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# Assessment of Conformity: Instrument Development

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UNIVERSITY OF CALGARY

Assessment of Conformity: Instrument Development

by

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A THESIS

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## **Abstract**

Current educational systems, including medical programs, incorporate learning in groups. However, subtle social factors functioning within these groups can influence learning and professional development. Thus, these social factors should be considered by both educators and learners.

One social factor that has gained the attention of medical educators is conformity. Conformity is submission to the pressure of the group or its members and is represented by changing one's behaviour, attitudes or beliefs to align with those of the group. It is associated with peer pressure and hierarchy whereby the need to be accepted within a professional milieu is paramount. Hence, conformity could prevent learners from actively engaging (e.g., asking questions) in education. Moreover, conformity has been associated with learners reporting feeling overwhelmed, and it has contributed to information mismanagement, inaccurate decision-making, and learners inefficiently using health care resources or compromising their role as patient advocates. The eventual outcome is deterioration in the provision of health care.

The aim of this study was to create an instrument that enables both learners and educators to track verbal and nonverbal behaviours that are indicative of conformity. An observational cross-sectional design was used in three phases in this study. In Phase I, an initial conformity instrument was created based on behaviours identified in the communication, social psychology, and medical education literature and through discussion with conformity experts. The researcher then used this instrument in Phase II to code archival videos of the conformity behaviours of medical and nursing students from a prior study on conformity. Finally, in Phase III the instrument was used in real-time simulation sessions to record the behaviours of

medical residents and students who were given the challenge of managing a patient case. This case was designed to expose the medical residents and students to pressure that would potentially influence their clinical decision making. Also, this study examined whether conformity as a construct is uni- or multidimensional.

The study results showed that the instrument's scores did not differentiate conforming from nonconforming behaviours. Also, the principal component analysis generated uninterpretable results, suggesting that the behaviours measured are not multidimensional. Participants also shared their perspectives about conformity, and revealed that they viewed conformity as a natural dynamic in their daily practice and could potentially yield to the pressure of the group or their senior colleagues when faced with a conflict.

The implications for teaching and practice are discussed. It is also recommended that further research examine conformity in clinical settings to determine if the results obtained in clinical simulations are consistent with practice.

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## **Dedication**

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## **Chapter One: Introduction**

### **Overview**

Most teaching and learning systems promote learning in groups over learning in isolation, and medical programs are no exception. Co-operation through respectful and valued collaboration with peers nourishes learning as well as the educational experience (Soller, 2001). Nonetheless, hidden social factors functioning within a peer group can influence collaboration and impact learning (Beran, McLaughlin, Al Ansari, & Kassam, 2012). Thus, these factors should be considered by both teachers and learners.

One social dynamic that is known to operate within group situations is conformity. Conformity is the submission to the pressure of the group or its members, whether this pressure is real or imagined (Crutchfield, 1955; Mcleod, 2007). When the pressure is exerted by several group members, conformity can be referred to as majority influence or group pressure (Mcleod, 2007). Conformity has also become a well-known social psychological phenomenon (Asch, 1955; Beran et al., 2012; Khoury, 1985; Pavitt, 1998; Stan, 1972). Since the 1930s, it has been investigated by researchers from many disciplines such as social psychology and communication studies. However, conformity has just begun to attract the attention of medical educators (Beran, Kaba, Caird, & McLaughlin, 2014; Beran et al., 2012). This late attention was sparked by the realization that individuals, such as healthcare professionals, may conform in team or group meetings even though they do not agree with the health care decision made. Such a situation raises a wide range of concerns that include hindering learning, mismanaging available resources, undermining a physician's role as patient advocate, and potentially jeopardizing patients' lives.

Acknowledging these concerns drives the need to investigate conformity and attempt to measure it in order to gain an understanding of its occurrence in a clinical setting particularly, and in medical education generally. This need is challenged by the fact that conformity is a subtle behaviour. It cannot be directly observed; rather, it can be observed only by behaviours or signs that indicate someone is changing his or her actions to align with others. Furthermore, there is no existing scale that measures conformity. Therefore, the current research was a first attempt at creating an instrument that enables medical educators and students to track verbal and nonverbal behaviours that seemingly indicate the occurrence of conformity. This attempt required consideration of three important features, that is, reliability, validity, and dimensionality. Reliability refers to the consistency of scores yielded from a measure, whereas validity refers to the ability of the scores to measure what they are intended to measure (Anastasi, 1961; DeVellis, 2012; Hecker & Violato, 2009; Streiner & Norman, 2008). Dimensionality refers to the number and nature of the items included in an instrument (Furr, 2011). The dimensionality of an instrument should reflect the dimensionality of the construct it is measuring (Edwards, 2001). Reliability, validity and dimensionality are explained in detail in the next chapter, along with two frameworks that address validity. The first is Messick's framework, which is a development of the methods that have been used extensively by researchers since 1954 to evaluate validity (Messick, 1995). The second, Kane's framework, focuses on the importance of creating a statement that clarifies all the assumptions and uses of the measure (Kane, 2013). In this thesis, Messick's framework was used to guide the process of collecting validity evidence.

The need for understanding conformity is increasing with the growing use of group-based educational techniques in medical education (Cantillon, 2003; Davis & Harden, 1999; Elwyn,

Greenhalght & Macfarlane, 2001; Jaques, 2003; Meo, 2013; Walton, 1997). One type of setting readily available in most medical programs that is suitable to study conformity is simulation-based medical education (SBME), or simulation. SBME is defined as the artificial recreation of a clinical environment or circumstances for the purpose of enhancing the educational message and allowing medical students to undertake specific tasks in a controlled manner (Al-Elq, 2010; Bandiera, Sherbino, & Frank, 2006; Jones, Passos-Neto, & Braghirolim, 2015; McGaghie, Issenberg, Petrusa, & Scalese, 2010, Ziv, 2009). Okuda et al. (2009) provided evidence that simulation-based medical training leads to clinical improvement in medical knowledge, comfort in procedures, and improvement in performance during retesting in simulated scenarios. In addition, simulation was found to be a reliable method for assessing learners, as well as for teaching teamwork and communication.

Along with its previously stated benefits, simulation provides a safe environment that allows students to make mistakes and learn from them without fear of harming patients (Fanning & Gabba, 2007). It offers a trainee-centered environment that allows each learner to progress according to his/her own needs and pace while providing the educator control in exposing students to complex, uncommon, or life-threatening clinical challenges (Ziv, 2009). In consideration of adult learning theories, simulation allows a hands-on approach to learning and active participation, thereby increasing the effectiveness of learning skills. Simulation also creates opportunities for teamwork training, leadership, and communication skills, which are crucial skills for expert patient care and the reduction of medical errors (Fanning & Gaba, 2007; Ziv, 2009). Furthermore, simulation allows educators to use specific curriculum objectives to design the simulation experience to ensure that learning goals are achieved, for both formative assessment (i.e., that aims to teach students through the provision of feedback) and summative



assessment (i.e., that aims to evaluate students) (Fanning & Gaba, 2007; Ziv, 2009). Taken together, these characteristics of simulation make it an ideal environment to observe students while they are managing a patient case under pressure that could potentially influence their clinical decision.

## **Rationale**

Conformity is important to understand because it can compromise the learning experience in several ways. It may prevent students from openly presenting and discussing information, particularly information that is discrepant from other ideas shared in a group (Beran et al., 2012). This inhibition may lead to an inaccurate and incomplete understanding. Learning can also be threatened when incorrect information remains unchallenged by any individual in the group, which can lead to wrong decisions (e.g., Kaba & Beran, 2016). In addition, ignoring conformity in medicine can hinder students from fulfilling their role as patient advocates by overwhelming them with peer pressure or the professional levels of hierarchy in medicine. For example, although a junior practitioner may believe that his or her differing views have value, respect for professional hierarchy may prevent that individual from expressing them (Lempp & Seale, 2004). In other words, conformity may lead students to ignore their own concerns about providing the best standards of care and may place patients at risk for poor quality health care. Yet, despite these compelling concerns, conformity and other social dynamics have received scant attention in the medical education literature. Moreover, the field of medical education is promoting learning in groups and adopting a variety of techniques, such as problem-based learning and SBME, which rely heavily on peer interactions but can also unintentionally trigger the pressure to conform.

To understand how and why conformity occurs, it is important to measure and assess it. Creating an instrument that can measure the verbal and nonverbal behaviours that people express when they are conforming to inaccurate information can be potentially useful in both simulation and clinical settings (e.g., during clerkship and in continuing medical education). In addition, it can be used to identify conformity and situations where it is most likely to occur; this information can then be used to initiate a plan to improve team communication and to mitigate the harmful outcomes of conformity. Such communication improvements can include assisting senior professionals in watching for signs of contradictory opinions and encouraging the open expression and acceptance of diverse opinions within their teaching environments. Moreover, this work has implications for junior professionals in helping them recognize their own conforming behaviours and in assisting them to resist the urge to conform through silence. Rather, junior medical students can learn to present their suspicions and doubts in a respectful way, and more senior professionals can learn to accept them in a similar manner. Through such realizations and considerations, the vision for improving patient care.

### **Philosophical Assumptions**

The underlying philosophical assumptions of the current study stem from a psychological theoretical perspective known as behaviourism, which emphasizes the study of observable stimulus-response behaviours (McLeod, 2017). In behaviorism there is a belief in scientific methodology and a concern with how environmental factors or stimuli influence the occurrence of observable behaviours or responses. Two relevant tenets of behaviorism are: (i) only observable behaviours should be studied because they can be measured, and (ii) all behaviours can be reduced to a simple stimulus-response association (McLeod, 2017). All in all,

behaviourism is a philosophy of science that focuses on behaviour without directly referring to mental events and processes (Moore, 2011).

Behaviourism was devised in 1913 through the work of psychologist John Watson, who established the theory with the publication of a paper titled “Psychology as the Behaviorist Views It”. Watson based his article on the belief that behaviours can be measured, trained, and changed. Simply worded, Watson believed that all behaviours were the result of an interaction with the environment (Moore, 2011). Although further developed in the work of Ivan Pavlov and Edward Thorndike, it was B. F. Skinner's work that greatly advanced behaviourism. Skinner proposed that all but a few emotions were conditioned by habit and could be learned or unlearned (Lagasse, 2017; Moore, 2011).

As noted earlier, behaviourism underlined the main assumptions of the current study. Specifically, we assumed the presence of behavioural evidence for a psychological construct (i.e., conformity). More simply stated, in the current study it was assumed that individuals would display a set of observable behaviours (both verbal and non-verbal) when they were conforming, and that observing and subsequently measuring these behaviors could assist us in gaining a deeper understanding of the underlying construct (i.e., conformity). According to behaviourism, the occurrence of conformity could be a response to a stimulus or a prompt (i.e., stimulus-response association). As a result, the last phase of the current research was designed to include what was called a conformity prompt.

An obvious advantage of behaviourism is that it is well established with many studies and experiments that support its premises. Another advantage is that behaviourism offers real life applications (e.g., in learning and therapy), as it focuses on behaviours and the measurement of behavioural change. While offering a simple framework that can explain human conduct from a

scientific point of view, behaviourism does not acknowledge the complexity of these behaviours; rather it provides only a partial account of them. In addition, it overlooks important factors that influence behaviours such as emotions, expectations, and motivations (McLeod, 2017).

Accordingly, behaviourism should be considered with caution when trying to uncover important aspects of human behaviour.

### **Research Assumptions and Framework**

A set of ideas and beliefs guided the development of this study. First, anecdotal information from students about subtle social influences (e.g., peer pressure) experienced on a regular basis in a variety of medical settings that accompany what seems to be incorrect clinical practice raised awareness that these influences could negatively affect learning. Likewise, discussion with medical educators revealed that these influences or pressures can also jeopardize proper communication, patient advocacy, and eventually the provision of proper health care, if ignored. These insights and the researcher's belief in the active role that medical teachers and students play in the educational process led to the purpose of this study: to create a conformity instrument and attempt to gain a deeper understanding of the effect of conformity in medical education. This active role entails the expectation that both medical teachers and students will take responsibility for ensuring successful learning. Medical teachers are expected to contribute to improving teaching methods and are required to modify academic curricula or tasks to prepare medical students as future physicians. Also, medical students are assumed to be motivated adults who will learn from experience and set their own learning goals. Second, the researcher perceived conformity in several ways. While conformity can be subjective and difficult to define, its manifestation or accompanying behaviours can be observable and measurable. Thus, an attempt to create an instrument to track these manifestations or behaviours was justified.

Finally, the researcher believed that high pressure situations could be created within a simulation setting to create opportunities to observe how medical students managed this pressure.

Additionally, based on the suggestions made in the literature (e.g., Cameron, 2011; Poni, 2014), the researcher believed that students' perceptions of this experience could also be well understood through interviews, thus they were conducted in the present study.

An observation made by Asch, a social psychologist who, in the 1950s, performed the seminal conformity experiments, inspired the idea for this current research. Asch noted that some of his research participants demonstrated nonverbal behaviours while feeling the pressure to conform. These included, for example, hesitating in their speech, smiling in an embarrassed way, or shaking their head. Others showed verbal behaviours such as expressing "Damn it! I always disagree" (Asch, 1950; Asch, 1952, 1956; Asch & Guetzkow, 1951). Consequently, communication was considered and addressed in the current study as to how it might reveal conformity.

Communication is a means of exchanging or sharing ideas and feelings among people, and has two main forms: non-verbal and verbal (Hartland & Tosh, 2001). Non-verbal communication is unspoken and involves conveying a message with the use of body language such as gestures, facial expressions, and eye contact (Archer & Akert, 1977, Hartland & Tosh, 2001). Non-verbal communication evolved before verbal communication, which incorporates the use of words for expression. Both forms are critical for conveying messages in our current world (Archer & Akert, 1977, Hartland & Tosh, 2001). Communication can also be viewed as any form of interaction between individuals who share a common goal and feel a sense of belonging to the same group in order to solve problems and make decisions to enable the group to achieve its goals (Beebe & Masterston, 2000). In general, the effect of communication can

also be viewed as the process of acting on information. In this study, the term *verbal communication* was used to refer to spoken language when conveying a message. The term *non-verbal communication* was used to refer to body language (e.g., facial expressions, gestures and any other paralanguage channels) as a means of conveying a message (Archer & Akert, 1977).

In addition to drawing attention to communication (verbal and non-verbal) and how it might reveal conformity, Asch's conformity experiments motivated the current study as well as other studies in medical education to investigate the phenomenon in a clinical setting (e.g., Beran et al., 2013). Because most social psychologists consider conformity as following the majority, it seems desirable in the medical field. In fact, it may contribute to the cohesiveness of the group and the adoption of good medical practice. However, Asch described conformity as agreement with the group—even when the individual suspected that the group was wrong. Indeed, in his studies Asch had instructed group members to provide information that was clearly incorrect to see how an individual would respond. Asch's work caught the attention of medical educators because it highlighted how a situation could jeopardize learning in medicine, proper communication among health professionals, and even the provision of quality patient care.

In terms of the framework of this study, this observational study was designed to proceed in three phases. In Phase I, the existing conformity literature was examined and expert review sought to develop a list of potential conformity behaviours. Phase II involved using the list to observe and code the behaviours of medical and nursing students in archival videos that were available from Kaba and Beran's (2016) previous conformity study. In their study, Kaba and Beran investigated how medical and nursing students, who were taking and reporting vital signs in a simulation lab, conformed to inaccurate information their colleagues provided. The behaviours observed in Phase II were subsequently used to further refine the list of potential

conformity behaviours to be used in Phase III of the study. Then, in Phase III, the third version of this list was used to observe and record the behaviours of medical residents and students who participated in real-time simulation scenarios that included a conformity prompt. Afterwards, this phase involved interviewing the participants to gain a deeper understanding about their perspectives on conformity. In the study, both quantitative and qualitative data were collected to provide insight into the types of behaviours that people may exhibit when encountering pressure to conform.

### **Study Purpose**

The purpose of this research was to create a conformity assessment instrument and to collect evidence of the validity of scores yielded by that instrument. Specifically, a measure was developed and improved to aid in observing and marking students' potential conformity behaviours (both verbal and non-verbal). This study used an observational design that analyzed data collected from a specific sample (i.e., medical residents and students) at a specific point in time (i.e., when they encountered pressure to conform) to understand what types of behaviours were displayed. Thus, this study was cross-sectional in nature.

### **Research Questions**

This research study attempted to answer two questions:

- What types of verbal and nonverbal communication and behaviours represent conformity among medical and nursing students, and are these behaviours also observed among residents?
- Is conformity a one-dimensional or multi-dimensional construct?

## **Importance of the Study**

It was anticipated that this study could aid medical educators and students in recognizing the occurrence of conformity in a clinical setting. This recognition could assist them in understanding the impact of conformity on patient care, as well as identifying important aspects of how medical students communicate when under the pressure to conform. In addition, such recognition could assist educators in developing a psychologically safe and nurturing environment, and strategies to manage conformity (e.g., communication strategies), especially during the early process of teaching or learning in medicine. Ignoring conformity may lead to a reluctance on the part of doctors to actively challenge other healthcare professionals in the face of inaccurate information and to minimize their roles as communicators and patient advocates. If medical students and educators are not aware of conformity or prepared to manage it and the risks it poses, the ultimate danger is that patient care and safety may be compromised.

## **Thesis Outline**

This document presents the research in five chapters. Chapter One provides a general overview of this dissertation and clarifies its rationale, importance, purpose, and research questions. In Chapter Two, a review of the literature relevant to this research is presented. Chapter Three outlines the methods used to answer the research questions posed in this study. Chapter Four presents the methods and results of all of the analyses. Finally, Chapter Five explains the results of the research and answers the research questions. This last chapter concludes by exploring the challenges and limitations of this study and in recommending new questions for future research.



## **Chapter Two: Literature Review**

This chapter presents and explains the published academic literature on conformity including its definitions, history, factors affecting its occurrence, the types of conformity, and reasons for its occurrence. Next, communication, decision making and conformity in small groups with a focus on groupthink theory is introduced. In addition, a discussion of assertive communication as a means of dealing with conformity is presented. Furthermore, research on SBME and its use as a means of studying conformity and deception as an important element in studying conformity is discussed. The chapter concludes with a description of reliability, validity, and dimensionality with an emphasis on their importance in measurement development.

### **Definition of Conformity**

Conformity has consistently been viewed as a phenomenon that occurs in groups, but its definition has varied somewhat over the years. Jenness (1932) was the first psychologist to study conformity and explained it as changing one's stance to agree with the group. Asch argued for a different theoretical perspective from Jenness' definition of accepting the group's opinion as correct. Asch defined conformity as an individual agreeing with the group even if that person was aware that the group's opinion was wrong. In other words, one yields to group pressure even if that person believes that the group members are mistaken in their views or beliefs (Asch, 1952, 1955, 1956; Asch & Guetzkow, 1951). Interestingly, most psychologists, except for those who replicated or built on Asch's study, continued to define conformity as yielding to the pressure of the group, but they did not clearly distinguish whether the conforming person truly thinks that the group's opinion is correct or not (e.g., Bond & Smith, 1996; Coleman, Blake, & Mouton, 1958; Crutchfield, 1955; Khoury, 1985; Mcleod, 2007; Neto, 1995; Rosenberg, 1961;

Stang, 1972). The use of this more simplified definition may be due to the difficulty in ascertaining if an individual believes the group's opinion to be incorrect.

The simplified definition of conformity as yielding to the group when the group's opinion is correct was likely not especially alarming to medical education researchers. Mostly, it is expected that individual students will be acquiescent to the group as a means of learning good medical practice. In contrast, Asch's view of conformity that an individual can conform to a *incorrect* view or position over the *right* one has gained the attention of medical educators (e.g., Beran et al., 2012). This possibility raises both ethical concerns for medical practitioners and concern for medical educators because conformity may jeopardize the learning of accurate information within a group, which eventually may interfere with the provision of proper medical care. Given these heightened concerns about the implications of conformity in the medical field, and since this paper focuses on the consequences of conformity in medical education, Asch's definition of conformity was used. Thus, this study focused on the occurrence of conformity behaviours when an individual was under pressure to agree with the group or its members, especially when s/he was unsure if the group was right or when s/he was certain that the group was wrong.

### **History of Conformity**

The interactions of group members have received considerable attention from social psychologists since the 1930s. Jenness (1932) was the first to describe its characteristics. In his initial experiment, Jenness used a glass bottle filled with beans and asked participants to individually estimate the number of beans. Then, he brought the participants together and asked them to provide him with an estimate as a group. Next, he interviewed participants individually, asking them to re-estimate the number of beans to see if they remained committed to their

original estimate or if they would change their estimate to match that of the group. Interestingly, almost all participants changed their estimates to be closer to the group figure (Jenness, 1932). Although simplistic, this experiment suggests that conformity to the group suppresses individuality, especially in the context of a shared task.

In 1935, Sherif conducted an experiment to examine whether individuals turn to group norms when they are facing ambiguous situations. The experiment took place in a lab using what is known as the autokinetic effect, which is a visual illusion whereby a light spot is projected onto a screen in a dark room. The light spot is still, but appears to move. Sherif asked the participants individually to estimate how far the spot had moved, and their responses varied considerably. Next, Sherif tested the participants in groups. Based on their responses, he composed groups consisting of three individuals each, two of these individuals had given similar estimates, while the third had given a different estimate. Then, he asked each participant to state her/his estimate in front of his/her group. The results of this experiment demonstrated that when groups reach a common estimate, the individual with a different response will change his/her mind and conform to the others. Sherif (1935) concluded that lacking information in an ambiguous situation will encourage an individual to turn to the group for guidance. In Sherif's experiment, even though there was no correct answer to the question of distance, individuals tended to follow the group's agreed upon norm or answer to the problem in question.

Solomon Asch, also a social psychologist, conducted the most famous conformity experiments (Asch, 1950; Asch, 1952, 1956; Asch & Guetzkow, 1951). He aimed to explore conformity and the effect of group pressure on an individual, especially when the group seemed to be wrong, through using a line judgment task. Asch presented two cards in his experiment: one with one line and the other with three lines and asked the participants, one at a time, to

answer which of the three lines matched the line on the other card. Each participant was seated with three confederates (i.e., individuals who were acting as participants but were actually part of the experiment). The confederates had scripted answers that were incorrect, and Asch found that when each confederate gave the same incorrect answer to the line matching test, the study participant was likely to provide the same incorrect answer (Asch, 1952, 1956; Asch & Guetzkow, 1951).

Jenness, Sherif, and Asch were the first researchers to draw attention to conformity as a phenomenon. Many researchers subsequently explored conformity and examined the effect of consensus, individual differences in responding to group pressure, the personality traits of conforming individuals (e.g., self-esteem, social and psychological processes leading to conformity, etc.), and circumstances influencing the occurrence of conformity such as task difficulty and group size (Coleman & Mouton, 1958; Crutchfield, 1955; Eagly & Chvala, 1986; London & Lim, 1964; Rosenberg, 1961; Stang, 1972). In addition, researchers examined social influences on individual conformity and social characteristics that increase or decrease an individual's susceptibility to conform (Centers & Horowitz, 1963; Deutsch & Gerard, 1955; Witkin et al., 1974). Furthermore, researchers conducted many studies of conformity as a phenomenon and replicated Asch's experiment to gain a deeper understanding of it (e.g., how conformity functions in different cultures and how it contrasts to deviance) (Bond & Smith, 1996; Neto, 1995). Conformity research was also addressed with a focus on the use of deception to observe how people respond to pressure to conform, without being informed of the study's purpose (Stang, 1976; Stricker, Messick, & Douglas, 1967).

Yet, despite 60 years of research on conformity, only recently has it gained the attention of medical educators (Beran, Drefs, Kaba, Al Baz, & Al Harbi, 2015; Beran, McLaughlin, Al

Ansari & Kassam 2012; Boldt, 1976; Mori & Arai, 2010; Wright et al., 2010). In the first empirical study on conformity in medical education, Beran et al. (2012) found that despite being informed about the correct location to aspirate on a knee model, the majority of students (58.33%) were more likely to conduct the aspiration procedure in the same incorrect location where they were told their peers had aspirated. This study suggested that additional research is warranted with medical students at all levels of training with different tasks and in various settings to determine if such conformity occurs. In 2014, Beran, Kaba, Caird, and McLaughlin called for more research in medical education to study the interactions of group members and how those interactions are influenced by underlying behaviours such as conformity (Beran et al., 2014).

Kaba and Beran (2016) conducted another study that is important to the current research. The researchers observed and video-recorded medical and nursing students who were participating in a simulation session and practicing the skill of reading and reporting vital signs. Their purpose was to determine whether participants ( $n = 104$ ) would conform to their colleagues after hearing them report incorrect vital signs, and after taking their own readings from a medical mannequin. The testing was completed in a simulation lab in the Ward of the 21st Century (W21C), which is a simulation facility. The results showed that both nursing and medical students are likely to conform to one another's incorrect vital signs reports, with 95% of participants conforming at least once. This study is relevant to the present research because it included many participants (both male and female, as well as medical and nursing students) who conformed in a clinically-simulated situation, and the precise moment of conformity was easily observed. As this study was conducted during simulation, situational factors were controlled for all participants (Kaba & Beran, 2016).

After medical educators had acknowledged the occurrence of conformity in the interactions of study group members, they began to investigate its occurrence within an online learning environment (Beran et al., 2015). Beran et al. (2015) created a virtual classroom and invited each participant to answer a set of questions about research. Each participant was a part of a group that consisted of four individuals and each was informed to give her/his answers when it was her/his turn. Furthermore, the participants were not aware that the other three individuals on their team were research confederates (i.e., they were part of the research team). The sessions were planned so that the participants would always provide their answers after two confederates had responded. The third confederate responded only after the participant submitted her/his answer. Two groups were created as part of the study (i.e., control and experimental). In the control group, the participants provided their answers without seeing the answer provided by the confederates. In the experimental group, the participants were able to see the answers given by the confederates. This study provided evidence that individuals are likely to conform to inaccurate information that group members provide in an online environment (Beran et al., 2015). Eveleigh and Winskel (2016) conducted a similar study that supported these findings.

It is interesting to note that most of the previous studies conducted to investigate conformity were not true experiments, but rather were quasi-experiments. True experimental studies usually involve random selection of the study's participants from a larger population and random assignment of the participants either to the control or experimental groups. Although in prior conformity studies, participants were not always randomly assigned to either control or experimental groups, the studies did employ experimental control over the situation that the participants encountered. That is, the participants were observed before and after an experimental manipulation took place, thus qualifying them as quasi experiments. These types of

quasi-experimental studies are critical in determining if people do conform, as self-reports about conformity are likely to be biased by factors such as social desirability.

### **Changing Perspectives on Conformity**

To illustrate the main perspectives that were clarified through conformity research over the years, the following section will present the main factors influencing conformity, its classifications, and the explanations provided in the literature for its occurrence.

**Factors affecting conformity.** Researchers have manipulated several factors in regard to the factors' influence on the occurrence and level of conformity. The first factor is group size or, more precisely, the majority size. Conformity tends to increase as the number of group members increase; however, changes in conformity levels become negligible once the size of the group reaches four (Asch, 1956; Rosenberg, 1961). Another factor affecting conformity is the lack of unanimity, or the presence of at least one person who declares a different position from the group, or the presence of an ally, who might not even share the dissenter's views but also takes a different view from the group. Such a presence seems to encourage individuals not to conform (Asch, 1956; Asch & Guetzkow, 1951). In addition, the culture of group members and where they are functioning as a group plays a role in influencing conformity (Bond & Smith, 1996; Centers & Horowitz, 1963; Neto, 1995; Witkin et al., 1973). Obviously, if the social culture promotes conformity, it is likely to occur. An additional factor that seems to affect the occurrence of conformity is the method of announcing the decision. For example, writing the decision privately does not appear to support conformity behaviours (Mcleod, 2008). The personal characteristics of individuals can also contribute to either the occurrence or absence of conformity. For example, young adolescents are more susceptible to conforming and women are more likely to conform than men (Eagly & Chrvla, 1986; Mcleod, 2008). Furthermore, the

more difficult a task or the higher the level of ambiguity means increased pressure on an individual to conform (Asch, 1956; Asch & Guetzkow, 1951; Coleman et al., 1958; London & Lim, 1964; Mcleod, 2008). Finally, individuals are more likely to conform to those who have a respected status such as leader figures or celebrities (Mcleod, 2008). Thus, various characteristics are associated with conformity.

**Types of conformity.** Kelman (1958) pointed to compliance, internalization, and identification as types of conformity. He viewed compliance as a type of conformity wherein a person follows the group by conforming on a behavioural level, but not on a beliefs or values level. In contrast, internalization describes a process of publicly displaying behaviours that are aligned with group norms, and that changes the individual's belief system to mirror that of the group's internal understanding. With identification, Kelman believed that conformity matches the expectations of a social role as accepted or recognized by the group, but it does not imply changes in one's opinion (Mcleod, 2007).

Furthermore, Pavitt (1998) outlined a difference between two forms of conformity, specifically, *compliance* and *acceptance*. According to Pavitt's research, a complying individual will display behaviours that are consistent with the group position while s/he does not hold similar internal beliefs and values to that of the group, while an accepting individual will show behaviours that are aligned with the group's opinion and hold matching beliefs and values to that of the group (Pavitt, 1998). So, Pavitt seems to agree with Kelman's classification, although he used the term acceptance in place of internalization.

Mann (1969) identified *normative*, *informational*, and *ingratiational* conformity types (Mcleod, 2007). Mann's classification focused on the reasons that motivated someone to conform, rather than on comparing one's position on the level of beliefs and opinions to her/ his



behaviour, as Pavitt and Kelman had done. Mann's view of normative conformity emphasized the desire to 'fit in' and the fear of rejection as the main motives for individual action when conforming. Although these types of motives are not usually strong enough for someone to change her/his opinion or beliefs, they may provide enough impetus for a person to change his/her behaviour to match that of the group. On the other hand, informational conformity takes place when one lacks information or is facing an ambiguous situation and turns to the group for guidance. Usually, in this situation an individual will internalize the group concept and adapt it as his or her own, then act upon it. Finally, ingratitonal conformity is derived from the desire to impress or gain favour from group members. Although similar to normative conformity, it is associated with the need for social rewards, and not only acceptance or rejection (Pavitt, 1998).

The identification of all these conformity types emphasizes the importance of understanding the internal thinking process of participants while conforming. Exploring one's beliefs and the reasons that stimulated an individual's action (i.e., agreeing with the suggestion of a senior colleague, even if it is inaccurate) are important in planning for dealing with conformity as we defined it in this research. Dealing with conformity appropriately is critical for residents and medical students as it may interfere with their roles as medical experts, collaborators, leaders, patient advocates, scholars and professional individuals, which are all essential physician competencies that the Royal College of Physicians and Surgeons of Canada has identified (Frank, Snell, & Sherbino, 2015). These competencies require that physicians integrate their knowledge and experience to provide high quality and safe patient care through working effectively with other health care professionals to take responsibility, understand, serve and speak on behalf of those in need of health care (Frank et al., 2015; Sherbino et al., 2015).

Thus, conformity should not be overlooked and physicians should learn how to acknowledge its occurrence in order to manage it.

**Reasons for conformity.** Since conformity can occur in different situations, it is important to consider why individuals conform. Pavitt suggested that the reasons that lead people to join a group could also be the ones that lead them to conform. People could conform to help reach the goals set by the group or to reach personal goals through being a group member (Pavitt, 1998). For example, someone could join a journal club to stay up-to-date with recent articles and to gain a deeper understanding through discussing the literature with others. In this case, a person could conform with article choices for the sake of reaching desired goals.

Mann was more detailed than Pavitt in his view of the reasons for conformity. He based his classification of conformity on what motivated individuals to conform. Thus, his categories will be revisited in the following paragraph to illustrate what reasons for conformity underlie his definitions. In addition, the paragraph will review the various reasons for conformity that other researchers examined.

It is generally believed that individuals have a psychological need to gain a sense of belonging and acceptance from a group (Asch, 1952, 1955, 1956; Asch & Guetzkow, 1951). Thus, when an individual's behaviour is not aligned with that of the group and s/he fears rejection, conformity to the group will most likely occur (Asch, 1952, 1955, 1956; Asch & Guetzkow, 1951). This reason underlies Mann's (1969) definition of normative conformity and, in this case, conformity may function to create organization within the group (Mcleod, 2007). Therefore, it can be said that conformity is a positive aspect of group work because it creates order within the group, helping each member understand how to contribute. It may also allow members to depend on one another for information and support. On the other hand, conformity

can have negative consequences for quality decision making in medical education, such as when students feel conflicted about whether to express their own ideas, knowledge, or questions, compared to their need to feel supported by the group. This desire to feel group support may explain why individuals might provide responses that are consistent with their peer majority, regardless of whether the responses are correct or not (Beran et al., 2012).

Social psychologists have also highlighted two additional reasons for conformity. These are called *informational* and *normative processes* (Deutsch & Gerard, 1955; Kelman, 1958; Wright, London, & Waechter, 2010). Informational processes suggest that conformity occurs when one trusts another person's memory or information more than her/his own, or when one is facing a new or ambiguous situation. This reason underlies what Mann (1969) called informational conformity, and it could explain why individuals tend to conform to colleagues they trust or who are senior to them in knowledge and experience. On the other hand, normative processes suggest that the decision about whether to conform is based on a cost comparison. That is, the possible negative consequences of making an error by disagreeing are compared to the gain of contributing an agreeable response. If the costs of making an error by disagreeing are low, then people are unlikely to conform (Wright et al., 2010). This could be one underlying reason for conformity in many situations in medicine. For example, a normative process could lead to conformity in situations where a medical decision will not change by someone speaking up to correct the group.

