple matter of trust. *Journal of Pragmatics, 43*, 521-541. doi:10.1016/j.pragma.2009.09.009
- Labov, W., & Fanshel, D. (1977). *Therapeutic discourse*. New York, NY: Academic Press.
- Måseide, P. (2003). Medical talk and moral order: Social interaction and collaborative clinical work. *Text – Interdisciplinary Journal for the Study of Discourse, 23*, 369-403. doi:10.1515/text.2003.016
- McMurtry, A., Rohse, S., & Kilgour, K. N. (2016) Socio-material perspectives on interprofessional team and collaborative learning. *Medical Education, 50*, 169-180. doi:10.1111/medu.12833
- Mishler, E. G. (1984). *Medical discourse: Dialectics of medical interviews*. Norwood, NJ: Ablex.
- Morgan, S., Pullon S., & McKinlay, E. (2015) Observation of interprofessional collaborative practice in primary care teams: An integrative literature review. *International Journal of Nursing Studies, 52*, 1217-1230. doi:10.1016/j.ijnurstu.2015.03.008
- Nilsen, L. L. (2011). Collaborative work by using videoconferencing: Opportunities for learning in daily medical practice. *Qualitative Health Research, 21*, 1147-1158. doi:10.1177/1049732311405683
- Nyström, S., Dahlberg, J., Hult, H., & Abrandt Dahlgren, M. (2016): Enacting simulation: A sociomaterial perspective on students' interprofessional collaboration. *Journal of Interprofessional Care, 30*. Advance online publication. doi:10.3109/13561820.2016.1152234
- Paradis, E., Leslie M., & Gropper M. A. (2015). Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive care units. *Advances in Health Sciences Education, 21*, 735-748. doi:10.1007/s10459-015-9662-5
- Posenau A., & Peters, T. (2016) Communicative positioning of one's own profession in interprofessional settings. *GMS Journal of Medical Education, 33*, Doc27. doi:10.3205/zma001026
- Powell, W., & Colyvas, J. (2008). Microfoundations of institutional theory. In R. Greenwood, C. Oliver, K. Sahlin-Andersson, & R. Suddaby (Eds.), *Handbook of organizational institutionalism* (pp. 276-298). Thousand Oaks, CA: Sage Publications.
- Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Davies, N., . . . Kitto, S. (2016). *A BEME systematic review of the effects of interprofessional education: BEME Guide No. 39*. *Medical Teacher, 7*, 656-668. doi:10.3109/0142159X.2016.1173663
- Reeves, S., & Hean, S. (2013). Why we need theory to help us better understand the nature of interprofessional education, practice and care. *Journal of Interprofessional Care, 27*, 1-3. doi:10.3109/13561820.2013.751293
- Rivera J., Yukawa M., Hyde, S., Fitzsimmons A., Christman J., Gahbauer A., . . . Wamsley, M. (2013). Interprofessional Standardized Patient Exercise (ISPE): The case of "Elsie Smith". *MedEdPORTAL Publications, 9*, 9507. doi:10.15766/mep_2374-8265.9507
- Rosen, M. A., Schiebel, N. E., Salas, E., Wu, T., Silvestri, S., & King, H. B. (2010). How can team effectiveness be assessed and diagnosed? In E. Salas & K. Frush (Eds.), *Improving patient safety through teamwork and team training*. Oxford, UK: Oxford University Press.
- Sacks, H., Schegloff, E. A., & Jefferson, G. (1974). A simplest semantics for organization of turn-taking in conversation. *Language, 50*, 696-735. doi:10.1353/lan.1974.0010
- Sargeant, J., Loney, E., & Murphey, G. (2008). Effective interprofessional teams. *Journal of Continuing Education in the Health Professions, 28*, 228-234. doi:10.1002/chp.189
- Shunk, R., Dulay, M., Chou, C. L., Janson, S., & O'Brien, B. C. (2014). Huddle-coaching: A dynamic intervention for trainees and staff to support team-based care. *Academic Medicine, 89*, 244-250. doi:10.1097/ACM.000000000000104
- World Health Organization. (2010). *Framework for action on interprofessional education and collaborative practice*. Geneva, Switzerland: WHO. Retrieved from http://apps.who.int/iris/bitstream/10665/70185/1/WHO_HRH_HPN_10.3_eng.pdf
- Zwarenstein M., & Reeves, S. (2006). Knowledge translation and interprofessional collaboration: Where the rubber of evidence-based care hits the road of teamwork. *Journal of Continuing Education in the Health Professions, 26*, 46-54. doi:10.1002/chp.50