### **Communication, Decision-making and Conformity**

Communication is defined as the continuous process of acting and reacting to information around us (Beebe & Masterson, 2000a). More specifically, communication is the process of using symbols to transmit ideas, emotions, skills, and so on. Symbols can be spoken wherein

individuals use words (i.e., verbal communication), or they can be unspoken (i.e., nonverbal communication). Often, unspoken symbols are unintentional behaviours that accompany verbal communication and aid in creating meaning for what is communicated (Trenholm, 1995). Both spoken and unspoken symbols are important to make meaning of the communicated message.

In small groups such as medical teams, where conformity was studied, communication represents a channel that enables the group and its members to carry on their daily activities and make effective decisions related to patient care. Consequently, communication is identified and emphasized as an important competency (Frank & Dandoff, 2007). Accordingly, gaining insight into a small group's communication can contribute to clarifying and explaining the decisions taken by the group and its members (Beebe & Masterson, 2000b). This insight is of vital importance in understanding how the group may make faulty or bad decisions and how such decisions can be avoided in the future. For this study, the researcher adopted a functional group communication theory approach which viewed communication in a small group as a means to problem solve and make decisions (Beebe & Masterson, 2000b). Another important theory that augments the functional approach to small group communication and focuses on small group decision making behaviours is *groupthink*, a theory about how groups make decisions. In groupthink, a group may start to feel so confident that it begins to make poor decisions (Trenholm, 1999). Since this theory may contribute to understanding conformity in medical teams, it will be discussed in the following paragraphs.

The psychologist Irving Janis first used the term groupthink in 1972 in reference to concurrence seeking within a group. Specifically, Janis defined groupthink as a thinking mode that influences an individual's engagement as a member of a cohesive or united group (Janis, 1971). In his work, Janis focused on group pressure for consensus that restricted the group from

adequately considering available alternatives and hazards, and consequently resulted in bad decisions (McCauley, 1989). This focus is understandable because though groupthink can produce good decisions, its ability to produce bad decisions can be alarming. Nevertheless, it is important to highlight that groupthink is not about a group making bad decisions, rather it is about the group overlooking important considerations or alternatives in order to achieve concurrence (Janis, 1971; McCauley, 1989).

In 1971, Janis suggested that groupthink tends to excel in the presence of certain determinants, and he categorized these into three categories: group cohesion or unity, situational determinants, and structural determinants. According to Janis, group cohesion or unity that holds group members together is central to all of the other determinants, but is not sufficient on its own to result in groupthink (McCauley, 1998). Situational determinants are associated with creating provocative contexts for the group. These contexts usually induce at least one of two factors (i.e., high stress or low self-esteem). High stress can result from the occurrence of external threats to the group, the need to deal with a moral dilemma, or the obligation to make a complex decision. Low self-esteem can result from recent failures of the group or little hope in finding better solutions than the ones already suggested. Low self-esteem usually lowers the trust of group members in their own abilities and efficacy (McCauley, 1989, 1998; Turner, 1998). As expected, a combination of high stress and low self-esteem can result in creating a highly provocative context. On the other hand, structural determinants are associated with structural faults of the group. An example of group faults can be the presence of promotional leadership (i.e., a leader or leaders who announce a favoured suggestion or solution in a situation). This form of leadership can endorse decisions by suggesting the advantages of a certain suggestion or solution at an early point of discussion. This action then discourages the

sharing of doubts and objections within the group and discourages searching for additional information and alternative solutions from resources outside the group. The influence of such leadership can be stronger in the absence of clear procedures to generate and evaluate alternatives or if the group is insulated from outside sources of information. Another group characteristic that could inhibit problem solving is when group members have a homogenous background (i.e., group members share the same background and ideology). In a similar manner to promotional leadership, homogeneity can discourage the exploration for alternative solutions from outside the group. Thus, it can promote a level of group insulation. (McCauley, 1989, 1998; Turner, 1998).

In addition to outlining the determinants that could contribute to groupthink, in 1971, Janis identified eight symptoms of groupthink that could suggest the existence of ineffective decision-making. The symptoms and their meanings as outlined by Janis are illustrated in Figure 1. Understanding these symptoms can aid in identifying the occurrence of groupthink and enable group leaders and their members to adopt a process that explores and evaluates available courses of action before committing to final decisions.

Symptoms of groupthink	Invulnerability	Perceiving the group as invulnerable provides group members with a sense of reassurance that leads to being overly optimistic and willing to take risks.
	Rationale	Victims of groupthink usually collectively construct justifications to overlook warning signs.
	Morality	Victims of groupthink blindly believe in the morality of the group. This belief can lead to members ignoring the possible ethical consequences of their decision.
	Stereotypes	Victims of groupthink tend to ignore group members who may challenge the group's idea/ decision or hold an opposing opinion.
	Pressure	Victims of groupthink place direct pressure on individuals who pose questions about a group decision or express doubts about it.
	Self-censorship	Victims of groupthink avoid deviating from the group consensus; thus, they hide their doubts and fears.
	Unanimity	Victims of groupthink are usually under the illusion that everyone in the group is in complete agreement. This illusion is enhanced when all expressed opinions are in favour of the point of view of the majority.
	Mindguards	Victims of groupthink hold themselves back from sharing problematic information that could disrupt satisfaction with previous decisions.

*Figure 1: Janis's eight symptoms of groupthink*

Groupthink is similar to conformity, with some differences. The latter refers to yielding to group pressure or to majority influence regardless if that pressure or influence is real or imagined (Bond & Smith, 1996; Coleman, Blake, & Mouton, 1958; Crutchfield, 1955; Khoury, 1985; Mcleod, 2007; Neto, 1995; Rosenberg, 1961; Stang, 1972). Reasons for conforming pertain to the individual rather than the group. For example, an individual may conform because s/he trusts the opinion or experience of others over his/her own or perceives the consequences of conforming to be less harmful than speaking out. Thus, conformity is not necessarily associated with group cohesiveness or unity. In fact, conformity occurs in groups of individuals who collaborate without knowing each other (e.g., Asch, 1952, 1955, 1956; Asch & Guetzkow, 1951; Kaba & Beran, 2016). Also, conformity may occur when individuals feel there is pressure from a majority of people, even without seeing those people (e.g., Beran et al., 2012). On the other hand, groupthink is a process of problem solving that occurs within a cohesive and united group (Kaba, Wishart, Fraser, Coddere, and McLaughlin, 2016). In this situation, the individual

experiences the group's cohesiveness and may strive for unanimity by minimizing discussion of divergent information (Janis, 1982; Kaba et al., 2016). Furthermore, groupthink implies a tendency toward conformity, but conformity does not necessarily lead people to pursue group cohesiveness (Richardson Ahlfinger & Esser, 2001). In sum, both groupthink and conformity could result in good decisions, but they could also result in poor decisions that could even harm others such as patients.

In 1989, McCauley highlighted the importance of understanding the distinction between two forms of conformity (i.e., internalization and compliance) to gain a better understanding of groupthink. In his article, McCauley challenged Janis' work and was curious about linking groupthink with internalization or compliance (McCauley, 1989). Specifically, he tried to understand if groupthink occurs due to the influence of internalization (i.e., group members actually align their beliefs and their behaviours with the group decision) or if it occurs due to the influence of compliance (i.e., group members suppress their own beliefs and doubts and show behaviours that support group decisions). McCauley (1989), concluded that groupthink structural and situational conditions contribute to both internalization and compliance. He explained that groupthink is a premature consensus that includes internalized agreement and compliance without inner acceptance. Furthermore, he encouraged continuing to distinguish internalization from compliance in future experiments testing groupthink predictions. According to him, this distinction holds a practical importance in marking factors that would influence public behaviours from factors that would influence public and private behaviours.

### **Assertive Communication as a Means of Dealing with Conformity**

By learning safe and assertive styles of communicating contrary information, medical students can gain confidence in managing divergent information presented in group problem-



solving situations (Beran et al., 2012). To do this, they must first become aware of how the tension to conform may inhibit and alter their participation in group learning activities. They must also raise their awareness about subtle influences towards group conformity. Medical students can be taught that assertive communication involves interacting in a manner that balances the respect of the opinions and rights of others with stating one's own rights, needs, and boundaries. This style of communication for students may strengthen their relationships with each other, reduce stress from conflict, and provide them with support when facing difficulties while learning (Pipas & Jaradat, 2010). Teachers must also recognize how conformity may prevent their students from speaking up in any educational setting, deliberately invite divergent opinions, and role model how to manage discrepant information. SBME and problem-based learning provides many such opportunities. Objective and structured clinical examinations can also be designed to evaluate how students communicate an idea that differs from the group. Developing such communication skills will be valuable for interdisciplinary collaboration in medical practice. The importance of these communication skills cannot be overemphasized as the expression of an alternate diagnosis or treatment may be in the best interest of patient care. Evidence suggests, however, that health care professionals are not likely to speak up when they have doubts about another doctor's management (Srivastava, 2013). As mentioned earlier, this behaviour can be the result of fear of negative evaluation or adverse consequences, adherence to hierarchical and power structures, or cultural morals that consider it disrespectful to question (Bond & Smith, 1996; Srivastava, 2013; Wright et al., 2010).

### **Conformity and Anxiety**

Though conformity may explain why people act in accordance with the majority of group members, it does not necessarily imply that they align their beliefs and opinions with the group

(McLeod, 2007). In many situations individuals conform naïvely (i.e., people are unconscious that they are being influenced by the group). Other times, individuals are conscious and aware that they are under pressure to yield to the majority (Zhang, Deng, Yu, Zhao, & Liu, 2016). This latter situation usually involves the majority declaring a position that contradicts the beliefs and opinions of the individual. Consequently, one of two scenarios could take place. In the first possible scenario, the individual would be convinced of the group's position, and, thus, change her/his beliefs or opinions to match the group (i.e., internalization or acceptance). In the second possible scenario, the individual would not be persuaded by the group's position. Consequently, s/he would face a difficult decision (i.e., comply or conform to the group and act against her/his own opinions, or stand out and speak up against the group's position). The second scenario may trigger a feeling of worry, nervousness or unease, typically referred to as anxiety (Bond & Smith, 1996; Srivastava, 2013; Wright et al., 2010).

The relationship between anxiety and conformity has not yet been thoroughly investigated in the available literature (Zhang et al., 2016). Nevertheless, available studies show that anxiety, which results from the fear of being wrong, negatively judged, or excluded by the group can magnify the pressure to conform. In this case, conformity can be a safe mechanism to deal with anxiety and avoid the possible negative consequences of standing out (Smith & Richards, 1967; Wright et al., 2010). Furthermore, studies suggest that highly anxious individuals conform significantly more than less anxious individuals, from which we could infer that being anxious could increase one's susceptibility to conform (Janis, 1955; Meunier, 1967).

How conformity influences and contributes to the occurrence of anxiety is not yet known. As stated earlier, conformity does not always mean that an individual is changing her/his own beliefs and values to match those displayed by the group (McLeod, 2007). Consequently, when

individuals are conscious and aware about the pressure to declare a position that he or she does not really believe in, it is logical to assume that they would experience anxiety and display anxiety behaviours when s/he is conforming. Nevertheless, further investigations have to be conducted to see if this relationship between conformity and anxiety occurs.

### **Studying Conformity through Simulation**

Considerable research in medical education has explored the use of simulation in training and education. Extensively studied within SBME research have been the methods for creating a simulation environment, the design of lesson plans, and the debriefing behaviours upon completion of a simulation scenario (Haji et al., 2014). The original purpose of simulation in medical education was as a pedagogical tool. Since then, it has been used as a medium to observe students' behaviours (e.g., Beran et al., 2012; Kaba & Beran, 2016).

Many characteristics of simulation make it ideal to create situations to observe a specific phenomenon that cannot be investigated by conventional research methods (Cheng et al., 2014). For example, it enables testing clinical improvement in many aspects such as gaining medical knowledge, performing medical procedures, and practicing appropriate communication behaviours during simulated scenarios. In addition, simulation is considered to be a reliable method for assessing learners and for teaching teamwork and communication (Okuda et al., 2009). Moreover, simulation provides a safe environment that allows participants to make mistakes and learn from them without fear of harming patients, while also providing the researcher control in designing complex, less common, or life-threatening clinical challenges in a standardized manner for the purpose of research (Cheng et al., 2014). Simulation additionally creates opportunities for teamwork, leadership, and communication skills development while enabling researchers to examine those crucial skills and to observe medical errors. Simulations

also allow the patient-participant contact to be reproducible and standardized, which is essential for scientific research.

Though simulation provides an advantageous setting to investigate conformity, one other critical factor that is needed is deception—for decades, social psychologists have used this research strategy to investigate conformity (e.g., Asch, 1952, 1955, 1956; Asch & Guetzkow, 1951; Beran et al., 2012; Kaba & Beran, 2016; Neto, 1995). The use of deception is necessary to obtain realistic responses from study participants and to avoid observing biased behaviours. In the following section, deception is explained more fully.

### **Conformity and Deception**

Deception refers to the act of intentionally providing limited, inaccurate, or misleading information about a situation. Its use to achieve pedagogical and research-related goals is not a novel practice, especially in the field of social psychology (Calhoun, Pian-Smith, Truog, Gaba, & Meyer, 2015; Stricker et al., 1967). Its use is justified by the nature of the topic under study, the absence of non-deceptive ways to investigate the phenomena of interest, and by the study's value. Furthermore, the American Psychological Association (APA) identifies the use of deception as acceptable when it is not expected to cause harm or distress to the participants and if the deception is explained to the participants as soon as the research design permits (APA, 2010). However, even with all of these conditions in place, the use of deception must be thoughtfully considered for its potentially negative effects on participants such as embarrassment (Calhoun et al., 2015). It may also compromise trust in the research community. Furthermore, researchers must consider the effectiveness of the deception (Stricker et al., 1967) and remember that it requires careful planning and implementation in order to comply with professional and ethical guidelines.

Nearly all of the conformity studies conducted in social psychology and medical education have used deception as part of the procedures (Asch, 1952, 1955, 1956; Asch & Guetzkow, 1951; Beran et al., 2012; Kaba & Beran, 2016; Neto, 1995). Specifically, a participant was placed in a group whose members were all previously instructed to provide an incorrect response. The researcher then observed whether the participant provided the same incorrect response and then interviewed this person at the end of the session to determine the reasons for conforming. These groups typically include 3-8 members who are asked to complete perception-based tasks (e.g., line matching). The participant being studied is not informed about the purpose of the study until after the behaviours are observed, which minimizes the occurrence of socially-desirable responses (Kimmel, 2011; Stricker et al., 1967). This method allows for the manipulation of situational factors that may influence conformity such as the group size of the majority, lack of unanimity, the method of making the decision, personal characteristics, and culture (Asch, 1955, 1956; Levine, 1999).

### **Creating an Instrument or a Scale to Measure Conformity**

Measurement is a vital part of science. Researchers develop knowledge about individuals, objects, and phenomena in the world through observations (DeVellis, 2012). To make sense of these observations and to quantify them, researchers can create an instrument or a scale (DeVellis, 2012). A scale is defined as a “collection of items combined into a composite score and intended to reveal levels of theoretical variables not readily observable by direct means” (Devellis, 2012, p. 11). In a sense, “measures are proxies for variables that we cannot directly observe” (Devellis, 2010, p. 17). Conformity is an example of a hypothetical variable or construct that cannot be directly observed. However, one can observe the behaviours that may indicate the existence of conformity. Thus, the purpose of the present study was to create an

instrument or a scale to measure the existence of behaviours that indicate the presence of conformity. Achieving this purpose required the careful consideration of three issues: reliability, validity, and dimensionality. Each of these issues are explained in the subsequent paragraphs.

**Reliability.** Reliability refers to the consistency and reproducibility of scores given by a measure (Anastasi, 1961; DeVellis, 2012; Hecker & Violato, 2009; Streiner & Norman, 2008). It is defined as the ratio of variability between individuals or in the variables being measured to the variability of scores of the measure used (DeVellis, 2012; Streiner & Norman, 2008). This ratio means that the scores of a measure will change due to a real change in the variable under measurement and not due to any source of error (DeVellis, 2012). The current literature emphasizes particular estimates of reliability over others, possibly as they are the ones more frequently used. These reliability estimates are outlined below.

**Internal consistency.** Internal consistency refers to the extent to which the items of a measure are inter-related, to see if they are assessing the same concept (DeVellis, 2012; Tavakol & Dennick, 2011). It can be measured by Cronbach's alpha coefficient, the split-half method, or the Kuder-Richardson formula 20 test (KR – 20) (Brown, 2002; DeVellis, 2012).

**Split-half reliability.** This form of reliability involves dividing all the items on a measure into two subsets of items. Then, the total score for each half is calculated. Split-half reliability estimates how closely the two scores correlate (DeVellis, 2012). This estimate can also be calculated by dividing the odd and even numbered items into two subsets or by dividing the upper and lower half of the items on the list into two subsets or by randomly dividing the items on the list into two subsets. The focus here is on the homogeneity of items and their corresponding sampling in the scale (Anastasi, 1961; Whiston, 2000).

***Inter-rater agreement.*** This estimate is concerned with the consistency of scores between different raters or judges (DeVellis, 2012; Streiner & Norman, 2008). Here, consistency includes what is scored in relation to the property of what is observed (which should be consistently observed between raters) (DeVellis, 2012). An accepted degree of raters' agreement depends on the purpose of the measure and the approach taken to estimate it (DeVellis, 2012). It is worth noting that though inter-rater agreement can be estimated through correlation (Anastasi, 1961), the kappa coefficient is frequently used for that purpose, especially in the medical literature. Kappa takes into account the contribution of chance in the agreement between raters (Viera & Garrett, 2005).

***Retest reliability.*** This reliability estimate is concerned with the consistency of scores over several administrations of the same measure (Anastasi, 1961). This estimate assumes that a measure will not truly reflect a certain construct if it cannot assess it on different occasions (DeVellis, 2012). One important factor that has to be considered when calculating this estimate is the length of time between the administrations of the measure (Anastasi, 1961). Though this technique is straight forward, it could be biased when practice could improve one's score. Another issue that could bias this technique is a participant's memory. If a short period occurs between administrations of the measure, individuals may remember their previous responses (Anastasi, 1961).

***Alternate or equivalent forms reliability.*** This estimate of reliability is used if two parallel forms of the measure are available. It is calculated by correlating the scores of both forms, provided they were administered under the same conditions to the same people (DeVellis, 2012; Streiner & Norman, 2008). This indication of reliability should consider consistency over time

(i.e., consistency in responding at two different times), as well as consistency over response (i.e., consistency in responding to different items) (Anastasi, 1961; Sapp, 2002).

Except for internal consistency, all previously mentioned estimates of reliability can be expressed in terms of a correlation coefficient and statistically represented as ( $r$ ) (Anastasi, 1961; Sapp, 2002; Whiston, 2000). A correlation coefficient quantifies the relationship between two sets of scores on a scale that ranges from (+1), representing a perfect positive relation, to (-1), representing a perfect negative relationship (Anastasi, 1961; Sapp, 2002; Whiston, 2000).

Internal consistency is typically associated with Cronbach's alpha coefficient—an index created by Cronbach in 1951 (Cronbach, 1951; DeVellis, 2012; Tavakol & Dennick, 2011). Cronbach's alpha is expressed as a number between 0 and 1. Zero indicates that items are not internally consistent, while 1 indicates that items are highly consistent (DeVellis, 2012).

The kappa coefficient is another statistic for quantifying reliability. It is associated with agreement between the raters and it ranges from 0 to 1, similar to Cronbach's alpha. A kappa coefficient of zero indicates that the agreement between raters is due to chance, while a coefficient of one indicates a true, perfect agreement between raters (Viera & Garrett, 2005).

**Validity.** The American Educational Research Association (AERA) defined validity as the degree to which theoretical and empirical evidence supports the interpretation of test scores to serve the proposed use of a test (AERA et al., 2014), and this definition is generally accepted. Yet, different validity frameworks define validity and validation with variations. For instance, Messick's framework includes consequence as part of validity and validation, while Kane's framework requires creating a clear statement of all the assumptions and uses of the measure (Kane, 2013; Messick, 1995). Thus, in Kane's opinion, validation is an evaluation of the



completeness of this created statement and of its implications and assumptions (Kane, 2013; Messick, 1995). Both frameworks are discussed in more detail later in this chapter.

***Progression and development of the concept of validity.*** Since the 1930s, educators and psychologists have established practices for creating and administering measures that yield valid results (Streiner & Norman, 2008). In the early 1950s, validity was perceived as a property that comes in different types. The APA organized validity into similar classifications that include content, predictive, concurrent, and construct validity (APA, 1953; Beran, 2003; Cronbach & Meehl, 1955). Concurrently, Anastasi (1954) identified validity as a concept that includes face, content, factorial, and empirical validity. In the 1960s, the APA reclassified validity into three classes by combining predictive and concurrent concepts as criterion-oriented validity (APA, 1966; Beran, 2003; Cronbach & Meehl, 1955). However, this view was critiqued for being fragmented and incomplete (Messick, 1995). In the 1970s, researchers like Cronbach (1971) and Guion (1977) began to discuss the consideration of validity as a unified entity (Hubley & Zumbo, 2011; Streiner & Norman, 2008).

In the 1980s, the APA, AERA, and National Council on Measurement in Education (NCEM) promoted the unified concept of validity. According to this view, content and criterion validity are part of determining construct validity (AERA, APA, & NCEM, 1985, 1989). Messick (1989) also included consequences as a part of constructing validity and defined the validation of a score as a process that includes careful evaluation of its meaning and consequences (Messick, 1995). In 1999, the AERA, APA, and NCEM recognized and adopted Messick's framework of unified validity (AERA, APA, & NCME, 1999; Hubley & Zumbo, 2011).

Understanding the challenges of judging validity led researchers like Cronbach (1982, 1988) and House (1980) to propose the idea of an argument-based approach to address validity. Yet, this idea did not receive enough consideration until Kane re-proposed it as a more detailed framework in 2006. In 2013, Kane advanced the work of Bachman (2002) and Bachman and Palmer (2010), who had highlighted test use as the core of their validity framework (Kane, 2013). Bachman and Palmer suggested declaring the use of a test they called an assessment-use argument (Kane, 2013). By bringing interpretations of scores along with test use to this area of discussion, Kane became the father of the current argument-based approach to validity.

***Evaluating validity.*** When examining validity, the first step is to ensure that the scores the measure produces are reliable (Downing, 2004; Streiner & Norman, 2008). The next step in assessing validity is complicated because the true score for a particular measure is sometimes obscured. That is, random error may change the true score by making it different from the measure's score that was calculated. In addition, measures are needed to assess intangible constructs such as intelligence or communication skills, which are not easy to precisely define. Consequently, examining validity requires using a framework to judge and evaluate both the empirical and theoretical basis for inferences and actions (Beran, 2003; Messick, 1995), in light of current knowledge about the test's purpose, use, and the individuals taking the test. Validity, therefore, in this circumstance, is not a trait of the test; rather, it is a trait of the scores obtained by the test and inferences and interpretations of those scores (Beran, 2003; Cook & Beckman, 2006; Downing, 2004). The next paragraphs will present the recent frameworks in the literature for examining validity.

***Messick's framework.*** This framework is the traditional conceptualization of validity as having different types or means for accumulating evidence, namely, content-related evidence,

which is concerned with showing that the items of a measure represent important and relevant aspects or domains of the desired construct. Criterion-related evidence reveals the degree to which the scores yielded by one measure are predictive or similar to scores of another measure. Finally, construct-related evidence supports that the scores adequately measure the construct of interest. In other words, it is concerned with the extent to which the scores yielded by the measure reflect the defined construct and not other constructs (AERA et al., 1999; Messick, 1995). Messick's framework combines aspects of these three types into one to create a comprehensive picture of construct validity (Messick, 1995). In this framework, validity is defined as an "evaluative summary of both the evidence for and the actual—as well as potential consequences of score interpretation and use" (p. 742). This framework empirically evaluates the hypothesis about a score's meaning, consequences, or utility (Messick, 1995). Furthermore, it suggests that any knowledge gained or discovered about a scale can serve in understanding the scores and their meaning, and that information will gain more value if it fits the theoretical rationale underlying the proposed interpretation of the scores (Messick, 1995).

Messick (1989) highlighted six aspects or standards that must be addressed when dealing with validity as a unified notion. The AERA (1999) adapted these as sources of validity evidence. The *content aspect* should address the available relevant evidence, representativeness, and quality of data content with the goal of including all-important aspects of the construct to be validated. The *substantive aspect* focuses on functional theories and process modeling, and their role in identifying the construct process and presenting it in assessment. The *structural aspect* is concerned with aligning the scoring structure with the construct structure. The *generalizability aspect* involves the degree to which score properties, meanings, interpretations, and uses are transferable across population groups and settings and generalizable to the construct domain.

The *external aspect* addresses the magnitude to which the score relates to other measures or non-assessed external behaviours that reflect the relations embedded within the construct being assessed. The *consequential aspect* examines evidence and/or justification for evaluating consequences (both intended and unintended) of score meaning and use for the short-term as well as the long-term. It is important to note that validity cannot rely on only one of the preceding aspects (Hubley & Zumbo, 2011). Thus, an “overall validity judgment” (p. 747) is needed (Messick, 1995). It is recommended that efforts be aimed at balancing collected evidence in light of test purpose and use so that scoring inferences and implications are not missed, and subsequent justifications are comprehensive in serving the sense of validity as a whole (Messick, 1995). Nevertheless, one must try to make balanced decisions about the use and meaning of test scores in light of the available evidence (Hubley & Zumbo, 2011).

However, there are two major threats to this framework. First, the construct may be underrepresented if an essential aspect of the construct is missing. Second, a construct may overlap with another, resulting in an overly broad definition of the construct (Downing & Haladyna, 2004; Messick, 1995).

***Kane’s argument-based approach to validity.*** In this framework, validation is defined as an “evaluation of coherence and completeness of interpretations and/or uses of argument and of the plausibility of its inferences and assumptions” (Kane, 2013, p. 1). This framework suggests documenting all claims and assumptions based on test scores into a statement that clarifies what is needed to interpret test responses (Kane, 2013). One suggested way to clarify the test-score claims is to develop an interpretation/use argument (IUA). This is an arrangement of all inferences, assumptions, and implications or uses that are important for reaching conclusions about test scores, and eventually making decisions based on them. In other words, IUA is a

statement that clarifies and details all aspects and conditions to successfully interpret the scores yielded by the test or measure and to consequently make conclusions. In addition, the IUA should detail two important factors: the population where conclusions and decisions are applied, and the range of contexts in which test scores can be used (Kane, 2013). When clearly and correctly written, an IUA may provide the evidence needed to guide the validation process and to analyze or judge the stated inferences and assumptions (Kane, 2013). Overall, Kane's framework of validity offers a step-by-step and practical guide for examining validity through the use of IUA (Kane, 2013).

**Dimensionality.** A scale's dimensionality refers to "the number and nature of the variables reflected in its items" (Furr, 2011, p. 25). Some scales are unidimensional in nature; thus, their items reflect a single variable or one theoretical concept. On the other hand, other scales are multidimensional in nature; therefore, the set of items included in them reflects different variables or several distinct but related dimensions manifested as a single theoretical concept (Edwards, 2001; Trochim, 2006)). The dimensionality of a scale is of vital importance in determining the number of meaningful scores that could be produced by that scale. Furthermore, proper understanding of the dimensionality of a scale is essential for the evaluation and interpretation of its scores. Without such an understanding, one risks obtaining meaningless scores. Consequentially, researchers who create and develop scales should never overlook examining the dimensionality of their scales (Edwards, 2001; Furr, 2011; Trochim, 2006)).

The first step in understanding the dimensionality of a scale or an instrument is inspecting the number and nature of the dimensions that are represented by its items. In other words, one should investigate if the scale or the instrument represents a single variable or more than one. The number of dimensions or measured variables is important because each dimension or

variable should be scored distinctly. Blending the scores of the dimensions or variables will only lead to ambiguity (Furr, 2011).

## **Summary**

Conformity is a phenomenon that has been studied since the 1930s. It has been defined in different ways, all of which emphasize one's need to belong to a group and it acknowledges the social pressure that group members can cause. Researchers have proposed many reasons for conformity and its associated factors. The most current research attention to this phenomenon has arisen from the medical education field. Thus, in an attempt to better understand its possible influence on clinical decision making, conformity has recently been studied using simulation labs to replicate clinical settings (e.g., Kaba and Beran, 2016). Given the risk to patient care, medical educators are examining how conformity can influence communication within a small group in a clinical setting. The primary approach used to understand conformity in medical education is the application of simulation as a means of recreating a clinical setting to observe how health care professionals act. This approach is combined with deception to gain an accurate representation of the behaviours of health care professionals.

Regardless of the continuous effort spent in understanding conformity as a phenomenon, researchers have yet to measure the behaviours exhibited when individuals face peer pressure. One possible reason for this is the challenge of creating a measure that reliably and accurately quantifies these behaviours. Validity, reliability, and dimensionality are important aspects to be considered when creating or using a measure, as they are both crucial for proper interpretation of the scores the measure yields. Thus, the purpose of this research was to create a conformity instrument, to examine its dimensionality, and to collect evidence of the validity and reliability of scores yielded by that measure. The conformity instrument was precisely designed to measure

participants' verbal and nonverbal communication behaviours or signs of conformity, and was tested during simulation sessions.

It is expected that one of the benefits of the present study is to encourage other researchers to further explore conformity within medical education. In addition, it may assist medical educators and learners in understanding how conformity can influence learning and clinical decision-making, and consequently impact patient care. Such an understanding is essential for developing approaches to manage conformity constructively. Ignoring the occurrence of conformity during early teaching or learning in medicine may lead to a generation of doctors who jeopardize their roles as collaborators, leaders, scholars, communicators and patient advocates and adopt conformity as a professional dynamic with their peers and other medical professionals. If medical students and educators are not trained in how to recognize conformity and the risks it poses, patients may be at risk.

### **Chapter Three: Research Methods**

This chapter presents the research methods used to respond to the two main research questions of this study: (1) What types of verbal and nonverbal communication and behaviours represent conformity among medical and nursing students, and are these behaviours also observed among residents? (2) Is conformity a one-dimensional or multi-dimensional construct?

This cross-sectional observational study was conducted in three phases. In Phase I, based on the literature review, an initial list of potential conformity behaviours (i.e., an initial conformity instrument) was created. This list was then revised and improved based on consultations with conformity experts. In Phase II, the modified list was used to view archival videos from Kaba and Beran's (2016) study and to observe and code the verbal and non-verbal behaviours of medical and nursing student participants facing pressure to conform to their colleagues. As noted in Chapter 2, Kaba and Beran's (2016) study investigated how medical and nursing students conformed to inaccurate information their colleagues provided while they were taking and reporting vital signs in a simulation lab. These observations helped this study's researcher refine the list to create an instrument of potential conformity behaviours that would be used in Phase III. Finally, in Phase III, the instrument was used to observe and code the behaviours of medical residents and students who were under pressure to conform during real-time simulation sessions at the Rockyview General Hospital (RGH). Simulation sessions are scenario-based activities that use both computer mannequin systems and actors to create a realistic learning situation for medical residents and students.

Conformity research influenced the design of the current study in two ways. First, Kaba and Beran's (2016) research on conformity, which provided the archival videos used in Phase II, was designed as deception research and Phase III of this study was also designed as deception



research. In Kaba and Beran's research, and in Phase III of this research, medical and nursing students were asked to take and report vital signs in a simulation lab. However, the participants were not informed beforehand that they were being observed for conformity or behaviours possibly associated with it. This deception helped to reduce or prevent potential bias in the participants' behaviours. Second, Phase III of this study was observational, rather than experimental in nature, which allowed the participants to demonstrate behaviours that may be similar to real life settings outside of the research context.

Detailed information about each phase will be provided in this chapter including, if applicable, the setting, participants, instruments (i.e., lists), relevant processes undertaken during the research, management of missing data, and so on. Finally, issues involved in conducting deception research in an ethical manner will be presented.

## **Research Approach and Design**

### **Phase I: The Creation and Revision of an Initial List of Potential Conformity Behaviours**

The goal of this phase was to create a comprehensive list of verbal and nonverbal behaviours reported in the literature that could suggest the occurrence of conformity. In collaboration with a librarian, the researcher mapped all the terms that could yield journal articles about conformity behaviours or behaviours related to conformity. The research data bases PsycINFO, MEDLINE, and HaPI were used to search three groups of terms, specifically Group A terms, Group B terms, and Group C terms. Group A terms included the following: *instrument, measure, measurement, or scale*. Group B terms included the following: *conformity, conformity behavior, conformity behaviour, nonconformity, nonconformity behavior, nonconformity behaviour, group dynamic, group behaviour, group behavior, group pressure, group influence, peer pressure, peer influence, agitation behaviour, agitation behavior, anxiety*

*behaviour, or anxiety behavior.* Group C terms included the following words: *verbal communication, non-verbal communication, gestures, facial expressions, postures, or body language.* Of the retrieved studies, only English language and peer-reviewed articles were considered. Alternatively, the exclusion criteria consisted of masters' theses and PhD dissertations, and articles concerning memory conformity, conformity to substance abuse, conformity to any guidelines or programs, gender non-conformity, and articles that focused on specific clinical or non-clinical conditions (e.g., Alzheimer's disease and dementia; mother's anxiety resulting from child separation; and behaviours in children, adolescents, older adults, or the elderly). Appendix A outlines the literature search process and provides more detailed information about the number of articles retrieved and scanned.

After all appropriate articles were reviewed by the researcher, only 20 were found to be useful for extracting potential conformity behaviours. From these 20 articles, 118 behaviours were identified as potentially being associated with conformity. Specifically, any verbal or nonverbal behaviours related to anxiety, social anxiety, conformity, social conformity, peer pressure, and uncertainty were extracted. Then, a list of the 118 behaviours was created. This list was called the Phase I List of 118 Potential Conformity Behaviours (Phase I: LPCB-118) and it was considered to be the first version of the conformity instrument. This list is outlined in Appendix B.

**Modification of the first version of the conformity instrument—the Phase I: LPCB-118 list and creation of the second version of the conformity instrument—the Phase II LPCB-43 list.** Following the creation of the Phase I: LPCB-118 list (i.e., the first version of the conformity instrument), several meetings were held with three academic researchers who had studied conformity for five or more years in the field of medical education (i.e., conformity

experts). As a result of these meetings, the previously extracted 118 potential conformity behaviours were reduced. Behaviours that were judged to be irrelevant (e.g., yawning) or unobservable by a researcher within the context of this study were excluded (e.g., blushing face, increase in blood pressure or heart rate). A total of 43 behaviours remained from which nine related themes emerged—eight non-verbal and one verbal. The eight non-verbal themes were identified as the following: general facial expressions; eye and eyebrows; mouth- and lip-related behaviours; voice quality and vocal behaviours; behaviours related to speaking, head position and movement; body gestures; and body posture. The verbal theme included four verbal behaviours. Specifically, these verbal behaviours had to include verbal statements—otherwise they would be considered as nonverbal. Then, a list of the 43 behaviours was created. This list was called the Phase II List of 43 Potential Conformity Behaviours (Phase II: LPCB-43) and it was considered to be the second version of the conformity instrument. This list is outlined in Appendix C. The 43 behaviours were written as items on a dichotomous behaviour rating scale where behaviours would be judged as being present or not present. This list was followed by a table that outlined a clear and precise definition of each of the 43 behaviours (refer to Appendix C). The list and table were considered as one document that was then used in Phase II to observe potential conformity behaviours in the archival videos.

**Phase I validity evidence.** The process of accumulating validity evidence began in Phase I and continued through Phase II and III of this study. This process focused on the content aspect of validity from Messick's (1989) framework. Accordingly, the content aspect of validity should address the available relevant evidence to ensure the representativeness and quality of all important aspects of the construct. The choice of Messick's framework over Kane's framework

was based on its clarity and practicality in considering validity while creating an instrument and was adopted to discuss content validity through all the phases of this study.

In Phase I, the researcher's efforts to meet the content aspect included careful consideration of the available literature on any verbal or nonverbal behaviours related to anxiety, social anxiety, conformity, social conformity, peer pressure, and uncertainty. This process was done through continuous consultation with the librarian and conformity experts to ensure the use of proper databases, search terms, and for agreement on suitable inclusion and exclusion criteria.

## **Phase II: Coding Behaviours in the Archival Video Recordings**

One hundred and four archival video recordings that were available from Kaba and Beran's (2016) research were analyzed using the Phase II: LPCB-43 list (i.e., the second version of conformity instrument). Kaba and Beran's (2016) study was completed in the W21C simulation facility at the University of Calgary (U of C) but did not employ the use of simulation scenarios. Rather, the simulation lab was utilized to observe participants performing a particular task (i.e., taking vital signs). Each video portrayed one participant (a medical or nursing student) reacting to incorrect vital signs given by three confederates<sup>1</sup> who acted as their colleagues. The purpose of Kaba and Beran's (2016) study was to determine whether participants, after taking their own readings from a medical mannequin, would conform to the confederates' wrong reporting of vital signs. The results showed that both nursing and medical students were likely to conform to one another's incorrect vital signs reports. Specifically, a total of 104 (95%) participants conformed at least once in Kaba and Beran's (2016) study. This study is central to the present research because the archival videos displayed the verbal and nonverbal behaviours of the medical and nursing students when responding to inaccurate information that confederates

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<sup>1</sup> A confederate is an individual who poses as a research participant, but is actually part of the research team.

presented about vital signs. Viewing these videos enabled the researcher to improve the list of potential conformity behaviours to be used in the next phase.

For the purposes of the current study, all 104 archival videos from Kaba and Beran (2016) were observed for behaviours such as facial expressions, eye movements, gestures, and vocalizations that were expressed when participants were conforming to others in the simulation scenario. The participants' conformity status was determined by whether or not they reported an inaccurate vital sign. The Phase II: LPCB-43 list was used to create a coding protocol in Noldus Observer XT software®, which is a software for the collection, analysis, and presentation of observational data. Then, this coding protocol was used to observe and code multiple conformity behaviours, screen by screen, that were observed in the archival videos. The participants' conformity status was not known during the process of coding the behaviours.

**Phase II reliability evidence.** To determine if the coding protocol yielded a consistent scoring of behaviours, it was decided that two raters—the researcher and another rater—would be involved. They used the coding protocol to view and code participants' potential conformity behaviours in Kaba and Beran's (2016) archival videos. Two forms of reliability were examined, inter-rater and intra-rater reliability. Inter-rater reliability will be presented first, followed by intra-rater reliability.

***Inter-rater reliability.*** To reach good inter-rater reliability, it was decided that the researcher and the other rater had to achieve a kappa coefficient of above 0.60 for 21 *consecutive* archival videos (i.e., 20% of the 104 archival videos) (Viera & Garrett, 2005). Whenever an agreement was low or unacceptable for a video (i.e., kappa was below 0.60), the researcher and the other rater recoded that video together and restarted the consecutive count.

To achieve this goal of reaching a kappa coefficient of above 0.60 for 21 consecutive archival videos, the researcher first used the protocol on 10 randomly selected archival videos, each with four different cameras recording each session (i.e., each session had four archival videos that recorded the session from different angles). The researcher checked the video from the first camera as a default choice. Then, she went to the other cameras if the first camera's video did not provide a complete observation (e.g., if the audio was missing or part of the participant's head or body was in the camera's blind spot).

After 10 archival videos were coded, the researcher then randomly chose an additional two archival videos and trained the other rater by coding the two archival videos<sup>2</sup> together. This training allowed the other rater to become familiar with the software and to discuss how to code certain behaviours. Next, the other rater independently coded the previous 10 archival videos that the researcher had coded, and rater agreement was checked. This coding resulted in low inter-rater agreement between the researcher and the other rater (i.e., the kappa co-efficient was below 0.60). Upon re-examining the coding together, and agreeing on how to code behaviours, each rater re-coded the selected 10 archival videos independently. Following this, the kappa co-efficient improved to an acceptable range of 0.71 to 0.93. The 10 videos were not considered in the consecutive count because, at first, they yielded low reliability, which only improved when the researcher and the other rater coded the 10 videos together.

Another 21 archival videos were then randomly selected, and the researcher and the other rater individually viewed and rated them. At this point, the consecutive count was restarted. The aim was to reach an acceptable consecutive inter-rater agreement, which was calculated after each video was rated. Whenever an agreement was low or unacceptable for a video (i.e., kappa

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<sup>2</sup> These two training archival videos were not considered for inter-rater reliability.

was below 0.60), the researcher and the other rater had to recode the video together. Then, they began a new consecutive count, with the aim of reaching consistent acceptable inter-rater agreement for 21 consecutive archival videos. A low agreement occurred four times. Consequently, four more archival videos had to be randomly selected for rating. Then, inter-rater reliability was calculated and the kappa coefficient ranged from 0.61 to 0.97. The last 21 archival videos (i.e., 20% of the archival videos) yielded a continuous acceptable kappa coefficient range. Once rater agreement was established, the researcher continued with coding the remaining 69 archival videos. Figure 2 depicts the process used to determine inter-rater reliability. Table 1 follows and outlines the inter-rater agreement details reached between the researcher and the other rater for all the 35 (10 +21 +4) archival videos used to establish inter-rater reliability.

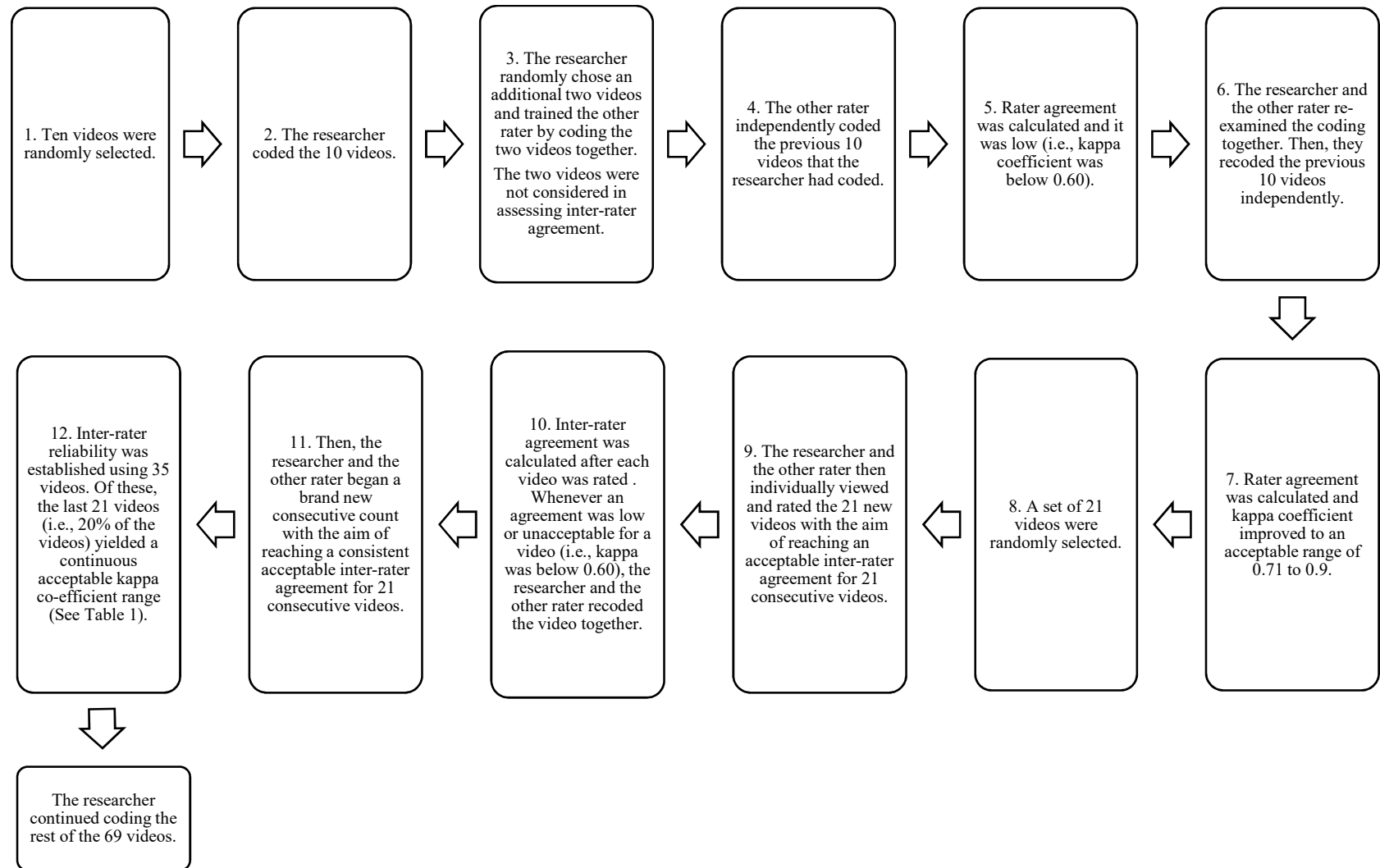


Figure 2. Establishing inter-rater reliability in Phase II



Table 1

*Inter-Rater Agreement in Phase II (Archival Video Recordings)*

Paired ratings of each video	Percentage of agreement	Kappa	95% Confidence interval
1	90.32	0.90	0.79 - 1.01
2	86.96	0.86	0.72 - 1.01
3	72.92	0.71	0.58 - 0.85
4	83.33	0.82	0.67 - 0.98
5	82.05	0.81	0.69 - 0.94
6	72.73	0.72	0.58 - 0.85
7	83.72	0.83	0.71 - 0.95
8	83.33	0.82	0.68 - 0.96
9	93.33	0.93	0.83 - 1.02
10	84.44	0.83	0.72 - 0.95
11	91.84	0.91	0.83 - 0.99
12	97.14	0.97	0.91 - 1.03
13	76.79	0.75	0.63 - 0.87
14	79.41	0.78	0.64 - 0.93
15	77.5	0.77	0.63 - 0.90
16	64.62	0.63	0.51 - 0.75
17	75.68	0.74	0.60 - 0.89
18	76.92	0.76	0.62 - 0.90
19	77.08	0.76	0.63 - 0.88
20	77.78	0.77	0.62 - 0.91
21	76.47	0.76	0.61 - 0.90
22	87.23	0.87	0.77 - 0.97
23	93.75	0.93	0.84 - 1.02
24	86.36	0.86	0.70 - 1.01
25	83.33	0.82	0.69 - 0.95
26	92.11	0.92	0.83 - 1.01
27	95.65	0.95	0.87 - 1.04
28	68.18	0.66	0.54 - 0.78
29	78.95	0.78	0.65 - 0.92
30	77.14	0.76	0.62 - 0.91
31	78.95	0.78	0.64 - 0.91
32	76.92	0.76	0.62 - 0.90
33	72.97	0.72	0.57 - 0.87
34	79.49	0.78	0.65 - 0.92
35	62.71	0.61	0.49 - 0.74

***Intra-rater reliability.*** For intra-rater reliability, each rater randomly selected 10 archival videos out of the previously coded 35 archival videos and re-coded them. The highest reliability coefficient was 0.95 for the researcher and 0.95 for the other rater. The lowest reliability coefficient was 0.71 for the researcher and 0.65 for the other rater.

### **Modification of the second version of the conformity instrument—Phase II: LPCB-43**

**list.** At the end of Phase II, after all the archival videos were coded, the Phase II: LPCB-43 list (i.e., the second version of the conformity instrument) was reviewed and the infrequently observed behaviours of the medical and nursing students (i.e., those behaviours that occurred three percent or less of the time) were excluded from the list. Table 2 lists all of the behaviours that were excluded.

Table 2

#### *Discarded Behaviours that Appeared Infrequently in the Sample*

Behaviours	Frequency of occurrence
Emotionless face (blank)	3
Flashbulb eyes (widening of the eyes)	2
Jaw drops	2
Raises voice	2
Clears throat	2
Speaks first (before instructor ask)	2
Latency in responding to questions or taking decision	2
Shrugs shoulders	2
Keeps hands and arms close to the body	2
Handles things inappropriately	2

Moves away from confederate(s)	4
Asks for help or for additional information about task at hand	4
Complains	2

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### **Creation of the third version of the conformity instrument—Phase III: LPCB-30 list.**

With the creation of the Phase III: LPCB-30 list (i.e., the third version of the conformity instrument), demographic data such as participants' gender and level of education were added, and small formatting changes were made. This list would be used in Phase III to observe the behaviour of the participants during real-life simulation sessions where a conformity prompt occurred. The Phase III LPCB-30 list (i.e., the third version of the conformity instrument) consisted of three sections, as outlined below.

The first section included the demographic characteristics of participants' such as their gender and education status, the simulation case observed, and whether they conformed or not. More detailed information was also noted about the other individuals who attended the simulation sessions as part of the research.

The second section of the Phase III LPCB-30 list (i.e., the third version of the conformity instrument) included 30 behaviours, written as items in a checklist. The items or behaviours were grouped into two categories: (1) nonverbal behaviours and (2) verbal behaviours. The nonverbal behaviours were further divided into seven sub-categories (i.e., head position and movement, general face expression, eye and eyebrows, mouth and lips related, other body behaviours, voice quality and vocal behaviours, and body posture or position). The researcher and the other rater observed the participants' behaviours for their occurrences during the simulation sessions, and marked the list accordingly. Also, the sub-categories had a 'not

applicable' box that was checked if the researcher and the other rater could not observe the behaviours due to any physical obstacles (e.g., could not see the mouth of the participant because s/he was wearing a mask).

The third section provided definitions to clarify each behaviour listed in the second section. This helped the researcher and the other rater to have a mutual understanding of each behaviour to help with consistency in marking them. The Conformity Assessment Instrument Phase III: LPCB-30 list is shown in Appendix D.

**Phase II validity evidence.** The process of accumulating validity evidence continued in Phase II. Through testing Phase II: LPCB-43 list (i.e., the second version of the conformity instrument), Phase II enabled the researcher to start examining her literature-based prediction of the behaviours that was included in the conformity instrument. This examination assisted in learning more about conformity as a construct and resulted in the extraction of behaviours that appeared infrequently in the archival videos. Thus, it contributed to the evidence continuum of establishing content validity and improved the quality of the conformity instrument by refining the included behaviours.

### **Phase III: Real-time Simulation Sessions and Interviews**

**Phase III overview.** Initially in Phase III, the Phase III: LPCB-30 list (i.e., the third version of the conformity instrument) was piloted in 10 simulation sessions<sup>3</sup>, which helped refine the process and procedures for this phase. Thus, Phase III included the following steps: (1) A *pre-briefing session*, which was an introduction that preceded the simulation sessions. This introduction took place in a meeting room equipped with monitors and that allowed viewing of the simulation activity taking place in another room (i.e., the simulation lab). During the pre-

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<sup>3</sup> These 10 sessions were prior to the 19 simulation sessions considered as part of Phase III. So, the 10 participants who were observed during piloting of the instrument were not included as part of this sample.

briefing session, two participants (sometimes only one) from the group of medical residents and students taking part in the internal medicine rotation were chosen to be involved in the simulation. The simulation instructor took these identified participants into the simulation lab, while the rest of the medical residents and students remained in the meeting room to observe a live broadcast from cameras that transmitted the activities in the simulation lab to a monitor in the meeting room simultaneously. This process is explained further in the section titled *Piloting the third version of the conformity instrument—the Phase III: LPCB-30 list*. This process, thus, restricted the researcher from using the same scenario with all of the participants because those not actively participating in the simulation session would have already watched the simulation from the meeting room and would be aware of the right diagnosis or decision for that scenario.

(2) These pre-briefing sessions were followed by the *simulation sessions* that occurred in the simulation lab, which was set up to look like an emergency room (ER). This room included a mannequin lying in a bed whereby the mannequin was treated as a patient during a simulation session. As noted earlier, the simulation lab was also equipped with cameras that recorded the activities and allowed the individuals in the meeting room to simultaneously observe. (3) After the simulation session ended, the instructor conducted a *simulation debriefing* to ensure that the simulation learning objectives were achieved and to explore the participants' perspectives about the simulation sessions. (4) Following this, a *research debriefing* took place where participants were informed about the true nature and aim of the current research. (5) Finally, the researcher and the other rater conducted interviews with the participants they had individually observed in the simulation sessions, to explore the phenomenon of conformity. Figure 3 outlines the steps in this phase.



*Figure 3. Steps in Phase III: real-time simulation sessions and interviews.*

The next section will discuss the participants who took part in Phase III of this study, followed by the process and procedures, including the steps and the instruments used.

**Phase III participants.** A convenience sample of 30 participants was obtained from residents and medical students who were participating in the RGH Internal Medicine Simulation Program. Most of the participants in the simulation sessions observed during this phase were medical residents ( $n = 20$ , 66.70%) and 10 (33%) were medical students. In addition, most of the participants from the group of medical residents and students participated in the simulation sessions together as a team ( $n = 16$ , 53.33%).

All medical residents had obtained a medical degree and were in their first year of residency (PGY 1). They came from various specialties and were undergoing one to two months of required training in general internal medicine at RGH. The medical students who participated in the simulation sessions were completing their mandatory internal medicine rotation. They were in the third year of studying medicine at the U of C and were in the beginning stages of their clinical rotations. Medical residents and medical students were chosen because they are more susceptible to conforming to more senior medical professionals due to the influence of hierarchy and their level of experience.

The 30 participants for this research phase came from various groups of medical residents and students who were attending the general internal rotation together. This means a different group of medical residents and students attended the general internal medicine rotation, each attended for a period of one to two months. Since the simulation sessions in Phase III took place over a period of eight months, the participants came from various groups. In addition, most of

the participants were male ( $n = 17$ , 56.70%). In 14 out of 19 simulation sessions (73.68%), the *observed* team consisted of a resident and a medical student. Table 4 on page 68 provides a detailed outline of the distribution of participants in the sessions.

**Phase III process and procedures.** The simulation sessions were conducted as part of the RGH Internal Medicine Simulation Program in Calgary, Alberta, Canada, and took place at the simulation lab there. This program provides scenario-based education for healthcare providers by using both computer mannequin systems and simulation confederates<sup>4</sup>, who were actually medical personnel posing as their real selves or other medical professionals, as needed. These medical personnel also served as the research confederates<sup>5</sup> in Phase III. The aim of the RGH Internal Medicine Simulation Program is to create a realistic learning situation to achieve the following learning outcomes: the development of clinical knowledge and skills, teamwork, communication skills, and crisis resource management (Alberta Health Services, 2016).

The following sections will outline the steps in the Phase III process.

***Piloting the third version of the conformity instrument—the Phase III: LPCB-30 list.***

Initially, in Phase III, the Phase III: LPCB-30 list (i.e., the third version of the conformity instrument) was piloted with two types of simulation sessions; eight standardized and two unstandardized simulation sessions. In standardized sessions, a clear plan of the clinical case and the sequence of correct steps that participants should follow in managing the case was created a priori. In unstandardized sessions, the clinical instructor was able to freely change the situation

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<sup>4</sup> A simulation confederate was an individual who participated in the simulation session to aid in achieving the desired learning experience. Usually, this individual had a specific role to play; for example, this person acted as a nurse or as a concerned relative of the patient.

<sup>5</sup> A Phase III research confederate was an individual who was aware of the real purpose of the current study, but s/he was not allowed to share this awareness with participants. Furthermore, s/he was asked to be cautious and not to express her/his real opinion or concern, so as not to influence the participants' decisions.

(e.g., to create a complication in the patient), in response to a participant's behaviour in the simulation scenario. Based on the pilot phase, it was determined that conformity behaviours were easier to monitor in the standardized rather than unstandardized scenarios. Consequently, it was decided to use standardized simulation sessions in Phase III to observe potential conformity behaviours in medical residents and students.

Next, the program director of the Internal Medicine Simulation Program at RGH selected four standardized clinical scenarios that were already used in the RGH simulation program and modified them to include a conformity prompt (i.e., information that is medically correct but not necessarily accurate in the particular situation). These scenarios allowed us to observe participants' conformity behaviors while not jeopardizing the educational purpose of the simulation. The four clinical scenarios selected were expected to stimulate the occurrence of conformity based on an assumed underlying feeling most people would have. In the coming paragraphs, the four scenarios will be explained in more details in respect to their sequence of presentation to each group of participants:

1. Diabetic Ketoacidosis (DKA) was a scenario wherein learners were required to assess and treat a patient with uncontrolled Diabetes Mellitus and to differentiate between DKA and a Hyperosmolar Hyperglycemic State (HHS). Though the correct diagnosis for this case was DKA, the first confederate (i.e., an ER doctor or a senior internal medicine physician) arrived to the simulation lab and request a summary of the assessment of the patient that s/he was consulted on earlier for HHS. This statement was the conformity prompt to indicate that the confederate thought that the diagnosis of the case was HHS. By the end of the scenario, the registered nurse (RN) (i.e., the second confederate) asked the participants to announce their final diagnosis so she



could complete the patient's file. Lack of knowledge and experience were expected to stimulate the occurrence of conformity in this scenario.

2. Pneumonia was a scenario wherein learners had to assess and treat a patient with community acquired pneumonia (CAP). During this scenario, the ER doctor or senior internal medicine physician (i.e., the first confederate) stepped in for consultation and stated that s/he thought the diagnosis for the case was CAP; thus, s/he asked why isolation was needed. In response to whatever answer the participants gave, the ER doctor or senior internal medicine physician stated that the most common pathogen was streptococcus pneumonia. Then, s/he clearly pointed out that isolation was not required in this situation; in fact, it was a waste of much needed resources. This statement was the conformity prompt and indicated that the confederate (i.e., the ER doctor or senior internal medicine physician) thought that the participants should not follow the isolation protocol. This prompt was not aligned with standard procedure, which is to initiate contact and droplet isolation pending the results of the microbiologic cultures and viral swabs. After the first confederate left the simulation lab, the RN (i.e., the second confederate) began removing her isolation gear. This act served as an enforcing action for the prompt that the first confederate presented. Once again, lack of knowledge and experience were suspected to influence informational conformity.

3. Upper Gastrointestinal Bleeding (UGIB) was a scenario wherein learners were asked to assess and manage a patient with UGIB. The patient presented with hypovolemic shock, did not respond to resuscitation with IVF, and required a blood transfusion. Upon acquiring the patient's consent to proceed with the blood transfusion, the RN revealed a pocket card that the patient had signed and dated in 2005 that stated that the patient requested no blood transfusions. The ER doctor or senior internal medicine physician (i.e., the first confederate) then stepped in for

consultation while the team was still assessing the patient. Though standard and ethical procedure requires respecting the patient's autonomy and decision not to receive blood, the confederate stated that, as a physician, his/her experience and belief dictated a focus on saving lives. The confederate then shared that s/he had encountered other cases such as this one wherein s/he had saved a patient's life and the patient was subsequently grateful. By the end of the scenario, the RN (i.e., the second confederate) asked if she should trigger the massive transfusion protocol. In this scenario, the participants' feelings for the need to belong and to align with the ethics of the ER physician in saving lives were expected to stimulate the occurrence of conformity.

4. C. Difficile Colitis was a scenario wherein learners were required to assess and treat a patient with sepsis that was caused by C. Difficile Colitis. At a certain point in the scenario, the participants' actual preceptor (i.e., the first confederate) arrived in the simulation lab to provide consultation on the patient's case. At this point, the preceptor proceeded to point out his/her familiarity with the patient and that the preceptor had seen the patient last week with urosepsis. Then, the preceptor announced that s/he would be completing the participants' evaluation forms that week, and that the participants were doing well and would not face issues with passing the block. Before leaving, the preceptor stated that the participants needed to take care of this patient with recurrent urosepsis. This statement suggested that the preceptor thought that the correct diagnosis was recurrent urosepsis, and it served as the conformity prompt in this scenario. Here, the fear of evaluation and hierarchy were suspected to stimulate the occurrence of conformity. By the end of the scenario, the RN (i.e., the second confederate) asked the participants to announce their admission diagnosis, as she needed to report it to the unit.

Table 3 provides a summary of each scenario and clarifies each one's conformity prompts, correct diagnosis/decision, suspected reasons for conformity, and confederate roles.

Table 3

*Summary of Simulation Scenarios in Phase III*

The simulation scenario	Summary of the scenario	Conformity prompt	Correct diagnosis / action	Suspected reason to conformity if it occurred	Delivered By	Enforced By
Diabetic Ketoacidosis (DKA)	Participant(s) must assess a patient with uncontrolled diabetes mellitus DM.	The confederate would request a summary of the assessment of the patient that s/he was consulted on earlier for HHS. I.e., this statement indicated that s/he thought it was an HHS case.	DKA	Lack of knowledge or experience.	ER doctor or Senior internal medicine physician	Not applicable (NA)
Pneumonia	Participant(s) must assess a patient with a febrile illness and cough.	The confederate would state that “isolation was not required in this situation.”	Keep isolation gear and ask the RN to put her gear on.	Lack of knowledge or experience.	ER doctor or Senior internal medicine physician	Registered nurse (RN). would remove her isolation gear.
Upper Gastrointestinal Bleeding (UGIB)	Participants(s) must assess a patient in hypovolemic shock caused by upper gastrointestinal bleeding.	The confederate would state “My experience and my beliefs as a physician dictate focusing on saving lives and personally I have had three cases similar to this situation when the patient later thanked me for just doing that. I had to save their life and give blood. I really think we have to do the right thing for the patient and decide like emergency room physicians who save lives.”	Not to give blood against the patient wish.	The presentation of peer pressure to belong was expected to stimulate the occurrence of conformity in this situation.	ER doctor or Senior internal medicine physician	NA
C. Difficile Colitis	Participant(s) must assess a patient in a septic shock caused by severe and complicated C. Difficile Colitis	The confederate would bring to the attention of the participant that s/he would be completing their evaluation form this week. Then, before leaving, s/he would suggest that they take care of this patient with recurrent urosepsis.	C. Difficile Colitis	Fear of evaluation.	Senior internal medicine physician who was the participant’s preceptor.	NA

Since both the researcher and the other rater were going to be observing the simulation sessions, and neither had a strong clinical background, the director of the RGH's Internal Medicine Simulation Program (who was also the simulation instructor in all the scenarios selected for this study), created a decision map to assist them in understanding all four scenarios and the decisions that could result from each scenario. Appendix G was created by the simulation instructor and was provided to the researcher and the other rater before they started attending simulation sessions. It provides extensive details about the cases including the scripts followed by the confederates and the decision maps for each simulation scenario included in Phase III of this study. Nevertheless, minor modifications occurred when they were used in real-life simulation sessions.

Throughout this piloting period, continuous discussions took place between the researcher, the other rater, the simulation instructor, and the same conformity experts from the previous phases, regarding procedural details of Phase III. From these discussions, it was decided that an introductory clinical scenario for each group of new medical residents and students in the block would be a case where no conformity prompt took place. This decision was made as some of the medical residents and students were being introduced to simulation for the first time. Consequently, it was determined that they might feel anxious about the simulation process, which could then lead to displaying behaviours not actually related to conformity. Thus, practicing in this first case was meant to help the medical residents and students establish familiarity with the simulation teaching modality and environment. It also helped introduce them to the ground rules for the simulation sessions.

In addition to the medical residents and student taking part in each simulation session, two confederates were also present. One was a registered nurse (RN) who acted as a nurse and was

part of the regular simulation activity. She was aware of the research and was instructed not to interfere with the participants as she would normally do so she would not influence their decisions. The second was a senior medical professional (i.e., ER doctor or IM doctor) who acted as a senior medical professional—this person promoted conformity by giving the conformity prompt during a simulation session and was aware of the research.

The discussions between the researcher, the other rater, the director of the RGH's Internal Medicine Simulation Program, and the conformity experts yielded agreement on the following issues for the Phase III study:

1. The researcher and the other rater would attend the pre-briefing, simulation, and debriefing for all 19 simulation sessions.
2. During the simulation session, the researcher and the other rater would not record the frequency of the occurrence of potential conformity behaviours displayed by the medical residents and students. Rather, they would observe and mark the presence or absence of each behaviour.
3. The starting point of observing behaviours was when the conformity prompt occurred as part of the scripted scenario. The end point of coding behaviours during a simulation session was when the session was announced as complete by the simulation instructor.
4. Finally, the simulation, simulation debriefing, and research debriefing sessions would be videotaped. The videotapes would be used to check the occurrence of behaviours observed in the simulation sessions and to make any needed revisions about the participants' reasons or mental framework that led to their decisions or actions.

After the Phase III piloting step, the next steps in the Phase III process were undertaken, which are outlined in the following sections.

***Pre-briefing.*** A pre-briefing session always preceded a simulation session. The pre-briefing process explained in this section adhered to Rudolph, Raemer, and Simon's (2014) recommendations for establishing a safe and engaging learning environment during simulation. During the pre-briefing session, the simulation instructor would meet with the complete group of medical residents and students who were undertaking training in general internal medicine for a one to two-month period. This pre-briefing ensured that the medical residents and students were introduced to the simulation environment, the logistical details of the activity, and all the individuals who would be present in the simulation lab during the simulation activity. These individuals included the instructor facilitating the simulation, a nurse posing as herself (the first confederate), and the senior medical professional (the second confederate who would only be present as scripted). The researcher and the other rater were also introduced to the participants in a standard manner that did not reveal the real purpose of this research. It was specifically stated that the researcher and the other rater would not be judging the participants' clinical skills. The following quote is an example of how the simulation instructor introduced the researcher and the other rater during the pre-briefing:

NS and NK are Ph.D. candidates in medical education at the University of Calgary. They are interested in simulation-based medical education. They are going to attend and observe both the simulation sessions as well as the debriefing. They will be taking notes. They don't have a medical/clinical background so they will not judge your clinical skills.

Prior to each simulation session, the researcher and the other rater determined who would observe either the medical student or the resident in each scenario. Participants were unaware of who (i.e., the research or the other rater), specifically, was observing them.

During the pre-briefing step, the goal of the simulation and the role of the simulation instructor were clarified in detail. The main goal of simulation was emphasized as learning and sharing feedback, and not to test or evaluate participants. It was further explained that the role of the simulation educator was to act as a facilitator who would encourage reflective feedback and assure safety measures in the simulation environment. Furthermore, the basic assumptions and expectations for the simulation instructor, confederates, and participants involved in the simulation activity were explained. For example, one assumption was that participants were well trained and that they would do their best to solve the clinical problem they would be facing. An expectation was that the simulation instructor and the confederates would respect the medical residents' and students' concerns and ensure that they were psychologically safe. Another expectation was that the simulation instructor would clarify the components of fidelity (physical, conceptual, and emotional), and the simulation instructor invited learners to do their best to accept the limitations of the simulation setting.

Then, two participants (sometimes only one) from the group of medical residents and students, were chosen to participate in the simulation session. The simulation instructor then took these one or two participants into the simulation lab, while the rest of the medical residents and students remained in the pre-briefing room to observe. In total, the following individuals were present in the simulation lab as part of a simulation session: the simulation instructor, the participants being observed for this study (i.e., a medical resident and/or a medical student), the RN (a confederate), the ER doctor or senior internal medical physician (a second confederate who would only be present as scripted), the researcher, and the other rater. After establishing inter-rater reliability, the two participants chosen to undergo the simulation session were observed. This choice was made due to the limited time available for conducting the study.



Table 4 provides details about the participants (i.e., medical residents and students) who were observed in each of the simulation sessions.

In all of these sessions, the confederates who provided a suggestion of the conformity prompt as part of the simulation scenario were male and they presented themselves as an emergency (ER) doctor ( $n = 21$ , 70%), preceptor ( $n = 6$ , 20%) or senior IM doctor ( $n = 3$ , 10%).