APPENDIX
SUPPLEMENTAL MATERIAL

Analytic Template

GroupID:
Group members (include gender):
Your name:
Date:

SURVEY RESULTS:
Problems:
Influenced thinking:
Anticipated roles/See role differently/Explain role:
Feedback on ISPE:
Likert scale items:

NOTES ON TEAM INTERACTION AND TEAM COMMUNICATION IN ENCOUNTER 1
Positioning (*where is each person located in the room*): Clockwise

Leadership (*does anyone seem to take the lead or at least guide the group process, does this vary at different points*):

Team dynamic (*especially description of how much the group actually seems to be working together, paying attention to one another, thinking about how their roles relate to one another*):

Patient-centeredness (*does the team acknowledge the patient having a perspective, the need to take her concerns into account during the interview*):

Other:

NOTES ON TEAM INTERACTION AND TEAM COMMUNICATION IN ENCOUNTER 2
Positioning (*where is each person located in the room*): Clockwise

Problem list (*items on the list, order, any discussion about what does/does not belong on the list or how to lump & split problems*)

Leadership (*does anyone seem to take the lead or at least guide the group process, does this vary at different points*):

Team dynamic (*especially description of how much the group actually seems to be working together, paying attention to one another, thinking about how their roles relate to one another*):

Patient-centeredness (*does the team acknowledge the patient having a perspective, the need to take her concerns into account during the interview*):

Other:

Appendix (continues)

(Appendix continued)

DESCRIPTIVE ORGANIZING QUESTIONS FOR FOUR KEY FOCI
 AND MAPPING SEQUENCES OF INTERACTION WITHIN EACH FOCI

Guiding questions	Supporting evidence (include relevant line #'s and time in transcript when possible; include profession)
1) How do participants prepare for the interview with the patient and decide the order in which they will interview the patient? a. Is there a guiding logic? (e.g., begin with broadest perspective, begin with priority issue, avoid redundancy/maximize efficiency) b. Do participants identify areas overlapping roles, expertise? How do they handle this? c. Do participants make assumptions about what others know and/or can do? How does the target person respond?	DESCRIBE THE SEQUENCE OF INTERACTIONS AS THE TEAM DECIDES THEIR APPROACH TO THE PATIENT.
2) How do participants decide the how to discuss the plan of care with the patient? a. Is there guiding logic? If so, provide supporting evidence. b. Do participants identify areas overlapping roles, expertise? How do they handle this? c. Do participants make assumptions about what others know and/or can do? How does the target person respond?	DESCRIBE THE SEQUENCE OF INTERACTIONS AS THE TEAM DECIDES HOW TO DISCUSS THE PLAN OF CARE WITH THE PATIENT. *Not relevant to faculty videos
3) How does the group discuss the fall? a. What questions arise during the group's discussion of the fall? (what types, who asks, who responds) b. What conjectures do participants make when discussing the fall? (who makes them) c. How do participants incorporate the patient's perspective (if at all)? (who does this) d. Does the group get stuck on one dimension /professional perspective? (e.g., medications that might cause the fall — pharm; mobility/ weakness issues — PT) e. Does the group incorporate multiple dimensions/professional perspectives?	DESCRIBE THE SEQUENCE OF INTERACTIONS AS THE TEAM DISCUSSES THE PATIENT'S FALLS. THIS INCLUDES HUDDLE 1 and HUDDLE 2.

Appendix (continues)

(Appendix continued)

Guiding questions	Supporting evidence (include relevant line #'s and time in transcript when possible; include profession)
4) How does the group discuss diabetes? a. What questions arise during the group's discussion of the diabetes? (what types, who asks, who responds) b. What conjectures do participants make when discussing the diabetes? (who makes them) c. How do participants incorporate the patient's perspective (if at all)? (who does this) d. Does the group get stuck on one dimension /professional perspective? (e.g., medications-pharm/MD; diet) e. Does the group incorporate multiple dimensions /professional perspectives?	DESCRIBE THE SEQUENCE OF INTERACTIONS AS THE TEAM DISCUSSES THE PATIENT'S DIABETES. THIS INCLUDES HUDDLE 1 and HUDDLE 2.

Note. PT = physical therapist; MD = physician.