Table 4

*Team Members Observed in the Simulation Sessions ( $n = 19$  sessions)*

Team members present in each simulation session	# of simulation sessions observed	% of simulation sessions observed	# of team members observed
One medical resident and one medical student	6	31.58	6 medical residents were observed for the purpose of establishing inter-rater reliability. (Inter-rater reliability for Phase III will be explained in the next section. (6 sessions x 1 participant per session = 6; the medical students were not observed).
One medical resident and one medical student	8	42.10	A total of 16 participants were observed (8 sessions x 2 participants per session = 16).
Two medical residents	2	10.53	A total of 4 participants were observed (2 sessions x 2 participants per session = 4).
Two medical students	1	5.26	A total of 2 participants were observed (1 session x 2 participants per session = 2).
One medical resident	2	10.53	A total of 2 participants were observed (2 sessions x 1 participant per session = 2).
Total	19 Sessions	100	30 participants.

Finally, as part of the regulations of the RGH Internal Medicine Simulation Program, the simulation and debriefing sessions were video-recorded for the purpose of obtaining feedback and ensuring program quality. The participants were notified that they would be recorded and

were required to sign a consent form, agreeing to the video recording of the simulation sessions and debriefing sessions. This consent was signed as a routine procedure for participating in the RGH Internal Medicine Simulation Program and it did not declare the purpose of the current research. Later in the process, the participants were asked to sign another consent form agreeing to take part in the current research. Further details about obtaining consent for this study will be presented under the section titled *research debriefing sessions*.

***Simulation sessions.*** During the simulation sessions, the medical residents and medical students took part in one of the four previously modified simulation scenarios (i.e., DKA, pneumonia, UGIB, and C. Difficile Colitis), which are outlined in Appendix G. These participants were required, at a pre-determined time, to make a decision about patient care after a conformity-prompt took place. During a session, the researcher and the other rater observed the behaviour of the medical resident(s) and/or student in response to a conformity prompt, and used the conformity assessment instrument (i.e., Phase III: LPCB-30 list) to record potential conformity behaviours. The decision about whether to mark a participant as conforming or not conforming was made later, after the researcher, the other rater, and the simulation instructor met to review and discuss the simulation and debriefing session. Also, the videotapes would be used by the researcher and the other rater to re-check the occurrence of behaviours observed in the simulation sessions and commit for a final recording. This re-check was done for each participant before data analysis took place.

The four simulation scenarios (cases) that were selected for this research were used several times (i.e., 19 total) for the scenario (i.e., with the 30 total participants), but every time a participant was included, it was a unique experience for her/him. DKA vs. HHS ( $n = 7$ , 23.30%), pneumonia ( $n = 8$ , 26.70%), UGIB ( $n = 7$ , 23.30%) and C. Difficile Colitis ( $n = 8$ , 26.70%).

Two debriefing sessions took place after the simulation session: the simulation debriefing, and the research debriefing, which are explained below.

***Simulation debriefing sessions.*** Following the simulation session, everyone present in the simulation lab rejoined their colleagues in the meeting room that contained the monitors. At that time, the simulation instructor led an interactive discussion to ensure that the learning objectives of the simulation activity were met. The simulation instructor also explored the participants' mental frameworks or perspectives, in order to elucidate what may have led participants to conform or not conform. As the researcher and the other rater were in attendance, they recorded the participants' reasons for conforming or not conforming. Later on, (after the research debriefing session and the participant interviews), the researcher and the other rater met with the simulation instructor to review what the participants had said in the simulation sessions and their stated reasons for conforming or not conforming. Then, all three discussed and came to a consensus on each participant's conformity status. This discussion took place because although the simulation cases were previously selected and explained, the researcher and other rater lacked the medical context of the cases. Consequentially, while observing, assessing and then scoring the occurrence of behaviours during the simulation sessions, both the researcher and the other rater were not aware of the final conformity status of the participants. If there was disagreement about a participant's conformity status or about what a participant had done or said in the simulation or debriefing sessions, the videos were reviewed and final decisions were made.

***Research debriefing sessions.*** After the simulation debriefing, the researcher and the other rater each independently conducted a second debriefing session with the participant that each had observed. During this second debriefing session, the researcher and the other rater individually explained the study and its purpose to the participant. They then individually asked

the participant for consent to include her/his data in the study. This consent was not obtained earlier, before the simulation sessions, because informing the participants of the purpose of the research in advance of observing their behaviours would likely have altered their behaviours. However, it was completed as soon as possible after the observations and debriefing, in accordance with ethical guidelines. The consent form can be viewed in Appendix F. Following the signing of the consent form, the researcher and the other rater individually conducted brief interviews with each of their participants.

**Interviews.** The interviews included a total of five questions. The first question asked was, *“Have you heard about this research from other colleagues? If yes, what do you know about this research?”* The aim of the first question was to ensure that participants had not heard about the study, which would have biased their behaviours in the simulation sessions. In the second question, participants were asked, *“During the session, a confederate suggested inaccurate information. Was the situation realistic?”* The aim of the second question was to check the validity of Phase III scenarios and design. Participants were then asked the third question: *“If changes occurred in your patient’s condition, but another health professional did not agree with you, how would you deal with that? Would that differ if s/he were your colleague rather than your senior/consultant?”* The aim of the third question was to explore participants’ views or perceptions about the influence of hierarchy in making decisions regarding patient care and dealing with conflict. Then, the fourth question was asked, *“Have you ever felt pressure to conform to the answers/decisions of the majority of health professionals in other sessions or in real life?”* The goal of the fourth question was to explore the occurrence of conformity in real life clinical situations, outside simulation. The fifth and final question was, *“Do you find it more difficult or easier to express your opinions regarding patient conditions to other health*

*professionals when you are working in a cohesive group with whom you have developed trusting working relationships, even if what you know about your patient may be in opposition to the opinions of your colleagues?”* The aim of this last question was to examine the influence of group cohesiveness on expressing differing opinions when a conflict occurs.

**Phase III reliability evidence.** During Phase III of the research, reliability evidence was considered on two levels: inter-rater reliability—agreement between the researcher and the other rater, and intra-rater reliability—the consistency of each rater in comparison to her/himself.

***Inter-rater reliability.*** Inter-rater agreement was calculated for six participants (i.e., 20% of the total sample). These participants were observed during the first six simulation sessions. During each of these six sessions, although two individuals (i.e., one medical resident and one medical student) actively participated in them, the researcher and the other rater observed the medical resident only for the occurrence of potential conformity behaviours. Agreement between the two (i.e., the researcher and the other rater) was assessed using the kappa coefficient. An acceptable kappa coefficient was reached (i.e., the kappa coefficient ranged from 0.65 to 0.79) after the researcher and the other rater had consecutively observed the medical residents in the first six simulation sessions. Next, the researcher and the other rater separately observed the medical residents and medical students partaking in the rest of the simulation sessions. For instance, if the researcher was observing a medical resident, then the other rater would observe the medical student in a simulation session.

***Intra-rater reliability.*** After observing and marking the potential conformity behaviours of the Phase III participants (i.e., all 30 medical residents and students), the researcher selected at random the simulation videos of six participants she had previously observed (i.e., six participants are 20% of the total sample). The other rater also randomly chose simulation videos

for six participants that she had previously observed. Then, the researcher and the other rater re-observed and re-scored the potential conformity behaviours using the Phase III- LCPB-30 list. After watching each video, the kappa coefficient was calculated and found to be always greater than or equal to 0.60. The highest reliability coefficient was 0.80 for the researcher and 0.81 for the other rater, while the lowest was 0.67 for the researcher and 0.67 for the other rater.

**Phase III validity evidence.** As previously mentioned, the process of accumulating validity evidence was carried on in Phase III of this study. Phase III started with piloting the third version of the conformity instrument (i.e., Phase III: LPCB-30). This piloting resulted in improving the instruments' usability in real-time simulations. In addition, Phase III tested the third version of the conformity instrument (i.e., Phase III: LPCB-30) with a different sample. This testing enabled the researcher to continue checking her prediction of the behaviours that could represent conformity.

### **Phase I, II, and III Data Analysis**

Phase I did not require data analysis as it mainly consisted of establishing a list of potential conformity behaviours (i.e., the Phase I: LPCB-118 list) based on an extensive literature review. Then, this list was improved based on consultations with conformity experts and converted into the Phase II: LPCB-43 list. Thus, data analysis will be discussed below for Phases II and III only.

Before analyzing the data from Phase II, the demographic characteristics of Kaba and Beran's (2016) sample were reported. Then, to address the first research question about the types of conformity behaviours that could be observed among nursing and medical students, the data collected in Phase II were analyzed as follows: first, the participants' potential conformity behaviours were labeled and summarized as frequency counts and percentages (i.e., the type and

number of times each behaviour occurred). Next, skewness and kurtosis for observed behaviours were calculated to explore if the data were normally distributed. This exploration led to the use of Kruskal-Wallis to compare the occurrence of behaviours among three groups of participants (i.e., the participants who did not conform, the participants who conformed once or twice by providing wrong vital signs once or twice, and the participants' who conformed three or four times by providing wrong vital signs three or four times).

Similarly, this analysis process was followed in Phase III to examine potential conformity behaviours that medical residents and medical students displayed when presented with a conformity prompt (i.e., an incorrect suggestion from a senior medical professional). Thus, the participants' potential conformity behaviours were labeled and summarized as frequency counts and percentages (i.e., the type and number of times each behaviour occurred). Next, skewness and kurtosis for the behaviours observed in Phase III were calculated to explore if the data were normally distributed. This exploration subsequently led to the use of Fisher's exact test to compare the occurrence of behaviours between male and female participants. This test was also used to compare the occurrence of behaviours between medical residents and medical students. The Mann-Whitney U test was used to examine the differences in behaviours that occurred among medical residents and medical students. Furthermore, Cronbach's alpha was calculated to examine the internal consistency of the behaviours included in the third version of the conformity instrument (Phase III: LPCB-30). This calculation led to pinpointing behaviours that should be removed to increase the reliability of the collected data.

To address the second research question (i.e., whether conformity is a uni-dimensional or multi-dimensional construct), a principal component analysis (PCA) was conducted to determine if the behaviours listed on the second version of the conformity instrument (i.e., Phase II: LCPB-

43 list) and the third version of the conformity instrument (i.e., Phase III: LCPB-30 list) created one or multiple dimensions.

Although the interview questions did not directly answer a research question, they helped the researcher to gain a deeper understanding into participants' views about conformity. To analyze participants' answers to these interview questions, the researcher applied Lockyer, Hofmeister, Crutcher, Klein, and Fidler's (2007) procedure, as follows. The researcher converted all 30 voice-recorded interviews into written transcripts. Then, the researcher and the other rater chose the first three interview transcripts, independently became familiar with the information in them, and identified topics or themes that the participants had raised. Next, the researcher and the other rater met to compare and discuss their observations and notes, and to construct an initial open-coding structure with codes and sub-codes. Then, the researcher used the coding structure to code the next seven transcripts and modified the coding structure to reflect any new topics that emerged from these transcripts. Following this step, the other rater used this updated coding structure to re-code the previous ten transcripts that had been assessed to verify the clarity, interpretability, and completeness of the initial coding. Subsequently, to further ensure the clarity and interpretability, the complete list of codes was reviewed with two content experts who were familiar with the aim of the current research. The experts suggested some ways to improve the coding structure. These suggestions included rewording and rearranging some parts of the coding structure.

Following the meeting with the content experts, the researcher used the improved coding structure to code the remaining 20 transcripts. Once again, the researcher continued building on the coding structure to include any emerging topics. After the open coding was completed, the researcher proceeded with axial coding that focused on answering the interview questions. The



data were compared and contrasted within and among categories, and categories were refined to determine the central themes. Then, the researcher and the other rater discussed the categories and the emerging central themes related to conformity. As a final stage in the process, the researcher and the other rater met with the previous two content experts to discuss and finalize the themes.

### **Phase II and III Data Management**

In Phase II, the archival videos from Kaba and Beran's (2016) study were handled in compliance with the regulations of the W21C and the U of C's Conjoint Health Research Ethics Board (CHREB). Consequently, to meet those regulations, the video files remained in the W21C at all times. The researcher stored a copy of the codes generated from the video files onto a separate flash drive that was secured in a locked briefcase stored in a locked cabinet in the home of the researcher. This flash drive will be destroyed five years after the researcher's PhD defense date.

In Phase III, the simulation instructor converted the simulation and debriefing session recordings from the camera into videos on CDs, and erased the original recordings on the camera. The requirements of the ethical approval granted by the CHREB at the U of C and RGH's Internal Medicine Simulation Program were followed. Thus, the CDs were kept in a locked cabinet in the RGH simulation lab and will be destroyed by the simulation program director five years after the researcher's defense date. Until then, the CDs will be stored in the simulation lab in a locked filing cabinet, accessible only to the director of the Internal Medicine Simulation Program.

**Managing missing data.** In Phase II (i.e., coding behaviours in the archival video recordings), five archival videos out of 104 (4.8%) were considered as missing data because

either the video was damaged or the participant was standing in the camera's blind spot. In Phase III (i.e., the real-time simulation sessions), missing data occurred when the behaviours could not be observed because the researcher or the other rater could not see the participant completely (e.g., if a face was covered with a mask due to standard isolation practice or a participant's feet were not visible because of her/his position in the room). Behaviours that could not be observed due to the nature of the simulation scenario (i.e., missing behaviours) were coded as 99 in SPSS. Missing behaviours were coded 14 times during Phase III, which represent (3.16%) of all the behaviours observed during this phase.

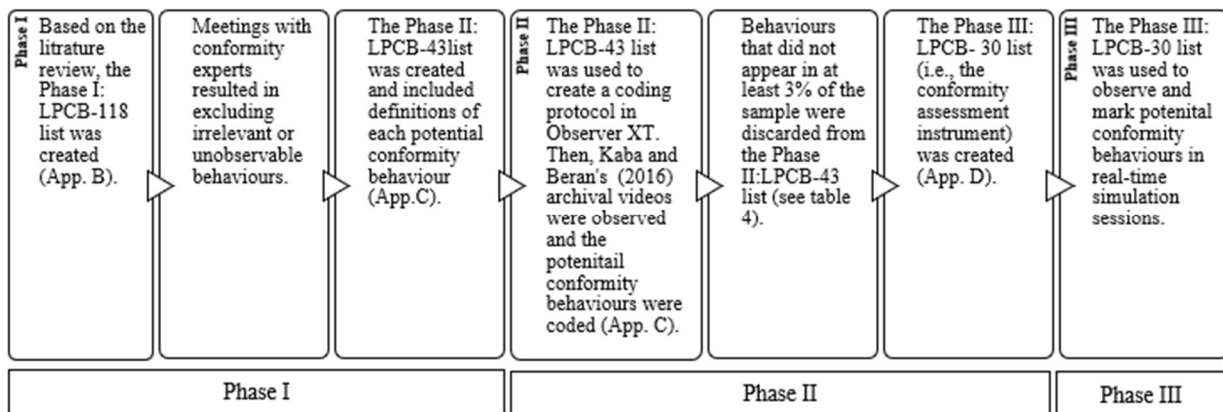
### **Ethical Considerations for the Study**

The U of C's CHREB approved this study. This approval covered accessing Kaba and Beran's (2016) archival videos in Phase II, and the collection of data in Phase III at RGH. According to the U of C's Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, Phase III of this research (i.e., coding data in real-life simulation sessions) was considered to be a deception study. Thus, it was not possible to secure informed consent from the study participants before the data was collected. According to Standard 8.07 in the ethics code for psychologists, deception is permitted in a study if "it is determined that the use of deceptive techniques is justified by the study's significant prospective scientific, educational, or applied value..." (APA, 2013, p. 233; CPA, 2010). As specified in the code, the CHREB agreed that the deception in this study was not likely to cause any physical pain or severe emotional distress to the participants. Moreover, the purpose and design of the experiment were revealed to participants immediately after the simulation debriefing was completed. The researcher and the other rater also answered all of the participants' questions to ensure full understanding of the research. Additionally, every attempt was made to ensure that the participants did not have any

remaining concerns about their experience as participants in the research and simulation activities.

## Chapter Four: Results

The current study proceeded in three phases. Phase I resulted in the creation of an initial list of potential conformity behaviours (i.e., the Phase I: LPCB-118 list, which was the first version of the conformity instrument). This list included 118 potential conformity behaviours that were extracted from the literature (Appendix B). Then, this instrument was revised and modified with conformity experts to create the second version of the conformity instrument (i.e., the Phase II: LPCB-43 list). Later, the Phase II: LPCB-43 list was converted to a coding protocol that was used in Phase II to observe the behaviours of participants in archival videos from Kaba and Beran's (2016) study (Appendix C). Afterwards, the Phase II: LPCB-43 list (i.e., the second version of the conformity instrument) was modified, improved, and converted into the third version of the conformity instrument (i.e., the Phase III: LPCB-30 list). This list was then used to observe the potential conformity behaviours of participants in real-time simulation sessions in Phase III (Appendix D). Figure 4 summarizes the development of the conformity instrument through all the three phases of this study.



*Figure 4.* Summary of the development of the conformity instrument

Since Phase I did not require any data analysis, the following paragraphs will present the results of Phase II and III of this study. For each of these two phases, the following information

is presented: the demographic characteristics of the samples, the descriptive results of the measured variables, and the results that were yielded for each of the research questions. Specifically, to answer the first research question, verbal and nonverbal behaviours representing conformity among medical and nursing students from the archival video recordings are identified, together with the conformity behaviours among medical residents and students in real-time simulation. Then, to answer the second research question, the dimensionality of the conformity construct is also examined below. Next, the results of Phase III are discussed by presenting the secondary results that resulted from observations made during the simulation debriefing sessions, research debriefing sessions, and interviews.

## **Phase II (Coding Behaviours in the Archival Video Recordings)**

**Demographic characteristics of the sample.** In Phase II of this study, archival videos from Kaba and Beran's (2016) conformity study were observed. This section presents a description of the behaviours of Kaba and Beran's (2016) participants, who were observed in the archival videos in this phase. A total of 99 of these videos were coded to examine behaviours that occurred while a participant was exposed to inaccurate information (i.e., incorrect reporting of the vital signs). Most of these students were female ( $n = 65$ , 62.5%), and enrolled in medicine ( $n = 61$ , 58.7%), followed by nursing ( $n = 43$ , 41.3%). In addition, the majority of students were in the third year of their program ( $n = 62$ , 62.6%), followed by those in their second year ( $n = 37$ , 37.4%). The mean age of participants was 29.94 ( $SD = 4.82$ ) - within a range of 23 years to 51 years.

**Descriptive data.** This first section reports the frequency counts of the behaviours that occurred in the archival videos from Kaba and Beran's (2016) study. Participants were credited for the occurrence of a behaviour once during the archival video through the use of a coding

protocol based on the second version of the conformity instrument (i.e., the Phase II: LPCB-43 list). Afterwards, the number of times that each behaviour occurred while participants were exposed to inaccurate information was calculated. A behaviour that did not appear in at least 3% of the sample was discarded from the next version of the conformity instrument (i.e., the Phase III: LPCB-30 list). Consequently, a total of 13 behaviours were removed. This step was done to increase the sensitivity of the conformity instrument, as those behaviours not appearing in at least 3% of the sample would not aid in differentiating between conforming and non-conforming individuals. Furthermore, these behaviours were not considered when conducting the analysis of this phase. Table 5 outlines the frequency of the behaviours observed in the archival videos. The removed behaviours are shown in boldface.

Table 5

*Frequency of Each Behaviour Observed in Kaba and Beran's (2016) Archival Video Recordings*

Behaviour	Frequency	Valid %	Frequency	Valid %
	Appeared	Appeared	Did not appear	Did not appear
<b>Nonverbal behaviours</b>				
1. Angry or disapproving face	23	23.20	76	76.80
2. Cannot remember or tries to remember face	19	19.20	80	80.80
3. Emotionless face (blank)	2	2.00	97	<b>98.00</b>
4. Sneaks glances to others	75	75.80	24	24.20
5. Gazes or glances up or down	92	92.90	72	72.70
6. Flashbulb eyes (widening the eyes)	1	1.00	98	<b>99.00</b>
7. Blinks excessively	27	27.30	72	72.70
8. Lateral eye movement (CLEM)	9	9.10	90	90.90

9. Lowers or knits eyebrows	30	30.30	69	69.70
10. Raises eyebrows	19	12.20	80	80.80
11. Smiles in an embarrassed way or fake smiling	43	43.40	56	56.60
12. Jaw drops	1	1.00	98	<b>99.00</b>
13. Compresses or purses lips	38	38.40	61	61.60
14. Normal or confident volume	65	65.70	34	34.30
15. Lowers voice or whispers	20	20.20	79	79.80
16. Raises voice	1	1.00	98	<b>99.00</b>
17. Strange noise	61	61.60	38	38.40
18. Clears throat	1	1.00	98	<b>99.00</b>
19. Speaks first (before instructor asks)	1	1.00	98	<b>99.00</b>
20. Responds quickly when answering	6	6.10	93	93.90
21. Latency in responding to questions or taking decision	1	1.00	98	<b>99.00</b>
22. Averts head position (rotated or tilted)	82	82.80	17	17.20
23. Head shake	24	24.20	75	75.80
24. Head nod	18	18.20	81	81.80
25. Breathes heavily	8	8.10	91	91.90
26. Shrugs shoulders	1	1.00	98	<b>99.00</b>
27. Self-touches (e.g., scratching)	74	74.70	25	25.30
28. Touches others or things	70	70.70	29	29.30
29. Keeps hands and arms close to the body	1	1.00	98	<b>99.00</b>

30. Crosses arms or legs (in front or back)	62	62.60	37	37.40
31. Handles things inappropriately	9	9.10	98	<b>99.00</b>
32. Paces, aimless wandering or restless in place	57	57.60	42	42.40
33. Taps hands or feet	9	9.10	90	90.90
34. Baseline demeanor (e.g., relaxed posture)	48	48.50	51	51.50
35. Rotates body	7	7.10	92	92.90
36. Tries to move to a different place (changes place)	20	20.20	79	79.80
37. Moves away from confederate(s)	3	3.00	96	<b>97.00</b>
38. Moves closer to confederate(s)	11	11.10	88	88.90

#### **Verbal behaviours**

39. A statement that indicates that the participant is uncomfortable	46	46.50	53	53.50
40. Curses or verbal aggression	5	5.10	94	94.90
41. Asks for help or for additional information about task at hand	3	3.00	96	<b>97.00</b>
42. Asks for a chance to re-check inputs (e.g., manikin vital signs) or re-checks	9	9.10	90	90.90
43. Complains	1	1.00	98	<b>99.00</b>

Subsequently, to determine if the observed behaviours were normally distributed, the significance of the skewness and kurtosis values were examined, as Tabachnick and Fidell (2013) recommended. Explicitly, if the skewness value divided by its standard error is not equal



to zero, then the data are significantly skewed. The significance of kurtosis is calculated the same way. Table 6 below outlines the statistics calculated to examine the significance of skewness and kurtosis.  $Z_s$  refers to the skewness value of the behaviour divided by its skewness standard error while  $Z_k$  refers to the kurtosis value of the behaviour divided by its kurtosis standard errors. According to the Z statistics in the two columns of Table 6 below, almost all of the behaviours were skewed or peaked i.e., they are not normally distributed. The sum presented in Table 6 refers to the total number of times the behaviour appeared in the 99 video recordings, and the mean represents the sum of each behaviour, divided by how many times that behaviour appeared.

Table 6

*Skewness and Kurtosis for Observed Behaviours in Archival videos (N = 99)*

Behaviours				Skewness		Kurtosis			
	<i>Sum</i>	<i>M</i>	<i>SD</i>	Statistic	<i>SE</i>	$Z_s$	Statistic	<i>SE</i>	$Z_k$
<b>Nonverbal Behaviours</b>									
1. Angry or disapproving face	23.00	0.23	0.42	1.29	0.24	5.38	-0.35	0.48	-0.73
2. Cannot remember or tries to remember face	19.00	0.19	0.40	1.59	0.24	6.63	0.53	0.48	1.10
3. Sneaks glances to others	75.00	0.76	0.43	-1.22	0.24	-5.08	-0.52	0.48	-1.08
4. Gazes or glances up or down	92.00	0.93	0.26	-3.40	0.24	-14.17	9.77	0.48	20.35
5. Blinks excessively	27.00	0.27	0.45	1.04	0.24	4.33	-0.95	0.48	-1.98
6. Lateral eye movement (CLEM)	9.00	0.09	0.29	2.89	0.24	12.04	6.48	0.48	13.50
7. Lowers or knits eyebrows	30.00	0.30	0.46	0.87	0.24	3.63	-1.27	0.48	-2.65
8. Raises eyebrows	19.00	0.19	0.40	1.59	0.24	6.63	0.53	0.48	1.10
9. Smiles in an embarrassed way or fake smiling	43.00	0.43	0.50	0.27	0.24	1.13	-1.97	0.48	-4.10
10. Compresses or purses lips	38.00	0.38	0.49	0.49	0.24	2.04	-1.80	0.48	-3.75

11. Normal or confident volume	65.00	0.66	0.48	-0.67	0.24	-2.79	-1.58	0.48	-3.29
12. Lowers voice or whispers	20.00	0.20	0.40	1.51	0.24	6.29	0.28	0.48	0.58
13. Strange noise	61.00	0.62	0.49	-0.49	0.24	-2.04	-1.80	0.48	-3.75
14. Responds quickly when answering	6.00	0.06	0.24	3.74	0.24	15.58	12.23	0.48	25.48
15. Averts head (rotates or tilts)	82.00	0.83	0.38	-1.77	0.24	-7.38	1.15	0.48	2.40
16. Head shake	24.00	0.24	0.43	1.22	0.24	5.08	-0.52	0.48	-1.08
17. Head nod	18.00	0.18	0.39	1.68	0.24	7.00	0.82	0.48	1.71
18. Breathes heavily	8.00	0.08	0.27	3.12	0.24	13.00	7.92	0.48	16.50
19. Self-touches (e.g., scratching)	74.00	0.75	0.44	-1.16	0.24	-4.83	-0.68	0.48	-1.42
20. Touches others or things	70.00	0.71	0.46	-0.92	0.24	-3.83	-1.17	0.48	-2.44
21. Crosses arms or legs (in front or back)	62.00	0.63	0.49	-0.53	0.24	-2.21	-1.75	0.48	-3.65
22. Paces, aimless wandering or restless in place	57.00	0.58	0.50	-0.31	0.24	-1.29	-1.94	0.48	-4.04
23. Taps hands or feet	9.00	0.09	0.29	2.89	0.24	12.04	6.48	0.48	13.50
24. Baseline demeanor (e.g., relaxed posture)	48.00	0.48	0.50	0.06	0.24	0.25	-2.04	0.48	-4.25
25. Rotates body	7.00	0.07	0.26	3.40	0.24	14.17	9.77	0.48	20.35
26. Tries to move to a different place	20.00	0.20	0.40	1.51	0.24	6.29	0.28	0.48	0.58
27. Moves closer to confederate(s)	11.00	0.11	0.32	2.51	0.24	10.46	4.40	0.48	9.17
<b>All the nonverbal behaviours</b>	<b>1017</b>	<b>10.27</b>	<b>3.12</b>	<b>-0.20</b>	<b>0.24</b>	<b>-0.83</b>	<b>0.37</b>	<b>0.48</b>	<b>0.77</b>
<b>Verbal Behaviours</b>									
28. A statement that indicates that the participant is uncomfortable	46.00	0.46	0.50	0.14	0.24	0.58	-2.02	0.48	-4.21
29. Curses or verbal aggression	5.00	0.05	0.22	4.17	0.24	17.38	15.69	0.48	32.69
30. Asks for a chance to re-check inputs (e.g., manikin vital signs) or re-checks	9.00	0.09	0.29	2.89	0.24	12.04	6.48	0.48	13.50
<b>All the verbal behaviours</b>	<b>60</b>	<b>0.61</b>	<b>0.71</b>	<b>0.92</b>	<b>0.24</b>	<b>3.77</b>	<b>0.22</b>	<b>0.48</b>	<b>0.46</b>
<b>All verbal and nonverbal behaviours</b>	<b>1077</b>	<b>10.88</b>	<b>3.43</b>	<b>-0.06</b>	<b>0.24</b>	<b>0.25</b>	<b>0.20</b>	<b>0.48</b>	<b>0.42</b>

Using the data collected in Phase II by means of the second version of the conformity instrument (i.e., the Phase II: LPCB-43 list), internal consistency was examined. The reliability of the items, according to Cronbach's alpha, was  $\alpha = 0.55$  for the 30 behaviours. This alpha indicates a low reliability.

**Conformity behaviours.** Since the previous descriptive analysis indicated that the behaviours observed in Phase II of this study were not normally distributed, the Kruskal-Wallis test was used to answer the first research question about conformity behaviours. Participants were grouped into three groups based on their conformity status in Kaba and Beran's (2016) study. This grouping occurred as follows: participants who did not conform while reporting the vital signs ( $n = 6$ , 5.80%), participants who conformed once or twice in reporting the vital signs ( $n = 51$ , 49%), and participants who conformed three or four times in reporting the vital signs ( $n = 47$ , 45.20%). Table 7 outlines the difference between these groups in displaying the observed behaviours. As seen in Table 7, there was no significant difference in displaying verbal, nonverbal, or both types of behaviours between people who conformed once or twice, people who conformed three or four times, and those who did not conform,  $p > 0.05$ .

Table 7

*Difference Between Kaba and Beran's (2016) Conformity Groups in Displaying Observed Behaviours*

	$\chi^2$	$df$	$p$
Total number of verbal behaviours	0.62	2	0.73

Total number of nonverbal behaviours	2.14	2	0.34
Total number of verbal and nonverbal behaviours	1.75	2	0.42

---

Similarly, there was no significant difference in the number of verbal behaviours, nonverbal behaviours, or all behaviours between male and female participants ( $p > 0.05$ ), between the different age groups ( $p > 0.05$ ), between nurses and medical students ( $p > 0.05$ ), or between second year and third year students ( $p > 0.05$ ).

**Conformity dimensionality.** To answer the second research question about whether conformity is a one-dimensional or multi-dimensional construct, principal component analysis (PCA) was considered. Initially, for the suitability of using factor analysis or factorability, 30 behavioural items included in the measure were examined. There are several well-recognized criteria for determining the suitability of using factor analysis methods on a correlation matrix. First, it was observed that 19 of the 30 items correlated at a level of at least 0.30 with one or more other items. According to Tabachnick and Fidell (2001), this suggests that there was a high enough degree of association among the items to identify patterns in the correlations (Beavers et al., 2013). Second, to determine if the sample size was statistically large enough to conduct PCA, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was conducted. The result was 0.52, which is suitable for PCA. Furthermore, Bartlett's test of sphericity was significant,  $\chi^2(435) = 700.92, p < 0.05$ , suggesting that linear combinations of the variables were possible (Williams, Brown, & Onsman, 2010). A PCA was attempted with all 30 items. Table 8 shows nine factors, but the components are uninterpretable.

Table 8

*Phase II: Rotated Component Matrix of Behaviors*

	1	2	3	4	5	6	7	8	9
Lowens or knit eyebrow	<b>0.79</b>	-0.10	0.05	-0.06	-0.02	0.08	-0.04	-0.06	-0.06
Angry or disapproving face	<b>0.70</b>	-0.10	0.10	-0.14	-0.07	-0.02	-0.10	0.10	0.04
Raises eyebrow	<b>0.70</b>	0.05	-0.01	-0.02	0.12	0.11	0.27	0.16	0.10
Cannot remember or tries to remember face	<b>0.54</b>	0.01	0.05	0.32	0.10	-0.03	-0.01	-0.40	-0.19
Head shake	<b>0.43</b>	0.39	-0.04	0.35	0.10	0.04	0.24	-0.14	-0.06
Moves closer to confederate(s)	-0.18	<b>0.71</b>	0.07	-0.01	0.08	0.04	-0.03	0.05	0.06
Asks for a chance to re-checks inputs	-0.09	<b>0.70</b>	-0.19	0.13	0.10	0.18	0.03	0.06	0.30
A statement that indicates that the participant is uncomfortable	0.11	<b>0.68</b>	0.16	0.06	-0.14	0.17	0.11	-0.14	-0.25
Smiles in an embarrassed way or fake smiling	0.14	<b>0.40</b>	0.21	0.05	-0.23	0.11	0.19	0.19	-0.37
Gazes or glances up or down	0.23	0.09	<b>0.73</b>	-0.13	0.05	0.08	0.05	-0.07	0.09
Averts head position (rotates or tilts)	0.04	-0.03	<b>0.69</b>	0.09	0.25	0.20	-0.03	-0.01	-0.02
Sneaks glances to others	0.07	-0.12	<b>0.62</b>	0.02	-0.37	-0.02	-0.04	0.06	0.04
Pacing, aimless wandering or restless in place	-0.12	0.24	<b>0.61</b>	0.03	-0.05	-0.17	0.20	-0.02	-0.05
Lowens voice or whispers	0.01	0.15	-0.02	<b>0.82</b>	0.07	0.01	-0.20	-0.09	0.05
Normal or confident volume	0.08	-0.01	-0.04	<b>-0.71</b>	0.21	-0.07	-0.09	0.00	-0.21
Taps hands or feet	-0.05	-0.20	-0.04	<b>0.43</b>	0.31	0.16	0.37	0.01	-0.22
Baseline demeanor (relaxed posture)	0.07	0.02	-0.12	-0.06	<b>0.75</b>	-0.08	0.12	-0.07	0.01
Crosses arms or legs (in front or back)	-0.07	0.01	0.28	0.00	<b>0.56</b>	0.09	-0.25	-0.13	0.04
Self-touches (e.g., scratches)	0.03	0.09	0.07	0.05	0.13	<b>0.69</b>	0.02	0.24	-0.02
Touches others or things	0.07	0.12	0.01	0.09	-0.06	<b>0.66</b>	-0.05	-0.17	0.02
Responds quickly when answering	-0.16	-0.14	-0.12	0.22	0.27	<b>-0.52</b>	-0.11	0.35	-0.17
Curses or verbal aggression	-0.02	0.12	0.13	-0.05	-0.15	0.00	<b>0.69</b>	0.00	0.00
Breathes heavily	0.25	0.12	0.07	0.04	0.37	-0.03	<b>0.61</b>	0.25	-0.20
Lip compression or purses	0.34	0.27	0.12	-0.14	0.02	-0.33	<b>-0.41</b>	0.34	0.02
Rotates body	0.00	0.05	0.04	0.18	-0.02	0.34	<b>-0.40</b>	0.29	-0.32
Lateral eye movement (CLEM)	0.18	0.09	0.02	-0.14	-0.16	-0.09	0.06	<b>0.74</b>	-0.06
Strange Noise	0.11	0.43	0.13	-0.08	0.02	-0.10	-0.01	<b>-0.52</b>	-0.03
Tries to get to a different place (Change place)	-0.14	0.00	-0.05	0.08	-0.17	0.23	0.07	-0.12	<b>0.63</b>
Head nod	0.16	0.02	0.18	0.07	0.26	-0.17	-0.15	0.06	<b>0.57</b>
Blinks excessively	0.46	0.12	0.10	0.24	-0.14	-0.01	-0.05	0.20	<b>0.50</b>
Percent of variance explained	11.12	8.39	6.92	6.43	5.87	5.49	5.01	4.70	4.34
Eigenvalues	3.34	2.52	2.08	1.93	1.76	1.65	1.50	1.41	1.30

a. Rotation converged in 17 iterations.

### **Phase III (Real-time Simulation Sessions and Interviews)**

**Demographic characteristics of the sample.** For Phase III of this study, a convenience sample of 30 participants was obtained from medical residents and medical students who were training in the Internal Medicine Simulation Program at RGH. The majority of participants were residents ( $n = 20$ , 66.70%), and most participants were male ( $n = 17$ , 56.70%). Study participants were observed in 19 simulation sessions. The details of the simulation sessions and the distribution of participants were noted earlier in Table 3 on page 63 of this document.

Four simulation cases were selected for Phase III of this study. In total, the DKA vs. HHS, the pneumonia, and the UGIB cases were equally used (i.e., each was used five times) in the 19 simulation sessions (26.32%), while the C. Difficile Colitis case was used in four simulation sessions (13.33%). The four cases were used several times on the participants but every time a participant was included, it was a unique experience for him/her. This means that participants were observed when they participated in simulation session for the first time. Furthermore, no participant was observed twice even if s/he went through more than one simulation scenario. Specifically, seven participants (23.0%) participated in the DKA vs. HHS case, eight participants (26.70%) were in the pneumonia case, seven participants (23.30%), were in the UGIB case, and finally, eight participants (26.70%) participated in the C. Difficile Colitis case.

All 30 participants interacted with a male confederate who provided the conformity prompt. The confederate presented himself as an ER doctor to 21 participants (70%), as a preceptor to six participants (20%), and as a senior resident to three participants (10%). In addition, all 30 participants had a confederate nurse as part of the simulation session.

In regard to the conformity status, the majority of participants did not conform ( $n = 24$ , 80%). Of those who did conform, ( $n = 6$ ), 66.7% were male ( $n = 4$ ). Fisher's exact test (1) =

0.67,  $p > 0.05$  revealed that the conformity status in our sample did not significantly differ by sex. Also, 3 out of 20 residents conformed (15%) and 3 out of 10 medical clerks conformed (30%), a difference that was not statistically significant; Fisher's exact test (1) = 0.37,  $p > 0.05$ . Furthermore, there was no significant association between the conformity status of the participants and how the confederate presented himself (i.e., ER doctor, preceptor, or senior resident),  $X^2 (2, N = 30) = 3.21, p = 0.20$ .

**Descriptive data.** This section includes the following: The response rate for Phase III of this study, the frequency counts of observed and missing behaviours in real-time simulations, an examination of the normality of observed behaviours (i.e., whether they are normally distributed), and an inspection of the internal consistency of the Phase III: LPCB-30 list (i.e., the third version of the conformity instrument).

Phase III of the current study yielded a response rate of 100% as all of the individuals who were invited to contribute their data agreed, and none of them requested to withdraw their data at a later time. Next, the number of times that each type of behaviour occurred while participants were exposed to a conformity prompt in real-time simulations is reported in Table 9. Also, the table reflects the behaviours that were missing due to the nature of the case. Additionally, the behaviours that appeared in all of the participants are in boldface. General facial expressions (i.e., disapproving face, I cannot remember or tries to remember face) and mouth and lip related behaviours (i.e., smiles in an embarrassed way or fake smiling and compresses or purses lips) were missing in all the pneumonia cases ( $n = 30, 26.7\%$ ) because the participants had to wear a mask as part of the protocol of dealing with pneumonia. The behaviours that appeared in all of the participants included an averted head (rotated or tilted), and glanced at others or at things. Other behaviours that were initially identified in Phase II, while observing the participants from

Kaba and Beran's (2016) archival videos, did not appear while observing the participants in Phase III (i.e., real-time simulation sessions). These behaviours included: responds quickly when answering, and curses or verbal aggression. Removing the behaviours that appeared in all the participants and the behaviours that did not appear in all the participants from the third version of the conformity instrument is recommended. This adjustment will aid in improving the sensitivity of the instrument as these behaviours do not seem to differentiate conforming from non-conforming individuals.

Table 9

*Frequency of Each Behaviour Observed in Real-time Simulation Sessions*

Behaviours	<i>Sum</i>	Valid %	Missing
Averts head (rotates or tilts)	30	<b>100</b>	0
Head shake	7	23.3	0
Head nod	29	96.7	0
Disapproving face	5	22.7	<b>8</b>
Cannot remember or tries to remember face	4	18.2	<b>8</b>
Glances to others or things	30	<b>100</b>	0
Gazes or glances up or down	27	90	0
Lateral eye movement (CLEM)	7	23.3	0
Blinks excessively	7	23.3	0
Lowers or knits eyebrows	12	40	0
Raises eyebrows	11	36.7	0
Smiles in an embarrassed way or fake smiling	15	68.2	<b>8</b>
Compresses or purses lips	19	86.4	<b>8</b>



Self-touches (e.g. scratching)	27	90	0
Touches others or things	29	96.7	0
Crosses arms or legs (in front or back)	17	56.7	0
Restless in place	17	56.7	0
Taps hands or feet	3	10	0
Breathes heavily	10	33.3	0
Strange noise	20	66.7	0
Normal or confident volume	24	80	0
Lowers voice or whispers	10	33.3	0
Responds quickly when answering	<b>0</b>	<b>0</b>	<b>0</b>
Baseline demeanor (Relaxed posture)	15	50	0
Rotates body	23	23.3	0
Changes place	14	46.7	0
A statement that indicates that the participant is uncomfortable	11	36	0
Curses or verbal aggression	<b>0</b>	<b>0</b>	<b>0</b>
Asks for a chance to recheck inputs	4	3.3	0
Asks for help or for additional information	13	43.3	0

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Next, to verify if the observed behaviours were normally distributed, the significance of the skewness and kurtosis values were explored as recommended by Tabachnick and Fidell (2013). It was found that that the behaviours were not normally distributed. Table 10 reports the Z statistics that reflect that almost all of the behaviours were skewed or peaked.

Table 10

*Skewness and Kurtosis for Observed Behaviours in Real-time Simulation Sessions*

Behaviours				<u>Skewness</u>			<u>Kurtosis</u>		
	<i>Sum</i>	<i>M</i>	<i>SD</i>	<i>Stat.</i>	<i>SE</i>	<i>Zs</i>	<i>Stat.</i>	<i>SE</i>	<i>Zk</i>
<b>Nonverbal behaviours</b>									
1. Averts head (rotates or tilts)	30	1.00	0.00						
2. Head nod	29	0.97	0.18	-5.48	0.43	-12.83	30.00	0.83	36.03
3. Head shake	7	0.23	0.43	1.34	0.43	3.11	-0.26	0.83	-0.31
4. Disapproving face	5	0.23	0.43	1.40	0.49	2.85	-0.06	0.95	-0.06
5. Cannot remember or tries to remember face	4	0.18	0.39	1.77	0.49	3.61	1.25	0.95	1.31
6. Glances to others or things	30	1.00	0.00						
7. Glances up or down	27	0.90	0.31	-2.81	0.43	-6.58	6.31	0.83	7.58
8. Lateral eye movement (CLEM)	7	0.23	0.43	1.33	0.43	3.11	-0.26	0.83	-0.31
9. Blinks excessively	7	0.23	0.43	1.33	0.43	3.11	-0.26	0.83	-0.31
10. Lowers or knits eyebrows	12	0.40	0.50	0.43	0.43	1.01	-1.95	0.83	-2.34
11. Raises eyebrows	11	0.37	0.49	0.58	0.43	1.37	-1.78	0.83	-2.14
12. Smiles in an embarrassed way or fake smiling	15	0.68	0.48	-0.84	0.49	-1.71	-1.44	0.95	-1.51
13. Compresses or purses lips	19	0.86	0.35	-2.28	0.49	-4.64	3.50	0.95	3.67
14. Self-touches (e.g., scratches)	27	0.90	0.31	-2.81	0.43	-6.58	6.31	0.83	7.58
15. Touches others or things	29	0.97	0.18	-5.48	0.43	-12.83	30.00	0.83	36.03
16. Crosses arms or legs (in front or back)	17	0.57	0.50	-0.28	0.43	-0.66	-2.06	0.83	-2.48
17. Restless in place	17	0.57	0.50	-0.28	0.43	-0.66	-2.06	0.83	-2.48
18. Taps hands or feet	3	0.10	0.31	2.81	0.43	6.58	6.31	0.83	7.58
19. Breathes heavily	10	0.33	0.48	0.74	0.43	1.74	-1.55	0.83	-1.87
20. Strange noise	20	0.67	0.48	-0.74	0.43	-1.74	-1.55	0.83	-1.87
21. Normal or confident volume	24	0.80	0.41	-1.58	0.43	-3.70	0.53	0.83	0.63
22. Lowers voice or whispers	10	0.33	0.48	0.74	0.43	1.74	-1.55	0.83	-1.87
23. Responds quickly when answering	0	0.00	0.00						
24. Baseline demeanor (Relaxed posture)	15	0.50	0.51	0.00	0.43	0.00	-2.15	0.83	-2.58
25. Rotates body	23	0.77	0.43	-1.33	0.43	-3.11	-0.26	0.83	-0.31
26. Changes place	14	0.47	0.51	0.14	0.43	0.33	-2.13	0.83	-2.55

<b>All the nonverbal behaviours</b>	<b>412</b>	<b>13.73</b>	<b>2.99</b>	<b>0.43</b>	<b>0.43</b>	<b>1</b>	<b>-0.00</b>	<b>0.83</b>	<b>0</b>
<b>Verbal behaviours</b>									
27. A statement that indicates that the participant is uncomfortable	11	0.37	0.49	0.58	0.43	1.37	-1.78	0.83	-2.14
28. Curses or verbal aggression	0	0.00	0.00						
29. Asks for chance to re-check inputs	4	0.13	0.35	2.27	0.43	5.32	3.39	0.83	4.07
30. Asks for help or for additional information about task at hand	13	0.43	0.50	0.28	0.43	0.65	-2.06	0.83	-2.48
<b>All verbal behaviours</b>	<b>28</b>	<b>0.93</b>	<b>0.79</b>	<b>0.58</b>	<b>0.43</b>	<b>1.35</b>	<b>0.19</b>	<b>0.83</b>	<b>0.23</b>
<b>All verbal and nonverbal behaviours</b>	<b>440</b>	<b>14.67</b>	<b>3.38</b>	<b>0.34</b>	<b>0.43</b>	<b>0.79</b>	<b>0.04</b>	<b>0.83</b>	<b>0.05</b>

For the third version of the conformity instrument (i.e., the Phase III: LPCB-30 list), internal consistency was examined through calculating Cronbach's alpha. Due to a low Cronbach's alpha coefficient ( $M = 0.50$ ,  $\alpha = 0.48$  for the 30 behaviours), the researcher used SPSS to examine which behaviours could be removed to increase the reliability. The examination revealed that by removing seven items, the alpha coefficient would increase to 0.65 for 23 behaviours. The behaviours that should be removed to improve alpha are shown in Table 11.

Considering the previous recommendations, a total of 11 behaviours were removed from the third version of the conformity instrument (i.e., Phase III-LPCB-30 list) and the final version of the instrument was created. In this final version, the four behaviours that appeared or did not appear in all the participants (i.e., averts head, glances to others or things, responds quickly when answering, and curses or verbal aggression) were eliminated. In addition, the behaviours that

should be removed to improve Cronbach's alpha were extracted. As a result, the new instrument includes a total of 19 behaviours and an alpha coefficient of 0.66.

Table 11

*Removed Behaviours to Improve Cronbach's Alpha*

Variable removed	Cronbach's $\alpha$	Improved Cronbach's $\alpha$
Restless in place	0.48	0.53
Statement indicating discomfort	0.53	0.56
Blinks excessively	0.56	0.58
Baseline demeanor (relaxed posture)	0.58	0.60
Normal or confident volume	0.60	0.62
Changes place	0.62	0.64
Cannot remember or tries to remember face	0.64	0.65

**Conformity behaviours.** Since the previous descriptive analysis indicated that the behaviours observed in Phase III of this study were not normally distributed, the Mann-Whitney U test was used to answer the first research question. Participants were grouped as (a) those who did not conform ( $n = 24$ , 80%) and (b) those who conformed ( $n = 6$ , 20%). *Non-conformity* was coded when participants rejected the inaccurate information and announced a decision or showed an action that was consistent with this rejection, while *conformity* was coded when participants accepted the inaccurate suggestion and announced a decision or showed an action accordingly. All those who participated in the C. Difficile Colitis simulation scenario did not conform ( $n = 8$ , 26.6 %). In each of the other three simulation scenarios, two participants conformed. The total number of conforming participants adds up to six out of 30 (20%).

There was no significant difference between those who conformed compared to those who did not in showing: (a) verbal behaviours ( $U = 52.00, p > 0.05$ ), (b) nonverbal behaviours ( $U = 63.00, p > 0.05$ ), or (c) both (i.e., combined verbal and nonverbal behaviours) ( $U = 60.50, p > 0.05$ ). Furthermore, Kruskal Wallis test showed that conformity status was not significantly different across the simulation scenarios,  $H(3) = 2.68, p > 0.05$ .

**Conformity dimensionality.** Since a number of behaviours showed zero or no variance, PCA could not be run using the data collected in Phase III.

### Phase III Secondary Results

As noted earlier, Phase III of this study included different steps (i.e., pre-briefing sessions, simulation sessions, simulation debriefing sessions, research debriefing sessions, and finally interviews) - refer to Figure 3. Then, the results from analyzing the data collected in the last step of Phase III (i.e., interviews) are revealed.

**Interviews results.** As the final step in Phase III, from October 2015 to April 2016, the researcher and the other rater interviewed 30 participants (i.e., 20 residents, 10 medical students). As explained earlier, five questions were asked during this step. Interview questions three and four were analyzed qualitatively and they resulted in the creation of the themes and subthemes for this study. The following paragraphs report the results of each interview question with respect to their sequence in the interview.

**Results of the first and second interview questions.** The *first interview question* was asked to ensure that no one had heard about the study and that all of the participants would indicate so. Then, the *second interview question* investigated whether the participants thought that the simulation scenario and conformity prompt were realistic. The answers showed that a total of 56.67% ( $n = 17$ ) said yes and 26.67% ( $n = 8$ ) used terms that indicated strong agreement

such as “absolutely”, “definitely” while 16.67% ( $n = 5$ ) used terms that indicated moderate agreement such as “fairly”, “somewhat” or “probably” to express how realistic they thought the situation was.

**Results of the third interview question.** The *third interview question* was about dealing with conflicts in patient care. The participants’ answers were qualitatively analyzed, and the analysis yielded four main themes and 16 sub-themes. These themes and sub-themes are presented in the following section. Figure 5 outlines all of the themes and sub-themes that emerged from the participants’ answers to question three.

The themes that emerged from the participants’ answers to how they would manage conflict in patient care.	<b>Theme one: Assessment of the participants' own characteristics and experiences.</b>	<i>Participants' qualifications (i.e., their knowledge, training and expertise).</i>
		<i>Participant's previous negative experiences.</i>
	<b>Theme two: Assessment of the characteristics of the contrarian(s).</b>	<i>Character of the contrarian.</i>
		<i>Level of the contrarian in the medical hierarchy.</i>
		<i>Authority of the contrarian.</i>
	<b>Theme three: Participants' assessment of the conflict or the situation causing it.</b>	<i>The number of contrarian(s) or the presence of a majority.</i>
		<i>Complexity of the conflict or the situation causing it.</i>
		<i>Consequences of the conflict or the situation causing it.</i>
	<b>Theme four: Actions taken by the participants to manage conflict in patient care.</b>	<i>The manner of communicating the conflict.</i>
		<i>Reassessing the situation causing the conflict.</i>
		<i>Undertaking further investigations or asking questions to understand the contrarian's point of view.</i>
		<i>Conforming to the contrarian.</i>
		<i>Using fact or evidence to support one's opinion when discussing the conflict with the contrarian.</i>
		<i>Consulting with other colleagues.</i>
		<i>Embracing the role of being a patient advocate.</i>

*Figure 5.* Themes/subthemes that emerged from participants’ answers to question three concerning how they would manage conflict in patient care.

**Theme one: Assessment of the participants' own characteristics and experiences.** In response to the occurrence of a conflict while providing care for a patient, the first theme emerged, that is, participants indicated that they would evaluate their own characteristics and previous encounters with conflict. Two sub-themes were then identified under this theme: (1) the participant's qualifications (i.e., their knowledge, training, and expertise), and (2) the participant's previous negative experience when dealing with conflict.

***Participants' qualifications.*** Participants stated that when they encounter conflicting opinions with colleagues, they evaluate their own professional qualifications, such as their own knowledge, training, and expertise. Their lack of knowledge or training was a major concern, especially for medical students. Some of their comments are noted below:

I lack the information or the training or the knowledge, and so it is very easy at this stage to automatically go with whatever you are told by somebody higher in authority than you because it is part of learning. (27-R1)

At this point in my training, I will normally defer to someone else on the team because I am usually working with people that have more experience than I have, but I would question and have them explain to me why. (30-R2)

A participant presented his response in a way that indicated that in addition to evaluating his own knowledge, he did not feel safe acknowledging what he did not know to his colleagues. He stated, "At this point, I wouldn't let them know that I don't know". (19-R1)

***Previous negative experience.*** The occurrence of a previous negative experience when speaking up during a conflict was highlighted as an issue that could play a role in dealing with a new conflict. The following participant received a negative evaluation for not agreeing with his supervisor, and he stated how it affected future conflicts:

It happened to me before. It only happened to me a few times, but it was enough of a sting to second guess doing it again. (04-R1)

**Theme two: Assessment of the characteristics of the contrarian(s).** The second major theme identified by participants revolved around assessing the characteristics of the contrarian(s) during a conflict situation. The term *contrarian* was used to refer to the person who took an opposing view from our participants. In their answers to how they would deal with a conflict in patient care, many participants admitted that they would evaluate their contrarian(s) before deciding whether or not to agree/disagree with them. Four sub-themes were recognized from the participants' answers: (1) the character of the contrarian, (2) the hierarchical level of the contrarian, (3) the authority of the contrarian, and (4) the occurrence of a majority or the number of contrarian(s).

***The character of the contrarian.*** Participants pointed out that what they know about the character or personality of the person opposing them would influence the extent to which they would consider their opinion.

As for colleagues, I will be influenced by what I know about [her or his] character as a physician; so, if I know [she or he] is someone [who is] careless, then I will be more confident in my opinion, and if I know that they are thorough, then I will be more considerate to their point of view. (09-R1)

Furthermore, a participant specified that the character of the opposing person is even more important than his years as a post-graduate medical professional (i.e., PGY).

I would say the most important [thing] is if I know them, and I know that they are smart. If I know them, and I know that they are not, then I don't care if they are PGY5; but, if I know they are smart, I will take it into consideration, and it is tough to tell. (22-R1)



***The level of the contrarian in the medical hierarchy.*** A couple of participants noted that the level of the contrarian or opposing person (i.e., a senior versus a junior colleague) would not make a difference in the way they dealt with the conflict. Nevertheless, most of the participants admitted that when dealing with conflict with a senior colleague, they would feel and deal differently with the conflict.

I might still question an attending physician, but I might not push as hard for it compared to a resident or a nurse. (17-R1)

If it is my colleague and he is at the same level as me, I will take it [her/his decision or suggestion] based on a scientific basis. And, if it's my supervisor, I will take it [her/his decision or suggestion] even if it is not on a scientific basis. (21-R1)

If my senior physician was like, 'Ok, let's take the patient off isolation and take her off isolation stuff,' I would've gone with that, just because this is what I am used to [doing], and what has been trained to do. (26-R2)

This last statement was made by a participant who did not conform to the research confederate in the simulation session where the pneumonia case was used. Rather, this participant's statement in the interview indicated that conformity occurred to the senior physician. The occurrence of conformity was not detected because it was conforming to a correct decision, rather than to an incorrect one. The occurrence of conformity to a correct decision is understandable, but it was not recorded since the focus of this research was on conformity to incorrect suggestions.

Understandably, most participants pointed out that they perceived their senior physicians to be more knowledgeable and to have more experience than them. Consequently, they would

give more weight to a senior's opinion, as they perceived it to be more trustworthy than their own. For example, a participant said:

I can't recall any circumstances where I thought for sure my attending physician was wrong and that I had to question them. (08-R2)

If it is an attending physician, then yeah it will be different maybe. I will discuss, and at the end, I will have to follow his lead and trust that what he is thinking is right. (25-R1)

Though the majority of participants perceived a student's opinion to be less influential and that one should trust her/his own experience over a junior's experience, others pointed to the importance of considering all members of the medical team, regardless of their level.

A lot of the time, medical students and [students] and people are not as high as me, and I am still a junior, [but] they have great ideas that I have not thought about. So, I think being inclusive to everybody and communicating with everybody is important, and it should not matter which level [they are at]. But, because people that are higher up in the hierarchy have more experience, they are more likely to know better or to have previous experience and examples to give for why you choose one path rather than another. (21-R1)

***Authority of the contrarian.*** Interestingly, some participants were specific in analyzing the relation between themselves and the contrarian and referred to the power dynamic that would be taking place.

It is harder if it is a staff person, especially if it is someone [who] is directly evaluating you. (04-R1)

If the senior [person] is not my boss, then I will say that I have to check it with my boss. (11-R1)

***The number of contrarian(s) or the presence of a majority.*** A participant spoke of the number of contrarians within the group and how this would influence his decision:

It is easier to conform if you've got five people and you are one. Right! So, if five people agreed on something, you will say, 'Well, yeah; that makes sense.' (08-R2)

**Theme three: Participants' assessment of the conflict or the situation causing it.** In the third theme, participants identified how conflict in a situation could shift their focus and result in their dealing differently with the conflict: "It depends; it is very contextual." (14-R2). Under this theme, three sub-themes were distinguished from participants' answers: (1) The complexity of the conflict or the situation causing it, (2) the consequences of the conflict or the situation causing it, and (3) the manner of communicating the conflict.

***Complexity of the conflict or the situation causing it.*** The nature or complexity of the issues in the conflict can definitely influence the way one deals with the conflict. For instance, for some participants, questioning practice guidelines and scientific debates seemed to be easier to deal with than medication choices and ethical issues, which were viewed as more complex.

Speaking up would depend on the issue. If it is a minor thing, then I would let it go; if it is major enough, then I guess it will definitely make a difference if I will object or not. (10-R2)

In the simulation situation today, it was less gray because there was a medical/legal thing that tells you that you cannot give blood if the patient says no. It was more black and white in that respect, and so I felt more comfortable going against what he was suggesting. (21-R1)

The complexity of the situation increases when more than one factor emerges that the participant has to consider in the presence of a conflict. For example, this could occur if an individual is

uncertain about a medical choice or condition and the contrarian is senior to that person. As one participant stated:

It will depend on a lot of factors, to be honest. (21-R1)

With an attending physician, it could be a little different, depending on who it is as well too ... In the ER, something I will take into account is if they have been there before. (28-R1)

***Consequences of the conflict or the situation causing it.*** Weighing the expected consequences of the situation causing the conflict seemed to influence the way a participant dealt with the conflict. Serious consequences typically motivated people to take action. Nevertheless, if the results of the conflict did not affect patient care or were not viewed as serious, most individuals tended to ignore the conflict.

That will depend on the consequences. So, if our disagreement won't affect our management of the patient's condition, then I wouldn't try to solve it. But, if it is going to affect the patient, then I will definitely say something. (09-R1)

***The manner of communicating the conflict.*** A participant commented that how an opposing opinion is expressed influenced how the conflict was dealt with. This participant's answer suggested that using an appropriate and respectful communication tone would make the team receive the conflict more openly.

I think what makes a difference is how it is said. As long as it is said in a way where you feel we are all working for the same goal and there is no condescending tone, it is ok if the contradiction comes from anyone higher or lower in rank. (03-R1).

**Theme four: Actions taken by the participants to manage conflict in patient care.**

Understandably, with theme four, the participants specified actions or strategies that they tend to

take or follow when they have to deal with conflict. Under this theme, seven sub-themes were identified, which are outlined in the next paragraphs. These identified sub-themes consisted of the following: (1) Reassessing the situation causing the conflict, (2) undertaking further investigation or asking questions to understand the contrarian's point of view, (3) confronting the contrarian, (4) using facts or evidence to support one's opinions when discussing the conflict with the contrarian, (5) conforming to the contrarian, (6) consulting with other colleagues, and (7) embracing the role of being a patient advocate.

***Reassessing the situation causing the conflict.*** It appeared that the first reaction of participants when facing a conflict was to reassess the situation that caused the conflict. Participants appeared to be concerned about missing something while trying to diagnose the patient, thus they usually tended to review the case to deal with their concerns.

I will ask myself, 'Am I missing something obvious? Is that something I didn't see?' (04-R1)

The first thing I will probably think is [that] maybe I misinterpreted something. [I will then think that] I should kind of review what I did already. (07-R1)

***Undertaking further investigation or asking questions to understand the contrarian's point of view.*** After reviewing the case, participants said they would investigate the issue of conflict further and try to understand the contrarian's opinion and acknowledge it. To do so, they acknowledged that they would ask various questions about the issue:

I will do my own research to figure out if I was right or if they were right, and then if I find out that I was right, I would go and talk to them afterward and let them know what I found. (19-R1)

I ask questions like, ‘Why have you thought about that?’ or ‘Why do you think that?’

But, usually it’s not because I think they are wrong, but because it is a learning point for me here. So, I always ask ‘Why?’ and ‘What helped [you] differentiate between this and that?’ (24-R1)

***Confronting the contrarian.*** Although most participants’ answers suggested that they would ask questions, acknowledge the other person’s opinion, and avoid confrontation with the conflicting person, some participants preferred to confront the opposing person about their concerns:

I saw where the other physician was coming from, and I chose to basically acknowledge what he was saying. I don’t think I was confrontational here ... but I will be less confrontational in this case. (03-R1)

I had situations where I did not agree with the seniors, and I had directly talked to them. (14-R2)

***Using facts or evidence to support one’s opinions when discussing the conflict with the contrarian.*** To deal with conflict, some participants preferred to share facts, rather than to ask questions:

I think usually I would restate what I know about the situation. (01-R1)

I will try to base the discussion on the facts. (23-R2)

***Conforming to the contrarian.*** Accepting the opposing person’s opinion seemed to be an option that some participants felt comfortable with. However, these participants linked this acceptance to perceiving that the opposing individual was more senior or more experienced:

If I was talking to someone more senior than myself, then I would be more likely to accept their assessment. (13-R1)

At this point in my training, I will normally defer to someone else on the team. (30-R1)

Interestingly, one participant suggested that perceiving the conflict as an opportunity to learn from colleagues could result in conformity, while another brought up the risks to patient care when one focuses on pleasing other team members:

We try to learn from them, so when they present us with new information we go, ‘Oh, really?’, and we accept it. (27-R1).

You try to anticipate almost what they would do instead of what you would do and then you lose the thread of it because now you are not looking after the patient anymore—you are trying to please somebody else! (04-R1)

***Consulting with other colleagues.*** Some participants also preferred to consult with colleagues or senior staff to help guide them when dealing with conflict:

I will probably talk to my other colleagues to make sure I am not completely idiotic and I don’t know! (10-R2)

This happens pretty often actually; I think the nurse is right and they have more experience than me and I feel they know more than me. But, if I cannot figure it for sure myself, I have to say that I will get back to you when I talk to my staff or my senior resident. (11-R1)

If I still really don’t agree with what they are doing, I will ask a staff physician. If it is my staff physician that is doing it, then I guess I have to find someone else to talk about it with, if I truly feel that it’s not right. (14-R2)

***Embracing the role of being a patient advocate.*** A participant mentioned the importance of shifting thinking from being about one’s self to being about one’s patient: “I think what I try and do is try and think less about myself and more about the patient.” (04-R1)

**Results of the fourth interview question.** The fourth interview question was about feeling pressure to conform to the answers or decisions of the majority of health professionals in other sessions or in real life. This question elicited a variety of responses from participants. Most of the participants admitted to conforming in real clinical life ( $n = 27$ , 90%). A total of 44.74% gave a simple “yes” as an answer ( $n = 11$ ) and 33.33% of those who said yes ( $n = 9$ ) used assertive terms such as “definitely”, “absolutely,” “usually,” “all the time,” and “of course” while 25.93% ( $n = 7$ ) used terms such as “sometimes”, “probably”, “a little”, “I think”, and “I guess.”

Furthermore, the participants gave responses that ranged from a simple “oh yeah” (01-R1), “absolutely” (29-R1), and “definitely” (05-R1), to more elaborate responses, as indicated by these comments:

Yeah of course. This is more the case when you start in a new group and you are not sure about your decisions yet, and you feel like ‘I should probably just blend in and kind of not stand out because I don’t want to get in any trouble because I want to belong to the group.’ But, I think with time as you know more what you are doing, you will be more confident in your decision and wouldn’t mind standing out from the group for a bit to prove a point that you know about. (03-R1)

I would say, maybe, a little bit. Not in anything too serious—usually in minor things. [laughs while answering]. (07-R1)

Yes, I think [conformity] definitely happens in the hospital setting and in normal life and I think that a lot of people would have to decide if the fight is worth fighting. (10-R2)



Yeah (laugh), I usually do [conform]. Depends on how strong I feel about the matter. Like if it is something that I strongly feel about differently from the team then I will try to speak with my preceptor. (12-R2)

These responses indicate that conformity does occur in the medical field at different levels. As such, it could interfere with learning and eventually with the provision of the best possible health care to patients. However, it is interesting to note that the majority of our participants ( $n = 27$ , 90%) admitted to conforming in real life without hesitation. This percentage suggests that medical residents and students are perceiving conformity as a natural behaviour. In fact, one participant stated, “Yeah, I think everyone does [conform]” (24-R1). Nonetheless, the majority of those who admitted to conforming gave reasons related to these matters: (1) The medical hierarchy, which refers to the system that defines the responsibilities or roles of team members in a medical setting. Medical students and residents are at the lower end of the medical hierarchy (Hallisy & Haskel, 2008), which explains why they associated the pressure to conform with orders coming from people higher in the hierarchy; and (2) training, wherein two sides of training were mentioned, that is, a participant’s level of training and the nature of medical training. A participant’s level of training also concerns hierarchy, but more specifically to the trust one puts in the training of more senior colleagues. On the other hand, the nature of medical training speaks to how junior medical professionals are taught to deal with and communicate with senior colleagues through a hidden curriculum.

Interestingly, although conformity seemed to be viewed as a natural behaviour, participants began justifying why they would conform. For example, some participants explained that conformity is something they have been trained to do or learned to do based on experiences they have encountered in their lives and careers:

Definitely [I conformed] in real life, especially in the beginning of my medical training. As [I have progressed], I've been able to work with various different people and see how various different people handle a situation. And, as my own medical knowledge is progressing, I am becoming more confident in my own assessments and my own decisions. However, I recognize that my experience is quite limited compared to my attending staff who have been practicing for many years, or the residents who have even one more year of experience than me. I do rely heavily on their experience as well. (13-R1)

Ummm, yeah, it happens all the time [laughs] ..... I would [have] gone with [my senior colleague's decision], just because this is what I have been trained to do. (26-R1)

Yeah, I absolutely do [conform] and I think we all do. And, again, it goes down to experience and you put more trust in those people who have more experience. (21-R1)

Conversely, instead of justifying why they conformed, a couple of participants stated they responded with silence when conforming. One participant said, "I probably have. Yeah, mostly I will stay silent, but in times where I think I know and I read this then I will question it just because the book practice is maybe different from the clinical practice". (17-R1) Another stated, "Probably yes [I conformed]. Sometimes I stay silent". (22-R1)

**Results of the fifth interview question.** In response to the fifth interview question about the difficulty of expressing opinions in a cohesive team, the majority ( $n = 20$ , 66.66%) pointed out that it is easier to express opinions in a cohesive team, whereas only 6.67% ( $n = 2$ ) stated that they did not see a difference with a less cohesive team. In addition, the participants' answers to the fifth interview question consisted of four themes, which are outlined in the next paragraphs: (1) group dynamics or group culture, (2) time spent with the group, (3) the personality of the

preceptor or senior staff/colleague in the group, and (4) participants' emotional state in the group.

**Theme one: Group dynamics or group culture.** Most of the participants pointed out that group culture is important, as it subtly dictates how group members communicate. A group with an inviting atmosphere for individual expression enables members to ask questions and discuss different points of view, as exemplified below:

I think it depends on the group dynamic that is set beforehand where people are really able to ask questions and to object [to] each other's opinions, versus a group where you have a senior talk down and say, 'That is the way things are.' (10-R1)

Let's say I am at surgery, and I am not picking on surgery, but often surgery rounds are fast-paced and they will tell you, 'Do this.' This is how it should happen - no room for discussion, no one else is talking. If you are in that dynamic, then you are much less likely to try to jump in and ask what they are thinking or try to disagree with their opinion. (10-R1)

There is a team dynamic where everyone respects each other and everyone's input is valuable, and then there are other team dynamics that are more hierarchy-focused and those are the ones where you might not pop up as much. (17-R1)

**Theme two: Time spent with the group.** Participants addressed being known by group members and they linked that with the time spent within the group. Accordingly, the more time one spends with the group, the better people get to know and understand each other; this then makes the communication easier:

If you worked with them before, they know what your level is, and so when you ask a question, they know that you know things and it's not like, 'Oh, he does not know anything.' (04-R1)

We experience that every time we start a new rotation. We are in these rotations for a month plus, and the first week is always difficult because you do not have time to feel people out, and you haven't really understood what your role is in the group. (21-R1)

**Theme three: Personality of the preceptor or senior staff/colleague in the group.**

The participants addressed the role of those who are senior to them in experience or position, in establishing the group environment, and how these colleagues could influence the expression of opinions:

If the senior physician is more open and you can tell that s/he likes to work in a group and s/he is more welcoming to teaching and, umm, they don't mind if you ask stupid questions, then this will set the group environment. (05-R1)

**Theme four: Participants' emotional state in the group.** Participants pointed out that they felt more safe and comfortable in expressing their opinion within a familiar group:

Definitely it's easier. So, if it's more of a cohesive group, I feel like almost more safe, even if perhaps my assessment is wrong of the patient. I think people are all over kinder and say, 'You did a good job,' or whatever, but this is what I think, so maybe we can go back and reexamine and figure where the patient is at ...'. (20-R2)

If I was working with colleagues that I was comfortable with, [then] I will be more likely to express my concerns. (28-R2)

## Summary of Findings

Phase I resulted in creating the first two versions of the conformity instrument. In particular, the first version of the conformity instrument (the Phase I: LPCB-118 list) was created from the available literature. Next, this list was revised and modified based on the suggestions of three conformity experts, which resulted in the creation of the second version of the conformity instrument (i.e., the Phase II: LPCB-43 list).

Phase II resulted in further refinements to the second version of the conformity instrument (i.e., the Phase II: LPCB-43). Specifically, the second version of the conformity instrument was used to observe and code behaviours from a conformity study conducted by Kaba and Beran (2016). The data collected from observing the behaviours displayed in these archival videos revealed that 13 behaviours that were originally included in the second version of the conformity instrument did not occur in at least 3% of the sample. Thus, the researcher discarded these behaviours from the second version of the conformity instrument (i.e., the Phase II: LPCB-43 list) and created the third version of the conformity instrument, consisting of a total of 30 behaviours (i.e., the Phase III: LPCB-30 list). Furthermore, Phase II revealed that observed behaviours in the archival videos occurred similarly with no significant difference across the participants who did not conform, the participants who conformed once or twice, and the participants who conformed three or four times. The behaviours also occurred with no significant difference among male and female participants, and nurses and medical students. A PCA was conducted to determine if participants' behaviours could be grouped into types, and the results revealed nine factors, but the solution was uninterpretable. In Phase III, the third version of the conformity instrument (i.e., the Phase III: LPCB-30 list) was used to observe the participants in real-time simulations sessions. A total of 20% of the participants conformed, and

no one conformed in the C. Difficile Colitis scenario. Two participants conformed in each of the other three scenarios (i.e., DKA, Pneumonia, UGIB). Phase III results showed that some behaviours (averts head, glances to others or things) appeared in all the participants, while others (responds quickly when answering, curses or verbal aggression) did not appear at all. Furthermore, the majority of participants did not conform, and there was not a significant difference in showing conformity between male participants and female participants or between medical residents and students. The occurrence of verbal, nonverbal, and both verbal and nonverbal behaviours combined, was not related to the conformity status of participants.

The last step of Phase III was interviewing the participants and the interviews revealed the following: First, most of the participants admitted to conforming in real life. Second, participants indicated that when dealing with a conflict, they considered their own qualifications (i.e., knowledge, training or experience), and any previous negative experience(s) they had encountered in conflict situations. They seemed to also be influenced by the character of the contrarian, her/his level in the medical hierarchy, and her/his authority, as well as how many colleagues presented opposing opinions. Participants also considered the complexity of conflict and the consequences of facing the conflict or not, on themselves and on their patients. When reacting to a conflict, the participants seemed to reassess the situation and undertake further investigation to make sense of the conflict and to explore the contrarian's point of view. They could also confront the contrarian and present evidence to support their opinion or consult others to avoid embarrassment. Furthermore, some tried to focus on the patient and not on the conflict. In some cases, participants found it easier to conform and accept the opposing opinion.

Finally, the majority of participants perceived expressing an opinion while working with a cohesive team as easier than doing so with a random group. Nevertheless, the following

factors seemed to influence communication within a group: group dynamics or culture, time spent with the group, personality of the preceptor or senior physician leading the group, and the participant's emotional state in the group.

## **Chapter Five: Discussion**

For the purpose of this study, a conformity instrument was created and used in two different settings. Its last version listed 30 behaviours potentially associated with conformity. The primary findings of this study were that the behaviours of those who conformed did not differ from those who did not conform. Furthermore, behaviours did not differ according to sex, specialty (medical versus nursing), or the participant's level in the medical hierarchy (i.e., resident versus student). These behaviours were additionally found to represent a unidimensional, rather than a multi-dimensional construct. The secondary findings of this study suggested that conformity can be associated with a sense of relief rather than with nervousness. In fact, medical students and residents perceived conformity as a natural dynamic of their daily practice. Specifically, they associated conformity with a set of issues (e.g., their own or other's knowledge, experience, previous negative experience, and team cohesiveness) that occur when facing a conflict with a colleague while caring for a patient.

This chapter begins by addressing and discussing the primary findings. Then, the secondary findings are reviewed under the umbrella of three issues: dealing with conflicts in patient care, perceiving conformity as a natural behaviour, and team cohesiveness and communication. Finally, this chapter concludes by outlining the limitations of the current research and by presenting recommendations for future research.

### **Conformity Instrument**

After conducting an extensive literature review, coding archival videos from a previous conformity study, and observing real-time simulation sessions that included a conformity prompt, a measure with a total of 30 behaviours potentially associated with the pressure to conform was created and improved. The 30 behaviours were categorized as verbal or nonverbal.



The nonverbal category was further subcategorized into seven subdivisions: general facial expressions; eyes and eyebrows; mouth and lips related; voice quality and vocal signs; signs related to speaking, head position and movement; body gestures and body posture. A behaviour was recorded once if the participant showed it after being exposed to the conformity prompt during the real-time simulation sessions. If the behaviour did not occur, it was not recorded on the instrument. The *least* frequently reported behaviours of participants were found to be responding quickly when answering and cursing or displaying verbal aggression. Moreover, neither of these behaviours occurred in the real-time simulation sessions. The participants' most frequently occurring behaviours in the real-time simulation sessions were to avert their heads (i.e., to rotate or tilt them) as well as to glance at others or to glance at things. A plausible explanation for the high frequency of participants tilting their heads or glancing at others or things is that such actions are natural when examining a patient and communicating with the medical team. For example, the medical resident or the medical student may have been standing by the bedside and so had to rotate his/her head in order to talk to the patient or the nurse. Similarly, while diagnosing a patient, a natural movement for a student to make is to glance at the monitor that displays a patient's vital signs.

The conformity instrument that was designed for this study had many strengths. At a practical level, it was found to be simple and straightforward, making it user-friendly for both medical educators and students. Furthermore, it was versatile in its application as it could be completed either during real-time simulation sessions or when observing the behaviours of medical and nursing students in video recordings. In addition, the instrument was found to have acceptable inter- and intra-rater reliability. Despite a careful process of identifying behaviours believed to be associated with conformity and observations of them in a highly realistic clinical

environment, the measure, at the same time, may have included clinical behaviors indicative of neither conforming or non-conforming. This possibility explains why the measure did not differentiate conforming and non-conforming participants. All observed verbal and nonverbal behaviours that occurred during the archival videos observed in Phase II (where conformity occurred under ideal conditions) and the real-time simulation sessions observed in Phase III (where conformity occurred in a setting similar to the real field of clinical practice) were similar among participants who conformed and those who did not conform.

The following additional factors are speculated to play a role in the inability of the instrument's scores to discriminate conformity from non-conformity.

First, participants conformed unconsciously. While creating the measure, it was assumed that conformity would cause some nervousness or discomfort because it entails agreeing with inaccurate information suggested by a senior medical professional. As a result, conforming participants were expected to display a set of behaviours that reflected this nervousness or discomfort and suggested their conformity status. However, the debriefing sessions of Phase III revealed that a lack of knowledge was one reason for conformity. Thus, participants who conformed were not always aware that they were agreeing with an inaccurate suggestion. In other words, they did not consciously conform. So, if participants were not conscious or aware that they were doing something wrong while conforming, then it is not surprising that they would not display any behaviours that we initially suspected to be associated with conformity.

Second, conformity could result in a sense of relief or comfort rather than a sense of anxiety or discomfort. Since the conforming participants were following a suggestion made by someone they were trained to follow and trust, it may be that their resultant conformity would not cause anxiety or discomfort. Rather, it could provide those conforming with a sense of relief.

Third, the occurrence of conformity was overlooked in some instances. Some participants were considered as non-conforming participants because at the end of the real-time simulation session, they made the right clinical decision, despite seriously considering and acting upon the incorrect information received. These participants responded or reacted to the conformity prompt in various ways that were not typical to what was initially anticipated in the simulation scenarios and decision charts presented in (appendix G). Thus, these responses or reactions were not considered when marking their conformity status. Furthermore, the participants had to go through many decision points during the real-time simulation sessions before coming up with their conclusion and announcing their final diagnosis or decision. Yet, their conformity status in the current study was determined only based on their final diagnosis. Thus, conformity could have occurred, but was missed by the researcher or the other rater.

Fourth, the instrument seemed to pick up a lot of behaviours (i.e., “noise”) that possibly appeared because of the dynamic nature and context of the real-time simulation sessions. Furthermore, the real-time simulation sessions offered a setting where the participants could have displayed a set of behaviours to hide what they were really thinking or feeling. For example, participants could have avoided responding by asking more questions or they could have changed their place to hide that they are not confident about what they know. This ability to mask behaviours would have resulted in the recording of many additional behaviors, potentially limiting the instrument’s ability to pinpoint conformity behaviours.

Fifth, the small sample size used in the current study could have contributed to the insensitivity of the instrument. A sample size calculation was conducted for the study using G\*Power Version 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007). For a two-tailed test at a moderate effect size of 0.40, alpha of 0.05, and power

of 0.80, the required sample size was determined to be 44. Nevertheless, it was feasible to observe only 30 participants in the available time of the current study. This instrument's inability to discriminate between conforming and non-conformity behaviours suggests that future research look at other signs of conformity or continue to develop other tools. This work is critical as even just one instance of conformity, particularly when one is unsure while facing ambiguous or inaccurate suggestion, creates risk for a patient's health.

In summary, the remarks of participants about their observed conformity behaviours seemed to suggest evidence contrary to what the researcher initially assumed. In fact, the results of this study suggested that conformity can be attributed to a sense of relief rather than to anxiety or discomfort. This relief may be because conformity unconsciously occurred, or a conforming individual was merely following what s/he was trained to do (i.e., trust their senior colleagues), thus not experiencing a confrontation with his/her colleagues. In addition, this relief could have come from the fact that conformity in medicine is positively accepted in many situations. For example, conformity occurs when following hand hygiene procedures and isolation protocols. This study also suggests that the occurrence of conformity is not a black and white matter. Individuals partially conformed by requesting unnecessary lab tests or by not enforcing an important decision. Consequentially, this partial occurrence of conformity should be reflected in the instrument or scale for measuring conformity.

**Occurrence of conformity.** The real-time simulation sessions revealed that 20% of the participants conformed. In this study, the use of a design that incorporated a high level of realism possibly points to what might be more accurate conformity levels in practice than what has previously been suggested in other studies. Though this conformity rate is low in comparison to the numbers reported by Kaba and Bearn (2016), it is still alarming in the medical

field. Nevertheless, it should be considered that conformity rates have widely ranged from 3 - 75% in the literature (Asch, 1951; Asch, 1955; Beran et al, 2013; Crutchfield, 1955; Kaba & Beran, 2016; Neto, 1995; Sheriff, 1935).

The low number of conforming individuals in this study in comparison to prior studies in the field of medical education can be mainly associated with the manipulation of factors influencing conformity. In this research, some of these factors were assumed to occur naturally while others were not properly modified to contribute to the occurrence of conformity. Specifically, there was not a majority in the current study, but rather only one senior colleague was giving the inaccurate information. However, in other studies, several group members formed a majority and gave the same inaccurate information (Asch, 1951; Asch 1955; Beran et al, 2013; Kaba & Beran, 2016). The literature recommended the presence of a majority of four to expose the participant to the maximum conformity pressure; thus, the low number of confederates in the current study could have weakened the pressure to conform (Asch, 1955). Also, the method of decision making can make a difference when one faces the pressure to conform, as it is known that writing the decision can reduce the possibility of conformity (McLeod, 2008). This factor was not manipulated for in this research, to allow the participants to act as they would in real practice. Another factor that could have contributed to a low occurrence of conformity in this study was the presence of an ally. This person can disturb the unanimity of the group, which, in turn, reduces the occurrence of conformity (Asch, 1956; Asch & Guetzkow, 1951). In this study, two participants were undergoing the simulation scenario together as a team thus they may have drawn strength from each other to disagree with the inaccurate information given. Indeed, as Asch (1955, 1956) suggested, when one member of a group disagrees with the proposed inaccurate information, other members feel less pressure to conform to this information. Such an

alliance may have influenced how the non-conforming participants dealt with any information the confederate provided to them, subsequently discouraging conformity (Asch, 1956; Asch & Guetzkow, 1951).

Another reason our conformity rates may have been lower was because we did not record the occurrence of a medical student conforming to a medical resident. For example, a medical student who was involved in the pneumonia scenario agreed with the resident about not complying with the inaccurate suggestion that the confederate gave. However, the medical student did so only because the medical resident made this decision. The medical student even enforced that decision by asking the nurse to comply with the team's decision and to follow the isolation protocol. This conformity became apparent during the interview, when the medical student laughed and said the following:

If my senior [physician] was like let's take the patient off isolation and took [off] the isolation stuff, I would've gone with [the senior's decision]. Just because that is what I am used to [doing] and what I have been trained to do (26 – R2).

Since the medical student's action was correct, this individual was marked as non-conforming, even though the medical student actually conformed to the senior team member (i.e., in this case the resident) who made the right decision in this particular case.

The final reason that we could attribute to the low occurrence of conformity is related to the design of the real-time simulation sessions and the conformity prompts introduced in them. In the real-time simulation sessions, the participants had to go through many decisions before concluding the simulation and committing to a final diagnosis/decision. The continuum of decision offered multiple instances where conformity could have occurred. Yet, these instances were not considered in determining the participant's conformity status. Furthermore, though the

participants thought that the scenarios and the conformity prompts were realistic and similar to what they might face in real clinical practice, they did not provide any additional feedback. The influence of the design on the occurrence of conformity was particularly observed in the C. Difficile Colitis scenario, which, unlike the other three scenarios, resulted in no conforming participants. This scenario was designed to influence conformity based on fear of evaluation; however, the participants comments during the debriefing sessions indicated that they were not thinking that the prompt is reminding them of their evaluation. These comments are understandable considering that the participants were aware that would not be evaluated based on their actions in the simulation sessions. In fact, they were reminded about that during the pre-briefing sessions just before the simulation activity start. Thus, perhaps they did not take the evaluation part of the conformity prompt seriously.

**Conformity, sex, specialty, and the medical hierarchy.** In the archival videos, the verbal and nonverbal behaviours that occurred while participants were conforming were similar between men and women, as well as between medical and nursing students. This finding suggested that neither sex nor medical specialty displayed differences in the types of behaviours that occurred in the face of pressure to conform, at least at this point in a participant's education. One reason that could explain this similarity is that the conformity instrument included behaviours that naturally occur in the context of a clinical setting (e.g., glancing up or down or touching things). Logically, it then follows that both female and male participants, regardless of whether they were medical or nursing students, would show these behaviours while taking the patient's vital signs.

Similar results appeared from the data collected in the real-time simulations, that is, men and women displayed similar verbal and nonverbal behaviours. This similarity also occurred in

medical residents and students. The reason for displaying no difference in conformity behaviours could be the same (i.e., the conformity instrument contained behaviours that are certain to occur as part of diagnosing and treating a patient). Thus, all participants, regardless of their sex, naturally displayed these behaviours in the real-time simulation sessions. Furthermore, there was no significant difference between medical residents and students in showing verbal and nonverbal behaviours. This similarity may be because, in all observed scenarios, students conformed when residents conformed and did not conform when the residents did not conform. In other words, medical students in this study never opposed the medical residents. This complete alliance based on hierarchy suggested the strong occurrence of conformity. Medical students and residents acted as a team in which residents seemed to naturally lead and students naturally followed. The influence of hierarchy and medical students' perceptions of residents as trustworthy leaders may have contributed to the presence of such a strong agreement between residents and students. This influence was also previously addressed in other studies in the literature (e.g., Holm, 1995; Kaba & Beran, 2016; Mcleod, 2008).

### **Dimensionality of Conformity**

As noted earlier, understanding the dimensionality of conformity behaviours is relevant to determining how it should be scored. A unidimensional construct refers to one that has only one theoretical concept, while a multidimensional construct has several distinct but related dimensions manifested as a single theoretical concept (Edwards, 2001). Unidimensional constructs are usually simple and can have either more or less of the construct (Trochim, 2006). In this study, the dimensionality of the data was first examined by relying on theoretical foundations that suggested conformity is multidimensional in nature, as it can be measured in at least two dimensions—verbal behaviours and nonverbal behaviours. Then, PCA was used to



examine the dimensionality of the behaviours observed in the W21C archival videos and real-time simulations. The PCA yielded an uninterpretable solution when PCA was attempted. The uninterpretable solution could be due to two issues. The first issue was the small sample size in Phase II and Phase III. Though there was agreement in the literature about the importance of sample size for conducting a PCA, there was a lack of agreement about the general rule that should be considered (Williams et al., 2010). According to Williams and his colleagues (2010), the lowest acceptable sample size reported in the literature was 100. However, the sample size in both Phase II and Phase III of this research was considerably below that number “99 videos, 30 participants”. The second issue was, is the nature of the behaviours in the version of the conformity instrument used in each phase (i.e., the behaviours were distinct and they were not expected to correlate or occur in a consistent pattern). These results suggested that behaviours occurring while under the pressure to conform, as measured in the present study, may be unidimensional. Nevertheless, considering the data were of low factorability, this suggestion should be re-investigated using a larger sample size with better factorability. Finally, it should be noted that there was no prior clear evidence related to the dimensional structure of conformity. Consequently, alternative means of investigating the dimensionality of such a novice construct were not available or applicable.

## **Secondary Findings**

Along with the previous conclusion that conformity may be associated with a sense of comfort or relief, other secondary findings of this study were related to dealing with conflict in patient care, perceiving conformity as a natural behaviour, and team cohesiveness and communication. The following paragraphs will discuss each of these secondary findings.

**Dealing with conflict in patient care.** In their interviews and along with their own personal characteristics, participants suggested expanding the scope of analysis to include the characteristics of the contrarian (i.e., the opposing individual). Personal characteristics such as being perceived as intelligent, responsible, caring, experienced, and professional can invite more people to conform. Additional characteristics such as being senior and more experienced also seem to play a role. In fact, Lempp and Seale (2004) and Mahood (2011) suggested that learners may comply because they confuse the act of obeying superiors with behaving professionally. Moreover, learners accept hierarchy because they have learned to do so during their training (Hallisy & Haskel, 2008). According to Lempp and Seale (2004) and Mahood (2011), such acceptance is implicitly taught by example in nearly all current medical programs. This suggestion could indicate that individuals in the medical field have adopted a social norm or a hidden ideology of not questioning their senior colleagues. Such a norm or shared ideology could influence the occurrence of groupthink (i.e., concurrence seeking) that consequentially promotes blind or undesirable conformity.

Also, one factor identified by participants as influential in dealing with conflict was the presence of a majority. Whether real or assumed, a majority opinion is known to increase one's tendency to conform (Asch, 1956; Asch & Guetzkow, 1951; Coleman et al., 1958; London & Lim, 1964; Mcleod, 2008; Sherif, 1935). Furthermore, when working with a team, one learns to trust other team members' knowledge, skills and morality. Consequently, if most team members agree to a decision, it is easy to trust that they know what they are doing and that they will not risk the safety of the patient. However, this belief in the morality of the medical team could be a symptom of groupthink and a factor that could incite conformity.

Another influential factor when dealing with conflict is related to the complexity of the situation causing the conflict or the consequences of causing conflict. A complex situation usually requires the consideration of many factors before making a decision; thus, it poses high stress for the group's members. Similarly, taking a decision that can lead to major consequences increases the pressure on group members to make the right decision. The occurrence of both, or at least one, of these factors can provide a context for groupthink and conformity to occur because the group's input is usually perceived as more accurate than an individual's perspective (Asch, 1956; Asch & Guetzkow, 1951; Coleman et al., 1958; Janis, 1971; London & Lim, 1964; Mcleod, 2008; Sherif, 1935).

From another perspective, an action that has no consequences or only minor ones could also influence the occurrence of conformity. This influence is because an individual may perceive that the consequences of speaking up to disagree with a senior team member or a colleague are not worth the consequences of doing so as there will be either minor or no consequences to what is being proposed or stated. For example, in the current study, some participants used the absence of consequences as their justification for avoiding the need to confront a colleague. This rationale that justifies avoiding conflict and overlooking different perspectives indicates that group members in the medical team were avoiding conflict and trying to preserve harmony on their teams. In other words, this logic is a symptom that suggests the occurrence of groupthink within the medical team, which, in turn, could lead to undesirable conformity

**Perceiving conformity as a natural behaviour.** Though conformity seemed to be viewed as a natural behaviour, participants began justifying and explaining why they would conform. One possible reason was because they wanted to clarify that they were not conforming blindly and they probably feared being judged as a *conformist*. This reason has been suggested in other

medical education studies (for example, see Beran, 2012; Beran, Kaba, Caird, & McLaughlin, 2014; Beran, McLaughlin, Al Ansari, & Kassam, 2012; Kaba & Beran, 2016). Moreover, the results from our study extend the current understanding of how medical residents and students perceive conformity and justify its occurrence as a naturally occurring part of their behaviour in a clinical setting. Their agreement may be a way to demonstrate acceptance of the knowledge, beliefs, and judgements that are inherent in the medical profession culture.

Conversely, instead of justifying why they conformed, a couple of participants stated they responded with silence when conforming. Staying silent, for example, is not easily defined in any situation. One can be silent at the beginning of the discussion and then begin actively contributing. Or, one could begin by being expressive and then becoming silent. Thus, either of these responses suggests that conformity displays itself in subtle yet complicated ways that were or could have been missed in the current study.

**Cohesiveness of team and communication.** The majority of participants stated that the cohesiveness of the team influenced the way they expressed their opinions. Cohesiveness relates to the unity of the group (Janis, 1971; McCauley, 1998), and is the extent to which individuals are motivated to be part of the group and driven to work towards its goals (Wendt, Euwma, & van Emmirk, 2009). This sense of unity allows individuals to express their opinions without fear of being negatively judged by other team members. In addition, it inspires an individual to speak her/his mind to improve the performance of the whole team (Wendt et al., 2009). Nevertheless, this cohesiveness can also promote groupthink or concurrence seeking when it hinders individuals from freely expressing their opinions and exploring alternatives from resources outside the group (McCauley, 1998). That is, the cohesiveness of a group can become a problem

if its cohesiveness becomes more important than committing to an effective decision-making process, and could result in faulty decisions.

Other factors that participants attributed to good communication within a group included the group's dynamics or culture, the amount of time spent with the group, the personality of the preceptor or senior physician leading the group, and a participant's emotional state in the group. The participants' perceptions that these factors were important in enhancing communication within the team was not surprising, as they are known to play a role in influencing communication and conformity (Bond & Smith, 1996). Though the role of group culture has been investigated in the literature across countries, our participants pointed out that this influence is also true in cultures across specialties. For example, surgery rotations are perceived to be quick-paced and not allowing much time for discussion or questioning. The personality of the preceptor or senior physician who is usually the group's leader also appears to influence communication as s/he sets the tone for communication between group members. If s/he encourages asking questions and discussing concerns, junior team members feel more at ease in sharing their opinions with other group members. Furthermore, group members seem to follow the example of more expressive group members and then themselves begin asking questions or raising concerns.

The opposite also seems to be true in that a promotional leader who announces her/his decisions and favoured solutions without genuinely encouraging questions, concerns, and alternatives can discourage healthy communication. In fact, such promotional leadership can present a structural fault in a group that can influence groupthink and blind conformity to occur. Consequentially, leaders or senior team members must establish an open and safe environment that welcomes sharing questions, concerns, and suggestions to enhance communication within

the group. This environment should also promote informed decision making rather than groupthink and blind conformity that could jeopardize the optimum provision of health care. Nevertheless, the liability of establishing such an environment should not only be assigned to leaders and senior team members. Rather, educators must begin promoting such an environment as part of the hidden curriculum in medicine. Furthermore, educators should teach medical students how to properly fulfil their roles as leaders and communicators who invite and explore alternatives and opposing ideas, evaluate them, and take informed decisions that focus on providing appropriate patient care. Likewise, junior medical students should be aware that they are more susceptible to blind conformity and premature concurrence seeking. Accordingly, they should practice assertive communication styles to address their concerns within the medical team.

### **Limitations of the Research**

The work in the current study was challenged by limitations related to the study design, the complexity of conformity as a phenomenon, and measurement properties. The following paragraphs will discuss each limitation in detail.

**Limitations related to study design.** This research is observational in nature. It did not fully control for factors that could have influenced the occurrence of conformity, such as the size of the majority, group unanimity, the method of making the decision, personal characteristics, or culture (Asch, 1955, 1956; Levine, 1999). Rather, these factors were designed in the simulation to match the clinical environment. In addition, the observational nature of this study poses challenges related to standardization. For example, we could not standardize the physical position of participants in the simulation lab, which sometimes contributed to missing some of the behaviours participants showed during simulation. Furthermore, standardizing the time of

exposing the participants to the study's conformity prompt (i.e., the start point for coding behaviours) was challenging and led to a longer period of observation for some participants in comparison to others. Nonetheless, the effect of these standardization issues was minimized in several ways. For instance, the researcher and the other rater observed the behaviours of participants during simulation, as well as video recordings of these sessions to reduce the risk of missing any behaviours. To consider the time standardization issue, the researcher planned to expose the participants to the conformity prompt at the same time in all the scenarios (i.e., around the time the participant had formulated her/his list of differential diagnoses). Nevertheless, the researcher decided that it was more important for the study to have the participants spend enough time to understand the simulation scenario. This understanding happened at a different pace based on the participants (i.e., the medical resident and the medical student) and was assessed by the simulation instructor.

Additional minor limitations related to the design of this research include the following. The scenarios were not structured to expose the participants to group pressure. Rather, participants were exposed to information suggested by one senior colleague. Though this exposure may have limited the occurrence of conformity, it did provide a more realistic context to understand the phenomena in a semi-natural setting.

In addition, conducting the research in a simulation centre revealed specific challenges, such as the need to define alternative courses of action that were not feasible in all four scenarios selected for this research. Ideally, having scenarios where the tasks were singular (e.g., taking vital signs) with fewer possible acceptable alternatives may have enabled better observation of the occurrence of conformity rather than having scenarios where tasks were layered (e.g., diagnosing a disease) (Walsh, 2009). In addition, the focus of this study was on observing if

conformity occurred in response to an inaccurate suggestion posed by our confederate. Instead, conformity should have been observed with respect to the specific rank in the line of authority or chain of command. In other words, instead of observing if both the medical resident and the student were conforming to a confederate who was a more senior physician, it may have been useful to observe if the resident was conforming to the more senior physician and if the student was conforming to the resident.

**Limitations related to defining and measuring conformity.** Conformity is a complex phenomenon that is difficult to define, especially in clinical situations. In the current study, the focus was on the occurrence of conformity and possible behaviours associated with it when participants were under pressure to agree with the group or its members, especially when they were unsure if the group was correct or when they were certain that the group was wrong. More particularly, conformity was defined as yielding to pressure applied by a senior member of the healthcare team through the provision of an unfitting suggestion or information. Adopting this definition may have resulted in underestimating the occurrence of conformity in reference to accurate information. In addition, attempts to precisely define what constituted conformity for each of the four simulation scenarios was continuously challenged. This was because participants provided unanticipated decisions. For example, one participant decided to consider our confederate's incorrect suggestion by requesting a series of unnecessary medical tests. Furthermore, this participant verbalized a commitment to the right diagnosis while considering the shared inaccurate information. This double action led to the realization that judging a participant's conformity to an inaccurate suggestion must be built on an understanding of that participant's action in light of how fully the act achieved the underlying purpose of the activity. For instance, in the pneumonia simulation scenario, an isolation protocol had to be followed



wherein the participants were obligated to wear isolation gear. Nevertheless, a confederate who was a senior physician suggested that the isolation gear was not needed. Based on this suggestion, the nurse started to take off her isolation gear and continued to provide care to the patient. At this stage of their clinical training, the study participants recognized that the main reason for following this isolation protocol was to protect oneself, one's clinical team members, the patient receiving care, and other patients in the hospital. Thus, if a participant (the medical resident or student) adhered to the isolation protocol, then it could be concluded that the participant did not conform to the erroneous suggestion that the confederate provided. However, if the participant did not encourage her/his colleagues to follow the isolation protocol, which subsequently threatened the purpose of the isolation activity, then the participant would have been considered as conforming or at least partially conforming. In this case, the participant undermined the purpose of the isolation just the same as a participant who conformed would have done so in this scenario. Thus, it is recommended that future research consider evaluating the degree to which people conform rather than just the presence and absence of conformity.

Furthermore, answering the question (at what point do you record the behaviours that could correspond with the conformity?) caused a serious challenge while designing this research. Due to the lack of evidence, the time frame to observe the behaviours potentially associated with conformity was established based on discussions with conformity expert. It is possible that that the time frame set was wide and resulted in observing irrelevant behaviours. Thus, it is recommended that future research consider examining the proper time-frame to observe behaviours that could correspond with the occurrence of conformity.

Another issue that speaks to the complexity of conformity is that it operates along with other dynamics and influences that were difficult to control for in this observational study. For

instance, some participants' potential confusion and anxiety from participating in simulation could have affected their behaviours, and, thus, were not necessarily a direct result of conformity pressure. Another influence was the physical presence of the researcher and the other rater in the simulation lab, which could have inadvertently affected participants' behaviours. Sometimes the participant made eye contact, smiled at the researcher or the other rater, or even expected them to restate what the nurse had said, if she was busy. This kind of communication suggested that participants were aware that they were being observed and, consequently, they could have felt distracted, anxious, or suspicious. However, control of all possible factors was difficult, if not impossible, in such simulated situations. Therefore, to minimize the possibility of missing important factors, the researcher and the other rater remained alert and took notes during the pre-briefing sessions, simulation sessions, and debriefing sessions. In addition, meetings were held with the simulation instructor to discuss what was observed both during the simulation sessions and the debriefing sessions.

**Limitations related to measurement.** Since conformity behaviours have not been investigated by other researchers, it was challenging in this study to provide evidence of content validity. Our attempt to account for this type of validity was based on our effort to ensure the comprehensiveness of all possible behaviours suggestive of conformity in the available literature. Moreover, experts on the topic of conformity were consulted when writing items for the measure.

Regarding reliability, attempts were made to provide evidence of the consistency of each raters' scores (i.e., intra-rater reliability). Behaviours were observed and marked for their occurrence during real-time simulation sessions by the researcher and the other rater. Then, at a later point in time, the researcher and the other rater watched videos of the participants that they

had previously observed to re-score the occurrence of the behaviours. This method was not ideal, as the researcher and the other rater could pause and replay videos during the re-scoring, although they could not perform this same check in real-time simulation sessions. Yet, as Hubley and Zumbo (2011) aptly stated, “Evidence is always incomplete” (p. 221).

A major limitation was that some behaviours seemingly indicative of conformity may have occurred as a participant’s natural response to the simulation itself. For example, touching things such as an iPad, a medical book, or a patient’s record are typical behaviours that can be observed in any clinical encounter. Indeed, a clinician cannot provide treatment without touching something. In the present study, all behaviours were recorded at the time of the conformity prompt if they were assumed to be related to conformity. Furthermore, some behaviours appeared before conformity was prompted and continued after it. However, this detail was not accounted for while using the instrument (e.g., a person who naturally extensively blinked received the same code as a person who began blinking extensively after hearing inaccurate information). Thus, behaviours other than those associated with the pressure to conform may have been measured.

### **Practical Considerations for Future Research**

The uniqueness of this study lies not only in its attempt to create a conformity instrument and its ecologically valid design, but also in its secondary findings. The secondary findings of the current study revealed that participants perceived conformity to be a natural behaviour and that it could cause comfort and relief in response to anxiety in medical education or clinical contexts. In addition, several steps were considered while conducting this research.. These steps are summarized below as practical tips or considerations for the study of conformity within clinical simulations:

- The design and implementation of deception research must align with ethical and professional codes. Studying conformity usually involves a level of deception because when a participant knows that a researcher is interested in a social or psychological phenomenon, this knowledge will tend to influence the participant's response. Thus, deception should be designed and implemented with caution and respect to known ethical and professional codes. Consequently, we recommend that researchers keep only the topic of interest (i.e., conformity) hidden and share the fact that a study is being conducted. If the plan is for the researcher(s) to be seen by the participants before or during the simulation session, then we suggest that the researcher (s) be introduced during pre-briefing. However, participants should also be assured that they will not be evaluated by the researcher(s) and that the intent of the study is not to jeopardize the safe educational environment of simulation. This consideration can establish a relationship of trust between participants and the researchers to promote participants' cooperation.
- Decide clearly on the type of conformity pressure to apply (peer pressure versus hierarchy pressure) and on the reason for conformity to be considered, for example, due to a lack of knowledge, a fear of evaluation, or for a sense of belonging.
- Select simulation scenarios carefully with consideration of their level of complexity. Simpler scenarios that incorporate single tasks with a clear set of clinical expectations will facilitate clearer observations of conformity.
- After selecting the simulation scenarios, it is critical that a researcher clearly defines conformity in each scenario (i.e., how it partially occurs and whether a set of behaviours is to be coded as conformity or non-conformity).

- Confederates must be properly trained so that they precisely understand what is expected from them. This training will reduce the influence of confounding variables that could bias participants' behaviours. Otherwise, confederates may not be consistent in their presentation of a clinical scenario and provide too much or too little information to participants. In both cases, such inconsistency could affect a study's conclusions. It is important, therefore, to train confederates in providing a level of standardization that will contribute to the validity of the study.
- The researcher(s) must assess whether the simulation scenario is realistic. Thus, it is important that the researcher(s) inquire about the simulation's realism with the simulation instructors and the participants, especially after they experience the scenarios. This inquiry will enable much needed and necessary feedback to the researcher(s). This assessment could take place during the debriefing sessions or during the research debriefing sessions.
- Recording the simulation and debriefing sessions is useful for ensuring consistency in coding. Although we encourage live observations, video records are useful for confirming coding consistency.
- A final general recommendation is for researchers to maintain notes of comments, jokes, gestures, actions, or responses that transpired during the pre-briefing, simulation, or debriefing sessions. Such notes can contribute to providing insights into the context and meaning of the phenomenon of conformity.

### **Suggestions for Future Research**

Conformity in medical education is under-researched. Thus, further research should attempt to continue to collect evidence about its occurrence, its impact, and to help us understand how conformity in a clinical setting may be the same or different from conformity in other social

settings. The present study reveals the importance of preparing medical educators and students in dealing with conformity when it occurs. This preparation should be done in a manner that ensures learning and informed decision-making that support providing optimal health care. Furthermore, deception is typically integrated as part of conformity research. This integration is understandable because of the possibility that social desirability can affect the occurrence of conformity. With continued respectful and considerate use of how deception is implemented, it is permissible as a means of obtaining information about people's true behaviours (Stang, 1976). Nevertheless, future research should conduct direct comparisons of people's conformity behaviours when they are aware, as compared to not aware, of the purpose of the study to determine differences in study results that may occur. Also, the use of qualitative approaches to investigating the phenomenon of conformity can offer enriched insights into why it occurs.

Although there is increasing interest in conducting simulation-based research, the quality of its design and the procedures and standards employed seem to fluctuate from one study to another (Cheng et al., 2014). This quality should not be overlooked by future researchers who are using simulation as part of their studies. Thus, we join Cheng in emphasizing the importance of explaining and reflecting on used designs and research methods in simulation-based research. Moreover, most simulation research in medical education has focused on understanding simulation as an educational instrument, while investigating it in a research context or setting has not received enough attention.

The results of our study suggest particular areas to be investigated in the future. At the beginning of this study, conformity and anxiety were suspected to be two sides of the same coin. In contrast, the findings suggest that participants in simulation seemed more at ease when joining the group and appreciated having guidance from a senior colleague, regardless of the inaccuracy

of this guidance. Consequently, it is recommended that researchers further explore the relationship between conformity and anxiety.

The results of this study also suggest that conformity in medical education seems to follow the direct chain of command (i.e., students conform to their residents and residents conform to their more senior medical staff members). However, the influence that comes from facing two different levels of authority and conformity was not explored in the current study; this influence should be investigated as it will extend the understanding of the occurrence of conformity in medical education.

### **Research Dissemination**

The overall dissemination plan for this study was to raise awareness among medical educators and diverse health care professionals about the phenomenon of conformity, how it could influence the process of clinical decision making, and how it may possibly result in jeopardizing patient care. The specific objectives included:

- To inform different health care professionals about what conformity is, how medical residents and students perceive it, what factors influence its occurrence and promote its existence, and why medical educators and health care professionals need to be alerted to conformity.
- To engage medical educators and medical professionals in establishing a safe learning environment and a culture that welcomes the sharing of concerns and opposing opinions.
- To engage medical educators in developing and improving communication programs that would promote the principles of assertive communication so as to limit the occurrence of blind or undesirable conformity.

- To promote further research in understanding the occurrence of conformity in a clinical setting and to help develop solutions that limit miscommunication and eliminate blind or undesirable conformity.

The results of the current dissertation will be disseminated to any group of health professionals who can affect or be affected by conformity. More specifically, the following groups will be considered as the target audience in our dissemination plan: medical educators, health care professionals, and health care students. Medical educators play an important role in developing, running, and evaluating different educational programs, while health care professionals and students are the main stakeholders that usually function within peer groups and are at risk of facing situations where conformity could influence collaboration and decision-making, as well as impact learning.

Two means of dissemination will be primarily considered to communicate the results of the current study. **(1) Journal article (s):** Publications through peer-reviewed journals are one of the most effective and efficient ways to communicate research findings among professionals. A journal article would serve in reaching a broad range of our target audience. Thus, our dissemination efforts would consider journals such as medical education, medical teaching academic medicine, advances in health sciences education, interprofessional care, nursing education, and simulation. **(2) Local and international conference presentations and publications:** The dissemination of research findings through presenting materials at conferences or symposia is one of the common ways of exchanging knowledge and experience. Accordingly, giving an oral presentation, sharing a research brief or poster at various conferences will be considered. An example of the conferences that the researcher would be interested in are the following: AMEE's annual conference, The Saudi Health Simulation



Conference, The Saudi International Medical Education Conference, The Simulation Summit, and The Asia Pacific Medical Education Conference. Moreover, additional dissemination would occur through any other possible academic opportunity such as discussing the dissertation in journal clubs or any other educational activity.

## **Conclusion**

This study attempted to create an instrument to measure verbal and nonverbal behaviours that occur when people are conforming. The instrument was straightforward and user-friendly for both medical educators and students. Furthermore, it could be used to observe the behaviours during real-time or video-recorded simulation sessions and it had acceptable levels of rater reliability. Despite a careful process of creating the instrument, it was not able to discriminate conformity from non-conformity.

Many factors were speculated to contribute to the instrument's inability to differentiate between conformity and non-conformity. First, the instrument included natural clinical behaviours not indicative of conformity or non-conformity. Also, the researcher initially assumed that conformity caused a level of nervousness or discomfort which was not always the case during the current research. This assumption failed either because the participants conformed unconsciously or because they felt a sense of relief by following what they were trained to do i.e., follow a trusted senior colleague. In addition, the participants had to go through many decision points before coming up with their final conclusion and commit to a final decision. Yet, conformity status was determined only based on their final decision which could have resulted in missing the occurrence of conformity during the simulation sessions. Finally, the simulation environment offered a rich setting that enabled the participants to disguise their thoughts and feelings by displaying a set of behaviours. Since the behaviours did not

discriminate conformity from non-conformity, we learned that the behaviours may reflect people's general responses to the *pressure to conform* within a simulated clinical environment. Besides that, these behaviours represent a unidimensional construct indicative of some type of relief to stress.

Additionally, we learned from the interviews that medical residents and students perceive conformity as a naturally-occurring behaviour, and they justify its occurrence based on their own level of knowledge and training, especially when it conflicts with someone who is higher in the medical hierarchy. They also viewed conformity as a natural behaviour that occurs among their colleagues, and in response to the decisions or knowledge expressed by senior team members, whom they regard as trusted colleagues who are helping them learn how to manage patient care. What is more, when medical residents and students sense the pressure to conform to senior colleagues, they tend to deal with this conflict by analyzing the situation and considering their own knowledge and experience, the characteristics of the opposing individual (e.g., her/his knowledge, skills, authority and level in hierarchy), and the situation's severity or consequences. As well, the interviews helped us to understand that the time spent in a team, its cohesiveness, its culture, and the communication norms set by the team's senior, may or may not facilitate the expression of individuals' opinions within the group.

This study has enhanced our understanding of the complexity of studying conformity, especially beyond the boundaries of experiments. Many confounding variables occur naturally alongside conformity. This occurrence makes dissecting conformity and examining it alone challenging, especially in contexts such as simulation sessions. Yet, efforts should be directed at identifying and understanding these factors to gain a deeper understanding of conformity in a clinical setting.



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## Appendix A

### Literature Search Protocol

#### General goal for the literature search:

- Articles that described general behaviours/characteristics of individuals who may conform.
- Scales that described behaviours/characteristics of individuals who may conform.

DB Name	Search Terms	Dates Searched	Studies Retrieved	Initial Screen (Possibly Relevant)
OVID (PsycINFO)	<u>Group (A)</u> (Instrument* OR Measure* OR measurement* Scale*). tw	Not specified (NS)	634294	N A
	<u>Group (B)</u> (Conformity* OR Conformity behavior* OR Conformity behaviour* OR Nonconformity* OR Nonconformity behavior* OR Nonconformity behaviour OR Group dynamic* OR Group behavior* OR Group behaviour* OR Group pressure* OR Group influence* OR Peer pressure* OR Peer influence* OR Agitation behaviour* OR Agitation behavior* OR Anxiety behaviour* OR Anxiety behavior*).tw	NS	18089	N A
	<u>Group (3)</u> (Verbal communication OR Non verbal communication OR Gesture* OR Facial expression OR posture* OR Body language*).tw	NS	21914	N A
	Group A AND Group B AND Group C	NS	5	2

Group A AND Group B	NS	3018	3
		Limiting search for adults (8 Years and older) We have 1273	1
Group B AND Group C	NS	60	10

Notes:  
The search terms are presented in the exact way that they were entered when searching the database.  
The (\*) at the end of the words will make the database search for both singular and plural form of the search term.

DB Name	Search Terms	Dates Searched	Studies Retrieved	Initial Screen (Possibly Relevant)
OVID (MEDLINE)	<u>Group (A)</u> (Instrument* OR Measure* OR measurement* Scale*). tw	NS	2209699	NA
	<u>Group (B)</u> (Conformity* OR Conformity behavior* OR Conformity behaviour* OR Nonconformity* OR Nonconformity behavior* OR Group dynamic* OR Group behaviour* OR Group behavior* OR Group pressure* OR Group influence* OR Peer pressure* OR Peer influence* OR Agitation behaviour* OR Agitation behavior* OR Anxiety behaviour* OR Anxiety behavior*).tw	NS	8794	NA
	<u>Group (3)</u> (Verbal communication OR Non-verbal communication OR Gesture* OR Facial expression* OR posture* OR Body language*).tw	NS	29097	NA
	Group A AND Group B AND Group C	NS	2	-
	Group A AND Group B	NS	1761	8
			Age limitation did not change the no.	
	Group B AND Group C	NS	25	1

Notes:

The search terms are presented in the exact way that they were entered when searching the database.  
The (\*) at the end of the words will make the database search for both singular and plural form of the search term.

DB Name	Search Terms	Dates Searched	Studies Retrieved	Initial Screen (Possibly Relevant)
OVID (HaPI)	<u>Group (A)</u> (Instrument* OR Measure* OR measurement* Scale*). tw	NS	41525	
	<u>Group (B)</u> (Conformity* OR Conformity behavior* OR Conformity behaviour* OR Nonconformity* OR Nonconformity behavior* OR Group dynamic* OR Group behaviour* OR Group behavior* OR <u>Group pressure*</u> OR <u>Group influence*</u> OR Peer pressure* OR Peer influence* OR Agitation behaviour* OR Agitation behavior* OR Anxiety behaviour* OR Anxiety behavior*).tw	NS	630	
	<u>Group (3)</u> (Verbal communication OR Nonverbal communication OR Gesture* OR Facial expression OR posture* OR Body language*).tw	NS	991	
	Group A AND Group B AND Group C	NS	0	-
	Group A AND Group B	NS	209 Age limitation did not change the no.	16
	Group B AND Group C	NS	4	2
Notes: The search terms are presented in the exact way that they were entered when searching the database.				

The (\*) at the end of the words will make the database search for both singular and plural form of the search term.

<b>Excluded Terms</b>	<b>Reason for exclusion</b>
<b>Behavioral anchored scale*</b> <b>Behavioural anchored scale*</b>	Yielded 0 results in all three databases.
<b>Communication</b>	Too broad and yield a lot of irrelevant literature
<b>Copying</b>	Too broad and yield a lot of irrelevant literature
<b>Mimicry</b>	Too broad and yield a lot of irrelevant literature
<b>Restlessness, Distractibility OR inability to concentrate, Vigilance, Imitation</b>	Too specific and narrowed the result of the

## Appendix B

### The First Version of the Conformity Instrument (Phase 1: List of Potential Conformity

#### Behaviours-118)

##### A. Non-Verbal behaviours

Non-verbal sign	Source	Comments
<b>Gaze, ocular or eyebrow movement</b>		
<input type="checkbox"/> Direct gaze	(Jusyte, Schneidt, & Schönenberg, 2015) (Holas, Krejtz, Cyprianska, & Nezlek, 2014)	Stimulus for social anxiety
<input type="checkbox"/> Altered ocular exploration of facial stimuli	(Di Simplicio et al., 2014)	Sign of anxiety
<input type="checkbox"/> Has difficulty making eye contact with others	SIAS, (Peters, 2000)	
<input type="checkbox"/> Averts gaze	(Duryea, 1991)	Signs of submission
<input type="checkbox"/> Down word glances	(Duryea, 1991)	Signs of submission
<input type="checkbox"/> Looks at an angle	(Duryea, 1991)	People, who communicate frontally and look and speak to other directly, are perceived as self-assured.
<input type="checkbox"/> Stares at colleague	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Initiates eye contact	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Averts eyes	(Ridgeway, 1987)	Submissive behaviours that could indicate conformity
<input type="checkbox"/> Occasionally sneaks glances to others	(Ridgeway, 1987)	Submissive behaviours that could indicate conformity
<input type="checkbox"/> Knits eye brows	(Ridgeway, 1987)	Submissive behaviours that could indicate conformity
<input type="checkbox"/> Blinks excessively	(Asch, 1952)	
<input type="checkbox"/> Lowers eyebrows	Kaba's Notes PhD 2014 (Published as Kaba & Beran, 2016)	
<input type="checkbox"/> Raises eyebrows	Kaba's Notes (Kaba & Beran, 2016)	



<input type="checkbox"/> Flashbulb eyes	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Eye-contact with participant and confederate(s)	Kaba's Notes (Kaba & Beran, 2016)	
Vocal signs or signs associated with speaking (Communication)		
<input type="checkbox"/> Speaks at angle	(Duryea, 1991)	People, who communicate frontally and look and speak to other directly, are perceived as self-assured.
<input type="checkbox"/> Strange noise	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Verbal bossiness	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Uses repetitive sentences or questions	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Shouts	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Commands	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Speaks first	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Responds quickly in conversation	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Confident voice tone	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Voice with a pleading tone	(Ridgeway, 1987)	Submissive behaviours that could indicate conformity
<input type="checkbox"/> Pauses before answering	(Asch, 1952, 1955; Asch & Guetzkow, 1951)	
<input type="checkbox"/> Whispers/ Lowers voice	(Asch, 1952, 1955; Asch & Guetzkow, 1951)	
<input type="checkbox"/> Grins embarrassedly	(Asch, 1952; Asch & Guetzkow, 1951)	
<input type="checkbox"/> Clears throat	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Yawns	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Talks excessively	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Speaks in response to direct prompts	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Remains silent, uses minimal verbal interaction	Kaba's Notes (Kaba & Beran, 2016)	

<input type="checkbox"/> Raises voice	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Soft voice/whispers	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Normal volume	Kaba's Notes (Kaba & Beran, 2016)	
<b>Facial Expression / Signs</b>		
<input type="checkbox"/> Angry face	(Jusyte et al., 2015) (Holas et al., 2014)	Stimulus for social anxiety
<input type="checkbox"/> Faces signaling threats or disapproval	(Jusyte & Schöenberg, 2014)	Stimuli for social anxiety
<input type="checkbox"/> Blushes	(Carleton, Collimore, & Asmundson, 2010) (Mauss, Wilhelm, & Gross, 2004)	Carleton identified it as a symptom of social anxiety.
<input type="checkbox"/> Fearful facial expression	(Mauss et al., 2004)	
<input type="checkbox"/> Rigid facial expression	(Mauss et al., 2004)	
<input type="checkbox"/> Feigned smile	(Duryea, 1991)	
<input type="checkbox"/> Smiles in an embarrassed way	(Asch, 1952, 1955; Asch & Guetzkow, 1951)	
<input type="checkbox"/> Emotionless Face	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Jaw-drop	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Lip compression	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Lip purse	Kaba's Notes (Kaba & Beran, 2016)	
<b>Head Position / Movement</b>		
<input type="checkbox"/> Frontal or averted head position	(Jusyte et al., 2015) (Holas et al., 2014)	Stimulus for social anxiety
<input type="checkbox"/> Shakes head	(Asch, 1952)	
<input type="checkbox"/> Head nod	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Head shake	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Head tilt (sideways)	Kaba's Notes (Kaba & Beran, 2016)	
<b>Body posture / gestures / signs</b>		
<input type="checkbox"/> Avoidance, leads to misattributions of anxiety stimulus	(Di Simplicio et al., 2014)	Anxiety is associated with altered ocular exploration of facial stimuli

<input type="checkbox"/> Rigid posture	(Mauss et al., 2004)	
<input type="checkbox"/> Hands and arms kept close to the body	(Duryea, 1991)	
<input type="checkbox"/> Sweaty palms	(Mauss et al., 2004)	I think it is going to be challenging to code for those signs.
<input type="checkbox"/> Trembles (e.g. in the hand)	(Shea, Tennant, & Pallant, 2009)	Items extracted from Depression, Anxiety and Stress Scale (DASS)
<input type="checkbox"/> Touches	(Shea et al., 2009)	Items extracted from Depression, Anxiety and Stress Scale (DASS)
<input type="checkbox"/> Paces, aimless wanders	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Scratching	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Tries to get to a different place	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Handles things in appropriately	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Tense, slumps or cowering posture	(Ridgeway, 1987)	Submissive behaviours that could indicate conformity
<input type="checkbox"/> Mimics posture of colleagues <input type="checkbox"/> Copies behaviours of group members (physical mimicry)	(LaFrance & Broadbent, 1976)	An indicator of group rapport. No specific posture position was mentioned.
<input type="checkbox"/> Crosses	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Palm down	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Palm up	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Shrugs shoulder	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Angular distance	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Participant faces confederate(s)	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Participant angles away from confederate(s)	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Participant moves away from confederate(s)	Kaba's Notes (Kaba & Beran, 2016)	

<input type="checkbox"/> Participant moves closer to confederate(s)	Kaba's Notes (Kaba & Beran, 2016)	
<b>Vital Signs</b>		
<input type="checkbox"/> Racing heart	(Mauss et al., 2004)	I think it is going to be challenging to code for those signs.
<input type="checkbox"/> Shortness of breath	(Mauss et al., 2004)	I think it is going to be challenging to code for those signs.
<input type="checkbox"/> Breathing difficulty	(Shea et al., 2009)	Items extracted from Depression, Anxiety and Stress Scale (DASS)
<b>Other signs</b>		
<input type="checkbox"/> Exhibits altered processing of facial affect, especially expressions signaling threat	(Jusyte & Schöenberg, 2014)	Stimuli for social anxiety
<input type="checkbox"/> Vigilance <input type="checkbox"/> Hyper vigilance	(Holas et al., 2014) (Capitao et al., 2014) (Ein-Dor & Perry, 2014) (Di Simplicio et al., 2014)	Is associated with anxious individuals
<input type="checkbox"/> Quick to detect probes replacing threatening faces	Capitao et al., 2014)	
<input type="checkbox"/> Distracted	Capitao et al., 2014)	
<input type="checkbox"/> Slow in identify the color of words communicating danger or threat	Capitao et al., 2014)	
<input type="checkbox"/> Participants could look for additional information	(Claidiere, Bowler, & Whiten, 2012)	This sign is very broad and could be seen in verbal forms or non-verbal forms. How to deal with it?
<input type="checkbox"/> Over reacts	(Shea et al., 2009)	Items extracted from Depression, Anxiety and Stress Scale (DASS)
<input type="checkbox"/> Uses a lot of nervous energy	(Shea et al., 2009)	Items extracted from Depression, Anxiety and Stress Scale (DASS)
<input type="checkbox"/> Finds it difficult to relax	(Shea et al., 2009)	Items extracted from Depression, Anxiety and Stress Scale (DASS)

<input type="checkbox"/> Intolerant	(Shea et al., 2009)	Items extracted from Depression, Anxiety and Stress Scale (DASS)
<input type="checkbox"/> Positive mood	(Tong, Tan, Latheef, Selamat, & Tan, 2008)	Positive mood enhances informational conformity
<input type="checkbox"/> Negative mood	(Tong et al., 2008)	Negative mood reduces informational conformity
<input type="checkbox"/> Negativism	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Restriction in attention and processing capacity. (Distracted and slow in responding)	(Blanchette, Richards, & Cross, 2007)	The author identified a contradiction in the literature where some associated anxiety with the stated signs and other pointed out that anxiety may be associated with a broadening of attention and of the range of information processed. These latest signs are not really relevant to conformity thus they were ignored.
<input type="checkbox"/> Less influenced by contextual information.	(Blanchette et al., 2007)	
<input type="checkbox"/> Seek out more information before reach a decision	(Blanchette et al., 2007)	
<input type="checkbox"/> Increase worry	(Blanchette et al., 2007)	
<input type="checkbox"/> Nervous when speaks with someone in authority	Social Interaction Anxiety Scale (SIAS), (Peters, 2000)	
<input type="checkbox"/> Shyness	(Duryea, 1991)	
<input type="checkbox"/> General restlessness	Cohen-Mansfield Agitation Inventory CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Relevant interruptions	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Irrelevant interruptions	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Does not like anything	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Repetition manner	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Down	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Chose head of table	(Ridgeway, 1987)	Assertive behaviours that could stimulate conformity
<input type="checkbox"/> Disoriented	(Asch, 1952; Asch & Guetzkow, 1951)	
<input type="checkbox"/> Doubt ridden	(Asch, 1952; Asch & Guetzkow, 1951)	

<input type="checkbox"/> Puzzled	(Asch, 1952; Asch & Guetzkow, 1951)	
<input type="checkbox"/> Hesitant	(Asch, 1952; Asch & Guetzkow, 1951)	
<input type="checkbox"/> Antigravity sign	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Rapport (friendly) developing between group members	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Warm relationship amongst group members	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Hostile relationship amongst group members	Kaba's Notes (Kaba & Beran, 2016)	
<input type="checkbox"/> Participant "relates" to confederates	Kaba's Notes (Kaba & Beran, 2016)	

Verbal sign	Source	Comments
<input type="checkbox"/> I always disagree – darn it!	(Asch & Guetzkow, 1951)	Sign shown by participant who did not conform
<input type="checkbox"/> Curses or verbal aggression	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Constant request for help	CMAI, (Cohen-Mansfield, 1996)	
<input type="checkbox"/> Complains	CMAI, (Cohen-Mansfield, 1996)	

## Appendix C

### The Second Version of the Conformity Instrument (Phase II: List of Potential Conformity Behaviours-43)

Conformity Instrument (Last Changed September 2015)				
	1. Non-Verbal Behaviours		2. Verbal Behaviours	
	<b>1.1 General Face Expressions</b>	<b>Comments</b>	<input type="checkbox"/> A statement that indicates the participant is uncomfortable e.g. I always disagree – darn it!	
	<input type="checkbox"/> Angry or disapproving face		<input type="checkbox"/> Curses or verbal aggression	
	<input type="checkbox"/> I cannot remember or I am trying to remember facial expression		<input type="checkbox"/> Asks for help or for additional information about task at hand	
	<input type="checkbox"/> Emotionless facial expression (Blank)		<input type="checkbox"/> Asks for a chance to re-check inputs (e.g. manikin vital signs)	
	<b>1.2 Eye and Eyebrows</b>			
	<input type="checkbox"/> Glances to others or things			
	<input type="checkbox"/> Gazes or glances up or down			
	<input type="checkbox"/> Flashbulb eyes (Widening of the eyes)			
	<input type="checkbox"/> Blinks excessively			
	<input type="checkbox"/> Lateral eye movement (CLEM)			
	<input type="checkbox"/> Lowers or knits eyebrow			
	<input type="checkbox"/> Raises eyebrow			
	<b>1.3 Mouth and Lips Related</b>			
	<input type="checkbox"/> Smiles in an embarrassed way or fake smiling			
	<input type="checkbox"/> Jaw-drops			
	<input type="checkbox"/> Compresses or purses lips			
	<b>1.4 Voice Quality and Vocal Signs</b>			
	<input type="checkbox"/> Normal or confident volume			
	<input type="checkbox"/> Lowers voice or whispers			
	<input type="checkbox"/> Raises voice			
	<input type="checkbox"/> Strange noise			
	<input type="checkbox"/> Clears throat			
	<b>1.5 Related to Speaking</b>			
	<input type="checkbox"/> Speaks first (before instructor ask)			
	<input type="checkbox"/> Responds quickly when answering			
	<input type="checkbox"/> Latency in responding to questions or taking decisions			
	<b>1.6 Head Position and Movement</b>			
	<input type="checkbox"/> Averts head (Rotates or tilts)			
	<input type="checkbox"/> Head shake			
	<input type="checkbox"/> Head nod			
	<b>1.7 Body Gestures</b>			
	<input type="checkbox"/> Breathes heavily			
	<input type="checkbox"/> Shrugs shoulder			
	<input type="checkbox"/> Self-touches (e.g., scratching)			
	<input type="checkbox"/> Crosses arms or legs (in front or back)			
	<input type="checkbox"/> Touches others or things			
	<input type="checkbox"/> Keeps hands and arms close to the body			
	<input type="checkbox"/> Handles things inappropriately			
	<input type="checkbox"/> Paces, wanders aimlessly or restless in place			
	<input type="checkbox"/> Taps hands or feet			
	<input type="checkbox"/> Baseline demeanor (relaxed posture)			
	<input type="checkbox"/> Rotates body			
	<input type="checkbox"/> Tries to move to a different place (changes place)			
	<input type="checkbox"/> Moves away from confederate(s)			
	<input type="checkbox"/> Moves closer to confederate(s)			
	<input type="checkbox"/> Physical mimicry			
	<b>1.8 Body Posture</b>			
	<input type="checkbox"/> Moves away from confederate(s)			
	<input type="checkbox"/> Moves closer to confederate(s)			

Non- Verbal Signs Definition		
	Sign	Definition
<b>1.1 General Face Expressions</b>		
1.	Angry or disapproving face	Anger or disapproval shows in jaws tensed to a biting position; frowning and tense-mouth expressions, and possibly staring with knitted eyebrows. Anger shows most clearly in the lower face and brow area.
2.	I cannot remember or I am trying to remember facial expression	A face in which a combination of signs could appear at the same time. It usually involves closing one eye or both, knitting eyebrows, touching face and pursing lips.
3.	Emotionless facial expression (blank)	1. A neutral, relaxed, seemingly "expressionless" face. 2. The face in repose, with eyes open and lips closed. 3. A condition in which the neck, jaw, and facial muscles are neither stretched nor contracted. 4. A baseline "emotionless" face, the muscle tone of which reflects a mood of calmness. 5. The deadpan face we adopt at home alone while resting, reading, or watching TV.
<b>1.2 Eyes and Eyebrows</b>		
4.	Glances to others or things	While talking to one person, trying to establish quick eye contact with another person or looking at the things around.
5.	Gazes or glances up or down	1. Rotating the eyeballs in their sockets to a downward position. 2. Bowing or tilting the head forward so that the eyes face the ground or floor.
6.	Flashbulb eyes	1. An involuntary, dramatic widening of the eyes, performed in situations of intense emotion, such as anger, surprise, and fear. 2. A maximal opening of the eyelids (i.e., dilation of the palpebral fissure), which shows the roundness, curvature, and protrusion of the eyeballs.
7.	Blinks excessively	A rapid closing and opening of the eyes. Usage: Our blink rate reflects psychological arousal in the manner of a polygraph test. The normal, resting blink rate of a human is 20 closures per minute, with the average blink lasting one quarter of a second (Karson 1992). Significantly faster rates may reflect emotional stress, as aroused, e.g., in the fight-or-flight response. 3 blinks separated with maximum 2 seconds are considered blinking.
8.	Lateral eye movement (CLEM)	1. An acronym for "conjugate lateral eye movement." 2. A nonverbal response, often to a verbal question, in which the eyes move sideways (to the right or left) in tandem. Note CLEM usually happens without an averted head if a person turned his head while looking aside.
9.	Lowers or knit eyebrow	1. To frown or scowl, as in anger, concentration, displeasure, or thought. 2. To depress, knit, pucker, or wrinkle the brow by contracting the corrugator, procerus, and orbicularis oculi muscles.
10.	Raises eyebrow	1. To lift the arch of short hairs above the eye, as in uncertainty, disbelief, surprise, and exasperation. 2. To elevate the eyebrow by contracting the occipitofrontalis muscle.
<b>1.3 Mouth and Lips Related</b>		
11.	Smiles in an embarrassed way or fake smiling	Fake smile attributes the falseness of the expression altogether to the orbicular muscles of the lower eyelids not being sufficiently contracted.
12.	Jaw-drops	1. A sudden and frequently sustained opening of the mouth visible in parted lips and dangling jaw, given in excitement, surprise or uncertainty. 2. An open-mouth position often seen in sleep. 3. A nonverbal sign to mock, challenge, or confront a foe. 4. A chronically open position of the mouth and jaw observed in the mentally challenged.
13.	Compresses or purses lips	A usually negative cue produced by pressing the lips together into a thin line.
<b>1.4 Voice Quality and Vocal Signs</b>		
14.	Normal or confident volume	The manner in which a verbal statement is presented, e.g., its rhythm, breathiness, hoarseness, or loudness at the point of making a decision or providing an answer is not different than any other point of communication and is in a firm voice – no waver.
15.	Lowers voice or whispers	The manner in which a verbal statement is presented, e.g., its rhythm, breathiness, hoarseness, or loudness at the point of making a decision or providing an answer is low.
16.	Raises voice	The manner in which a verbal statement is presented, e.g., its rhythm, breathiness, hoarseness, or loudness at the point of making a decision or providing an answer is high.
17.	Strange noise	Produces an involuntary voice that does not reflect a clear emotion or produces a voice that indicates disapproval or restlessness such as ummm, aaaa, eee, hmmm, hoof.
18.	Clears throat	In a staff meeting or discussion at a conference table, a listener's unwitting throat-clearing may suggest disagreement, anxiety, or doubt. 2. While speaking, the throat-clearing may reveal uncertainty; acute or abnormal throat clearing is a possible sign of deception. 3. An aggressive version of throat-clearing may be used to interrupt, overrule, or challenge a speaker. 4. Consciously, the throat-clearing may be used to announce one's physical presence in a room.
<b>1.5 Related to Speaking</b>		
19.	Speaks first (before instructor ask)	Participant jumps to provide a decision or an answer before her/his colleagues.
20.	Responds quickly when answering	The manner in which a verbal statement is presented is quick. Most likely this sign means that the participant will provide the answer in one long statement. Coding for this sign will be at the point when the participant starts answering.
21.	Latency in responding to questions or taking decisions	Amount of time passed before answering from the time confederate number two answer to the time participant utters a sound.
<b>1.6 Head Position and Movement</b>		
22.	Averts head (Rotates or tilts)	Participant eye line is not parallel to shoulder line in any form. E.g. Participant seem to move head toward one shoulder or rotate head to one side. Head-tilt-side may be used a. to show friendliness and foster rapport; b. to show coyness, as



		in courtship; c. to strike a submissive pose (e.g., to show deference to one's boss); and d. to respond to cute signs (i.e., to immature cues emanating, e.g., from kittens, puppies, and babies).
23.	Head shake	Rotating the head horizontally from side-to-side a. to disagree, or b. to show misunderstanding of a speaker's words. 2. In an emotional conversation, a rhythmic, side-to-side rotation of the head to express disbelief, sympathy, or grief.
24.	Head nod	A vertical, up-and-down movement of the head used to show agreement or comprehension while listening. 2. A flexed-forward, lowering motion of the skull, used to emphasize an idea, an assertion, or a key speaking point.
<b>1.7 Body Gestures</b>		
25.	Breathes heavily	Inhalation and exhalation of air in a slow manner shown by chest movement and possibly accompanied with a voice indicating difficulty of breathing.
26.	Shrugs shoulder	
27.	Self-touches	Self-touches are often seen in anxious or tense settings, as a form of self-consolation by means of self-stimulation. For example rubbing one's arm or thigh, poking one's cheek or scratching one's forehead, hands in pockets or hands on waist. Touching clothes is considered self-touching.
28.	Crosses arms or legs (in front or back)	Folding the arms over the lower chest or upper abdomen, with one or both hands touching the biceps muscles. 2. A common resting position of the arms upon and across the torso. 3. A self-comforting, self-stimulating posture unconsciously used to alleviate anxiety and social stress.
29.	Touches others or things	Comes into physical contact with another individual, for example, laying a hand on, rubbing, poking. Or handling, holding, picking up, playing and/or moving a thing such as a pen or chair. Touching glasses or watch.
30.	Keeps hands and arms close to body	Resting hands and arms beside the body in an aligned manner.
31.	Handles things inappropriately	Dealing with or using available tools or equipment wrongfully, playfully or in a goofy manner.
32.	Paces, wanders aimlessly or restless in place	If the participant was walking during providing vital signs in the 3rd round, S/he will walk faster or walk in a wandering manner as if s/he lost direction.
33.	Taps hands or feet	To strike (the fingers, a foot, a pencil, etc.) upon or against something, especially with repeated light blows.
34.	Baseline demeanor (Relaxed posture)	1. The inventory of gestures and postures observed in relaxed settings, free of social anxiety or stress. 2. Nonverbal behaviors observed in solitary subjects, who may be reading, snacking, or watching TV. 3. Those nonverbal cues presented during the initial "friendly" phase of an interview or interrogation, as opposed to those given in the subsequent "stress" phase.
35.	Rotates body	To turn the upper part of the body around while the feet are not moving from its place and forming a center point.
36.	Tries to move to a different place (Change place)	Participant changes his/her current physical space and moves to another when providing an answer.
37.	Physical mimicry	Participant starts mimicking the posture of confederates or copies their behaviours at the point of providing vital signs at 3 <sup>rd</sup> round.
<b>1.8 Body Posture</b>		
38.	Participant moves away from confederate(s)	Participant physically moves to increase the distance between him and the confederate.
39.	Participant moves closer to confederate(s)	Participant physically moves to reduce the distance between him and the confederate.

## Appendix D

### The Third Version of the Conformity Instrument (Phase III: List of Potential Conformity Behaviours-30)

<b>Research No.1 Instrument</b>		<b>For data entry use:</b>	
		<input type="checkbox"/> ID	
<b>Rater:</b> <input type="checkbox"/> The researcher <input type="checkbox"/> The other rater	<b>Case:</b> <input type="checkbox"/> 1. DKA Vs. HHS <input type="checkbox"/> 2. Pneumonia <input type="checkbox"/> 3. UGIB – J Witness <input type="checkbox"/> 4. C. Difficile	<b>Day / Date:</b>  <b>Time</b>	<b>Conformity Status:</b> <input type="checkbox"/> 1. Conformed <input type="checkbox"/> 2. Did not conform
<b>Participant</b> <input type="checkbox"/> 1. Resident <input type="checkbox"/> 2. MD Student (Clerk)		<b>Sex</b> <input type="checkbox"/> 1. Female <input type="checkbox"/> 2. Male	<b>Year of residency / clerkship</b>
<b>Confederate</b> <input type="checkbox"/> 1. ER Doctor <input type="checkbox"/> 2. Senior Resident <input type="checkbox"/> 3. Preceptor		<b>Sex</b> <input type="checkbox"/> 1. Female <input type="checkbox"/> 2. Male	
<b>In -sim</b>	<b>A. Nonverbal Signs</b>	<b>Video</b>	<b>Comments</b>
<b>1. Head Position and Movement</b>			<input type="checkbox"/> Not Applicable (NA)
<input type="checkbox"/>	1.1. Averts head (rotates or tilts)	<input type="checkbox"/>	
<input type="checkbox"/>	1.2. Head-shake	<input type="checkbox"/>	
<input type="checkbox"/>	1.3. Head-nod	<input type="checkbox"/>	
<b>2. General Face Expression</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	2.1. Disapproving face (angry or surprised)	<input type="checkbox"/>	
<input type="checkbox"/>	2.2. I cannot remember or I am tries to remember face	<input type="checkbox"/>	
<b>3. Eye and Eye brows</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	3.1. Glances to others or things	<input type="checkbox"/>	
<input type="checkbox"/>	3.2. Glances up or down	<input type="checkbox"/>	
<input type="checkbox"/>	3.3. Lateral eye movement (CLEM)	<input type="checkbox"/>	
<input type="checkbox"/>	3.4. Blinks excessively	<input type="checkbox"/>	
<input type="checkbox"/>	3.5. Lowers or knit eyebrow	<input type="checkbox"/>	
<input type="checkbox"/>	3.6. Raises eyebrow	<input type="checkbox"/>	
<b>4. Mouth and Lips Related</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	4.1. Smiles in an embarrassed way or fake smiling	<input type="checkbox"/>	
<input type="checkbox"/>	4.2. Compresses or purses lips	<input type="checkbox"/>	
<b>5. Other body signs</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	5.1. Touches self (e.g., Scratching)	<input type="checkbox"/>	
<input type="checkbox"/>	5.2. Touches others or things	<input type="checkbox"/>	
<input type="checkbox"/>	5.3. Crossing arms or legs (in front or back)	<input type="checkbox"/>	
<input type="checkbox"/>	5.4. Restless in place	<input type="checkbox"/>	
<input type="checkbox"/>	5.5. Taps hands or feet	<input type="checkbox"/>	
<input type="checkbox"/>	5.6. Breathes heavily	<input type="checkbox"/>	
<b>6. Voice Quality and Vocal Signs</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	6.1. Strange noise (ummm, aah)	<input type="checkbox"/>	
<input type="checkbox"/>	6.2. Normal or confident volume	<input type="checkbox"/>	
<input type="checkbox"/>	6.3. Lower voice or whispers	<input type="checkbox"/>	
<input type="checkbox"/>	6.4. Responds quickly when answering	<input type="checkbox"/>	
<b>7. Body Posture or position</b>			<input type="checkbox"/>
<input type="checkbox"/>	7.1. Baseline demeanor (Relaxed posture)	<input type="checkbox"/>	
<input type="checkbox"/>	7.2. Rotates body	<input type="checkbox"/>	
<input type="checkbox"/>	7.3. Changes place	<input type="checkbox"/>	
<b>B. Verbal Signs</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	8. A statement that indicates the participant is uncomfortable	<input type="checkbox"/>	
<input type="checkbox"/>	9. Curses or verbal aggression	<input type="checkbox"/>	
<input type="checkbox"/>	10. Asks for a chance to re-check inputs.	<input type="checkbox"/>	
<input type="checkbox"/>	11. Asks for the consultation of someone senior	<input type="checkbox"/>	

### General Guides to use the instrument:

- If you coded for a general face expression, don't code for its details, (e.g., don't code for angry face and then a knitted eyebrow that was a part of the general expression)..
- Note that some collection of facial signs (e.g., surprised face) is considered here as a form of disapproving and thus it is coded as disapproving face.
- Some signs can be coded based on general impression so try to code them at the end of the session (e.g., normal voice and relaxed posture).
- Be careful not to code for CLEM as glance to others or thing.
- 5.4 Restless in place and 7.1 Relaxed posture should not be checked concurrently.
- If you were not able to code for a category because of any reason (e.g., your position in the room was behind the mannequin station or because the participant was wearing a mask) please check the Not applicable (NA) box in the comments of that category. Also, please make sure that you indicate if you are checking NA based on a live simulation session or based on video recordings.

Last changed April 12, 2016

A. Non- Verbal Signs Definition		
	Sign	Definition
<b>1. Head Position and Movement</b>		
1.1	Averts head (Rotates or tilts)	Participant eye line is not parallel to shoulder line in any form. E.g. Participant seems to move head toward one shoulder or rotate head to one side. This sign could be seen as a half nod or half shake. Head tilt to side may be used a. to show friendliness and foster rapport; b. to show coyness, as in courtship; c. to strike a submissive pose (e.g., to show deference to one's boss); and d. to respond to cute behaviours (i.e., to immature cues emanating, e.g., from kittens, puppies, and babies).
1.2	Head-shake	Rotating the head horizontally from side-to-side a. to disagree, or b. to show misunderstanding of a speaker's words. 2. In an emotional conversation, a rhythmic, side-to-side rotation of the head to express disbelief, sympathy, or grief.
1.3	Head-nod	A vertical, up-and-down movement of the head used to show agreement or comprehension while listening. 2. A flexed-forward, lowering motion of the skull, used to emphasize an idea, an assertion, or a key speaking point.
<b>2. General Face Expressions</b>		
2.1	Disapproving face (Angry or surprised)	Anger or disapproval shows in jaws tensed to a biting position; frowning and tense-mouth expressions; and possibly staring with knitted eyebrows. Anger shows most clearly in the lower face and brow area (Ekman, Friesen, and Tomkins 1971).
2.2	I cannot remember or I am tries to remember face	This sign is a general expression that could manifest itself in more than one way. some of the most common combined signs are closing one eye or both eyes and possibly touching the forehead, cheek or the chin. This general expression is also usually accompanied with a quick answer, strange voice or a long pause.
<b>3. Eyes and Eyebrows</b>		
3.1	Glances to others or things	While talking to one person, try to establish quick eye contact with another person.
3.2	Glances up or down	1. Rotating the eyeballs in their sockets to a downward position. 2. Bowing or tilting the head forward so that the eyes face the ground or floor.
3.3	Lateral eye movement (CLEM)	An acronym for "conjugate lateral eye movement." 2. A nonverbal response, often to a verbal question, in which the eyes move sideward (to the right or left) in tandem. Note CLEM is usually happens without an averted head if a person turned his head while looking to a side that is not coded for as a CLEM. Also , a person should sustain the movement for 5 seconds; other than that it should be coded as a glance (to others or up or down)
3.4	Blinks excessively	A rapid closing and opening of the eyes. Usage: Our blink rate reflects psychological arousal in the manner of a polygraph test. The normal, resting blink rate of a human is 20 closures per minute, with the average blink lasting one quarter of a second (Karson 1992). Significantly faster rates may reflect emotional stress, as aroused, e.g., in the fight-or-flight response 3 Blinks separated with maximum 2 seconds are considered blinking
3.5	Lowers or knits eyebrow	1. To frown or scowl, as in anger, concentration, displeasure, or thought. 2. To depress, knit, pucker, or wrinkle the brow by contracting the corrugator, procerus, and orbicularis oculi muscles.
3.6	Raises eyebrow	1. To lift the arch of short hairs above the eye, as in uncertainty, disbelief, surprise, and exasperation. 2. To elevate the eyebrow by contracting the occipitofrontalis muscle.
<b>4. Mouth and Lips Related</b>		
4.1	Smiles in an embarrassed way or fake smiling	Fake smile attributes the falseness of the expression altogether to the orbicular muscles of the lower eyelids not being sufficiently contracted".
4.2	Compresses or purses lips	Lip compression is usually a negative cue produced by pressing the lips together into a thin line. Lip purse is to evert, pucker, and around the lips in a look of disagreement, scheming, or calculated thought.
<b>5. Other Body Signs</b>		
5.1	Self-touches	Self-touches is often seen in anxious or tense settings, as a form of self-consolation by means of self-stimulation. For example, rub the arm or thigh, poke the cheek or scratch the forehead, hands in pockets or hands on waist. Touching clothes are considered self-touches.

5.2	Touches others or things	Come into physical contact with other individual for example lay a hand on, rub, poke. or handle, hold, pick up, play and/or move a thing e.g. a pen or chair. Touching glasses or watch
5.3	Crossing arms or legs (in front or back)	Folding the arms over the lower chest or upper abdomen, with one or both hands touching the biceps muscles. 2. A common resting position of the arms upon and across the torso. 3. A self-comforting, self-stimulating posture unconsciously used to alleviate anxiety and social stress.
5.4	Restless in place.	If the participant was walking during providing vital signs in the 3rd round, S/he will walk faster or walk in a wandering manner as if s/he lost direction. Restless in place can show in many manners for example the participant mover his upper body forward and backward or change his posture or point and wave excessively
5.5	Taps hands or feet	To strike (the fingers, a foot, a pencil, etc.) upon or against something, especially with repeated light blows.
5.6	Breathes heavily	Inhalation and exhalation of air in a slow manner shown by chest movement and possibly accompanied with a voice indicating difficulty of breathing.
<b>6.</b>	<b>Voice Quality and Vocal Signs</b>	
6.1	Strange noise	Produce involuntary voice that does not reflect a clear emotion or produce a voice that indicate disapproval or restlessness such as ummm, aaaa, eee, hmmm, "hooff"
6.2	Normal or confident volume	The manner in which a verbal statement is presented, e.g., its rhythm, breathiness, hoarseness, or loudness at the point of making decision or providing an answer is no different than any other point of communication and is firm voice – no waver.
6.3	Lowers voice or whispers	The manner in which a verbal statement is presented, e.g., its rhythm, breathiness, hoarseness, or loudness at the point of making decision or providing an answer is low.
6.4	Responds quickly when answering	The manner in which a verbal statement is presented is quick. Most likely this sign mean that the participant will provide the answer in one long statement. Coding for this sign will be at the point when the participant start answering.
<b>7.</b>	<b>Body Posture and Position</b>	
7.1	Baseline demeanor (Relaxed posture)	1. The inventory of gestures and postures observed in relaxed settings, free of social anxiety or stress. 2. Nonverbal behaviors observed in solitary subjects, who may be reading, snacking, or watching TV. 3. Those nonverbal cues presented during the initial "friendly" phase of an interview or interrogation, as opposed to those given in the subsequent "stress" phase.
7.2	Rotates body	To turn the upper part of the body around while the feet are not moving from their place and forming a center point.
7.3	Changes Place (Tries to get to a different place)	Participant change current physical space and move to another when providing answer that is not closer or away from participants.

## Appendix E

### The Final Version of the Conformity Instrument

<b>Research No.1 Instrument</b>		<b>For data entry use:</b>	
		<input type="checkbox"/> ID	
<b>Rater:</b> <input type="checkbox"/> The researcher <input type="checkbox"/> The other rater	<b>Case:</b> <input type="checkbox"/> 1. DKA Vs. HHS <input type="checkbox"/> 2. Pneumonia <input type="checkbox"/> 3. UGIB – J Witness <input type="checkbox"/> 4. C. Difficile	<b>Day / Date:</b>  <b>Time</b>	<b>Conformity Status:</b> <input type="checkbox"/> 1. Conformed <input type="checkbox"/> 2. Did not conform
<b>Participant</b> <input type="checkbox"/> 1. Resident <input type="checkbox"/> 2. MD Student (Clerk)		<b>Sex</b> <input type="checkbox"/> 1. Female <input type="checkbox"/> 2. Male	<b>Year of residency / clerkship</b>
<b>Confederate</b> <input type="checkbox"/> 1. ER Doctor <input type="checkbox"/> 2. Senior Resident <input type="checkbox"/> 3. Preceptor		<b>Sex</b> <input type="checkbox"/> 1. Female <input type="checkbox"/> 2. Male	
<b>In -sim</b>	<b>A. Nonverbal Signs</b>	<b>Video</b>	<b>Comments</b>
<b>1. Head Position and Movement</b>			<input type="checkbox"/> Not Applicable (NA)
<input type="checkbox"/>	Head-shake	<input type="checkbox"/>	
<input type="checkbox"/>	Head-nod	<input type="checkbox"/>	
<b>4. General Face Expression</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	Disapproving face (angry or surprised)	<input type="checkbox"/>	
<b>5. Eye and Eye brows</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	Glances up or down	<input type="checkbox"/>	
<input type="checkbox"/>	Lateral eye movement (CLEM)	<input type="checkbox"/>	
<input type="checkbox"/>	Lowers or knit eyebrow	<input type="checkbox"/>	
<input type="checkbox"/>	Raises eyebrow	<input type="checkbox"/>	
<b>5. Mouth and Lips Related</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	Smiles in an embarrassed way or fake smiling	<input type="checkbox"/>	
<input type="checkbox"/>	Compresses or purses lips	<input type="checkbox"/>	
<b>6. Other body signs</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	Touches self (e.g., Scratching)	<input type="checkbox"/>	
<input type="checkbox"/>	Touches others or things	<input type="checkbox"/>	
<input type="checkbox"/>	Crossing arms or legs (in front or back)	<input type="checkbox"/>	
<input type="checkbox"/>	Taps hands or feet	<input type="checkbox"/>	
<input type="checkbox"/>	Breathes heavily	<input type="checkbox"/>	
<b>7. Voice Quality and Vocal Signs</b>			<input type="checkbox"/> NA
<input type="checkbox"/>	Strange noise (ummm, aah)	<input type="checkbox"/>	
<input type="checkbox"/>	Lower voice or whispers	<input type="checkbox"/>	
<b>8. Body Posture or position</b>			<input type="checkbox"/>
<input type="checkbox"/>	Rotates body	<input type="checkbox"/>	
<b>B. Verbal Signs</b>			
<input type="checkbox"/>	Asks for a chance to re-check inputs.	<input type="checkbox"/>	
<input type="checkbox"/>	Asks for the consultation of someone senior	<input type="checkbox"/>	
<b>General Guides to use the instrument:</b> <ul style="list-style-type: none"> <li>• If you coded for a general face expression, don't code for its details( e.g., don't code for angry face and then a knitted eyebrow that was a part of the general expression).</li> <li>• Note that some collection of facial signs (e.g., surprised face) is considered here as a form of disapproving and thus it is coded as disapproving face.</li> <li>• Some signs can be coded based on general impression so try to code them at the end of the session (e.g., normal voice and relaxed posture).</li> <li>• Be careful not to code for CLEM as glance to others or thing.</li> <li>• 5.4 Restless in place and 7.1 Relaxed posture should not be checked concurrently.</li> <li>• If you were not able to code for a category because of any reason (e.g., your position in the room was behind the mannequin station or because the participant was wearing a mask) please check the Not applicable (NA) box in the comments of that category. Also, please make sure that you indicate if you are checking NA based on live simulation session or based on video recordings.</li> </ul>			

<b>A.</b>	<b>Non- Verbal Signs Definition</b>	
	<b>Sign</b>	<b>Definition</b>
<b>2.</b>	<b>Head Position and Movement</b>	
1.1	Head-shake	Rotating the head horizontally from side-to-side a. to disagree, or b. to show misunderstanding of a speaker's words. 2. In an emotional conversation, a rhythmic, side-to-side rotation of the head to express disbelief, sympathy, or grief.
1.2	Head-nod	A vertical, up-and-down movement of the head used to show agreement or comprehension while listening. 2. A flexed-forward, lowering motion of the skull, used to emphasize an idea, an assertion, or a key speaking point.
<b>2.</b>	<b>General Face Expressions</b>	
2.1	Disapproving face (Angry or surprised)	Anger or disapproval shows in jaws tensed to a biting position; frowning and tense-mouth expressions; and possibly staring with knitted eyebrows. Anger shows most clearly in the lower face and brow area (Ekman, Friesen, and Tomkins 1971).
<b>3.</b>	<b>Eyes and Eyebrows</b>	
3.1	Glances up or down	1. Rotating the eyeballs in their sockets to a downward position. 2. Bowing or tilting the head forward so that the eyes face the ground or floor.
3.2	Lateral eye movement (CLEM)	An acronym for "conjugate lateral eye movement." 2. A nonverbal response, often to a verbal question, in which the eyes move sideward (to the right or left) in tandem. Note CLEM usually happens without an averted head if a person turned his head while looking to a side that is not coded for as a CLEM. Also , a person should sustain the movement for 5 seconds; other than that, it should be coded as a glance (to others or up or down)
3.3	Lowers or knits eyebrow	1. To frown or scowl, as in anger, concentration, displeasure, or thought. 2. To depress, knit, pucker, or wrinkle the brow by contracting the corrugator, procerus, and orbicularis oculi muscles.
3.4	Raises eyebrow	1. To lift the arch of short hairs above the eye, as in uncertainty, disbelief, surprise, and exasperation. 2. To elevate the eyebrow by contracting the occipitofrontalis muscle.
<b>4.</b>	<b>Mouth and Lips Related</b>	
4.1	Smiles in an embarrassed way or fake smiling	Fake smile attributes the falseness of the expression altogether to the orbicular muscles of the lower eyelids not being sufficiently contracted
4.2	Compresses or purses lips	Lip compression is usually a negative cue produced by pressing the lips together into a thin line. Lip pursing is to avert, pucker, and compress or purse around the lips in a look of disagreement, scheming, or calculated thought.
<b>5.</b>	<b>Other Body Signs</b>	
5.1	Self-touchung	Self-touching is often seen in anxious or tense settings, as a form of self-consolation by means of self-stimulation. For example, rubbing the arm or thigh, poking the cheek or scratching the forehead, hands in pockets or hands on waist. Touching clothes are considered self-touching.
5.2	Touches others or things	Coming into physical contact with another individual, for example, laying a hand on, rubbing, poking, or handling, holding, picking up, playing and/or moving a thing e.g. a pen or chair. Touching glasses or watch.
5.3	Crossing arms or legs (in front or back)	Folding the arms over the lower chest or upper abdomen, with one or both hands touching the biceps muscles. 2. A common resting position of the arms upon and across the torso. 3. A self-comforting, self-stimulating posture unconsciously used to alleviate anxiety and social stress.
5.4	Taps hands or feet	To strike (the fingers, a foot, a pencil, etc.) upon or against something, especially with repeated light blows.
5.5	Breathes heavily	Inhalation and exhalation of air in a slow manner shown by chest movement and possibly accompanied with a voice indicating difficulty of breathing.
<b>6.</b>	<b>Voice Quality and Vocal Signs</b>	
6.1	Strange noise	Producing an involuntary voice that does not reflect a clear emotion or producing a voice that indicates disapproval or restlessness such as ummm, aaaa, eee, hmmm, "hooff"
6.2	Lowers voice or whispers	The manner in which a verbal statement is presented ( e.g., its rhythm, breathiness, hoarseness, or loudness) at the point of making a decision or providing an answer is low.
<b>7.</b>	<b>Body Posture and Position</b>	
7.1	Rotates body	To turn the upper part of the body around while the feet are not moving from their place and forming a center point.

## Appendix F

### Consent Form

*Faculty of Medicine*  
*Department of*  
*Sciences*  
*Nouf S. Al Harbi*



FACULTY OF MEDICINE | UNIVERSITY OF CALGARY

*Community Health*

*Email: ns.alharbi@gmail.com*

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Research Project Title:	<b>Assessment of Conformity: Instrument Development</b>
Sponsor:	University of Calgary
Principal Investigator:	Tanya Beran
Co-Investigators:	Elizabeth Oddone Paolucci, Nouf S. Al Harbi

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This consent form is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, please ask. Take the time to read this carefully and to understand any accompanying information. You will receive a copy of this form.

### **BACKGROUND**

Conformity is the change of one's behavior to show consensus with a group even when s/he believes the group may be wrong. Though conformity has been studied in social psychology since the 50's, its application in medical education has just recently been studied. This study will create and validate a tool that helps both teachers and students track verbal and non-verbal communicated signs of conformity during simulation. Since students spend a considerable amount of time learning in the company of their peers, it is expected, therefore, that their

learning is affected by social factors inherent within the peer group. This research could help both students and their teachers to understand and to detect conformity and to initiate a plan to improve team communication with patient's best interest in mind.

### **WHAT IS THE PURPOSE OF THE STUDY?**

In this study, A tool will be created and validated to track verbally and non-verbally communicated behaviors of conformity during simulation sessions. The study has three phases, phase one involved accessing records held in Ward of 21st Century to code all verbal and non-verbal signs communicated by participants of a previous conformity study to create a draft of conformity tool. Phase two involved reviewing the created tool with several experts and modify it as need to be more comprehensive. Phase three, is the current phase, where the tool will be validated by being used to observe participants in simulation sessions.

### **WHAT WOULD I HAVE TO DO?**

During the simulation session, the researcher was using the created tool to observe you and track the signs you showed when you had to take a decision. In addition, she will record if you conformed or not each time. Your responses in the debriefing session were also recorded. We would like to code all of the signs/responses to identify the signs associated with conformity. We seek your permission to include the data collected from observing you to and from your interaction within the debriefing session in our data set.

### **WHAT ARE THE RISKS?**

There are no risks to participation in this study than those ordinarily experienced in daily life.

### **WILL I BENEFIT IF I TAKE PART?**

Once your results are compiled, the direct benefit to you will be a summary report. From a post-secondary perspective, the study will provide insights of how students may be influenced by the performance of their peers when learning statistical information in online courses.



**DO I HAVE TO PARTICIPATE?**

Your participation in this research study is completely voluntary. You can refuse to allow your information to be included in the study, and you can later withdraw your information up to 6 months after the date you initially agreed to have your information included in the study, without retribution.

**WHAT ELSE DOES MY PARTICIPATION INVOLVE?**

No other participation is requested. Please note that your responses and participation will in no way affect your grades in any course.

**WILL I BE PAID FOR PARTICIPATING, OR DO I HAVE TO PAY FOR ANYTHING?**

There will be no payment for participation.

**WILL MY RECORDS BE KEPT PRIVATE?**

The data will be gathered and processed in such a way as to ensure confidentiality and complete anonymity by the Principal Investigator. As such, each participant will be assigned an anonymous Study Identification Number, and results will be presented in an aggregated format that will not identify any one person. Signed consent forms and data will be kept in a locked filing cabinet at the University of Calgary for ten years after completion of the research, and will then be destroyed. This information may be submitted for publication in scientific journals. No identifying features of any individual will be included in such reports.

**IF I SUFFER A RESEARCH-RELATED INJURY, WILL I BE COMPENSATED?**

In the event that you suffer injury as a result of participating in this research, no compensation will be provided to you by the University of Calgary, the Faculty of Medicine or the Researchers. You still have all your legal rights. Nothing said in this consent form alters your right to seek damages.

## SIGNATURES

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout the study. If you have further questions concerning matters related to this research, please contact:

Nouf S. Al Harbi at (403) 399 8275

If you have any questions concerning your rights as a possible participant in this research, or research in general, please contact the Chair of the Conjoint Health Research Ethics Board, University of Calgary at (403) 220-7990

**Please indicate if you agree to release the following information:**

Signs showed by you and recorded by the raters during the simulation session and comments about or by you provided within debriefing session.	I give permission <input type="checkbox"/> I do not give permission <input type="checkbox"/>
---	---

\_\_\_\_\_  
Student's Signature

\_\_\_\_\_  
Date

### Post debriefing consent renewal

Please also sign that you have been debriefed, know that the study actually involved some deliberately deceptive or misleading information, and know now what the true circumstances were (as described by the researcher).	          _____ Signature
---	--

## **Appendix G**

### **Simulation Scenarios and Decision Charts**

This document will describe the following:

- 1- Pre-briefing protocols and preparation of learners.
- 2- List of clinical scenarios.
- 3- Specific triggering stimulus of conformity.
- 4- Summary of clinical scenarios including script, deception plan, and expected responses.
- 5- General debriefing strategies and protocol.

#### **1. Pre-briefing protocols and preparation of learners.**

We will have four clinical simulation scenarios running for each group of residents on a monthly basis. The first clinical scenario for each group of residents will be dedicated to run a case where no deception or conformity stimulus occurs for the purpose of establishing familiarity with the simulation teaching modality, environment, and introducing the ground rules for simulation sessions for each group of residents.

Specifically, the simulation educator has to fulfill a debriefing assessment in simulation for health care (DASH) element 1 and its dimensions:

DASH element 1 (Rater version): Establishes an engaging learning environment.

<https://harvardmedsim.org/debriefing-assesment-simulation-healthcare.php>

Element 1 dimensions:

- Clarifies course objectives, environment, confidentiality, roles, and expectations.
- Establishes a “fiction contract” with participants.

- Attends to logistical details.
- Conveys a commitment to respecting learners and understanding their perspective.

Protocol of pre-briefing will adhere to recommendations for the establishment of a safe and engaging environment: <http://www.ncbi.nlm.nih.gov/pubmed/25188485>.

Of note, the simulation educator will have to ensure that the following points are clear:

1. Introduce the researcher and the other raterto the group of learners as “PhD candidates in the specialization of medical education and interested in simulation-based education and research. They will join several of our sessions and debriefings to observe and learn more about the simulation modality and research applications.”
2. Learners are allowed and encouraged to use/bring online or paper resources.
3. The purpose of the simulation session is to practice the approach and management of a simulated patient presentation. The purpose is to offer the opportunity for deliberate practice where mistakes are treated as opportunity to learn and not events to be punished for. This simulation activity is not a test or an evaluation of the block.
4. Our observations of the performance will not be used and will not affect decisions in regard to passing or failing a block.
5. The role of the simulation educator will consist of being a facilitator to encourage reflective feedback and to assure safety measures in the simulation environment.
6. Recite the basic assumption.
7. Clarify the components of fidelity (physical, conceptual, and emotional) and invite learners to do their best to “buying in” to the simulation. We will use a similar statement as recommended on page 342: <http://www.ncbi.nlm.nih.gov/pubmed/25188485>.
8. Participants have to be oriented to the simulation setting and environment.

9. Video recording of simulation sessions and debriefings:

Notify learners that sessions will be video recorded including debriefings for the purpose of program feedback and quality control of scenario design and debriefings.

10. All learners (participants and observers) have to sign consent for the video recording of the sessions and debriefings.

11. Consent forms will be kept in the simulation lab.

12. Recorded materials and video files will be converted into movie files on discs by the simulation instructor and kept locked in the simulation lab. Access to those discs will be granted following the policies and procedures of the RGH Internal Medicine Simulation Program.

13. A back up for video files will be kept on an external hard disc that is stored in the simulation lab.

14. All video files will be deleted from cameras every three months.

**2. Clinical scenarios.**

- 1- Diabetic ketoacidosis (DKA): in this scenario, the learners have to assess and treat a patient with uncontrolled Diabetes Mellitus (DM) and differentiate between DKA and Hyperosmolar hyperglycemic state (HHS).
- 2- Pneumonia: In this scenario, the learners have to assess and treat a patient with community-acquired pneumonia (CAP).
- 3- Upper Gastrointestinal Bleeding (UGIB): In this scenario, the learners have to assess and manage a patient with UGIB.

- 4- C. Difficile Colitis: In this scenario, the learners have to assess and treat a patient with sepsis caused by C. Difficile Colitis.

The four clinical scenarios will be scheduled to run in the same order for every group of residents, but will be mixed with other clinical simulation sessions to minimize the risk of predicting when deception will occur for each group of learners. The cases will be scheduled to run in this order every month to achieve a graded challenge and pressure to conform.

### **3. Specific triggering stimulus of conformity.**

- Case one: DKA vs. HHS. The event would be triggered by a lack of experience.
- Case two: Pneumonia. The event would be triggered by information influences.
- Case three: UGIB. The event would be triggered by needing to belong and normative influences.
- Case four: C Difficile Colitis: The event would be triggered by fear of evaluation and hierarchy.

Other triggering factors could contribute to the event and the effect is distributed among the four cases in this manner:

- Uncertainty: C. Difficile Colitis
- Need to belong and normative influences: UGIB
- Informational influences: Pneumonia
- Authority: C. Difficile Colitis, UGIB
- Hierarchy: C. v Difficile Colitis, UGIB
- Lack of expertise: DKA vs. HHS
- Fear of evaluation: C. Difficile Colitis
- Self-perception: C. Difficile Colitis

#### 4. Summary of simulation scenarios and outline of potential responses

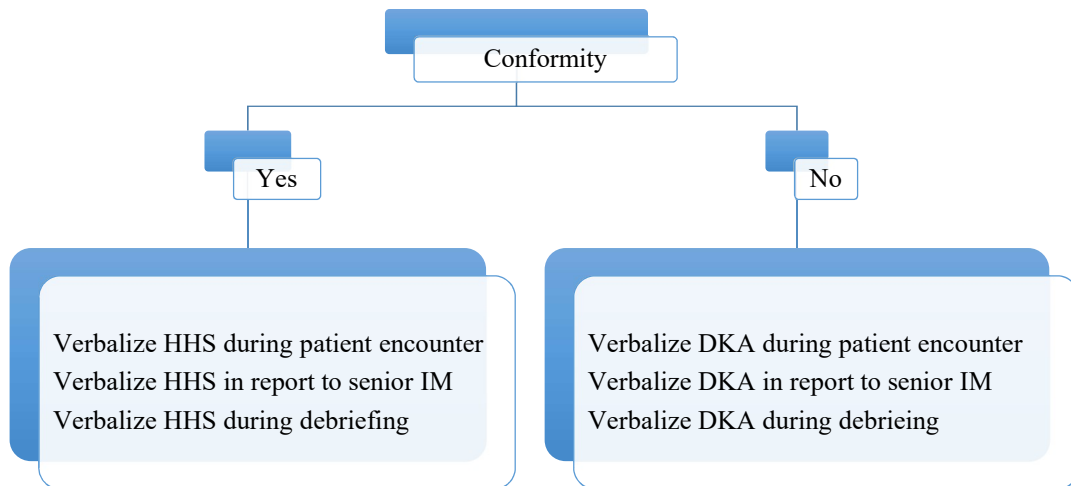
##### **Case one: DKA vs. HHS.**

In this scenario, the learners have to assess a patient with uncontrolled DM. The internal medicine (IM) team is consulted to evaluate this patient for hyperglycemia who was recently discharged from the hospital for a similar problem. The correct diagnosis is DKA triggered by infection (cellulitis) and a lack of adherence to therapy with insulin.

##### ***Script.***

- Step 1: Initial IM consultation will be introduced by the ER RN by stating, “We have a consultation to IM for admission of this patient with uncontrolled DM. The ER doctor has already spoken with the senior IM resident and asked us to page you to start seeing the patient.”
- Step 2: The confederate senior IM resident will arrive by the end of the clinical encounter and request a brief summary of the assessment of the patient s/he was consulted on earlier for HHS.

***Deception plan.*** This case will be introduced in the first week of the MTU block, and we expect that most learners may not have been engaged in a discussion differentiating between HHS and DKA. We are counting on a lack of experience in this situation. The senior IM resident will relay this impression when receiving the report about the assessment.



### ***Debriefing Plan.***

- Yes, conformity: Elicit knowledge and facts related to differentiating between HHS and DKA. Close knowledge gap of clinical and biochemical parameters differentiating between HHS and DKA if needed.
- No, conformity: Inquire about frames and prior experiences/knowledge. Enforce correct frames and knowledge.

### **Case two: Community acquired pneumonia (CAP).**

In this scenario, the learners have to assess a patient with a febrile illness and cough. The patient has typical symptoms and signs of CAP. In any patient who presents to the emergency room (ER) with cough and fever, a standard procedure is to initiate contact and droplet isolation by an ER registered nurse (RN), pending the results of microbiologic cultures and viral swabs, if sent.



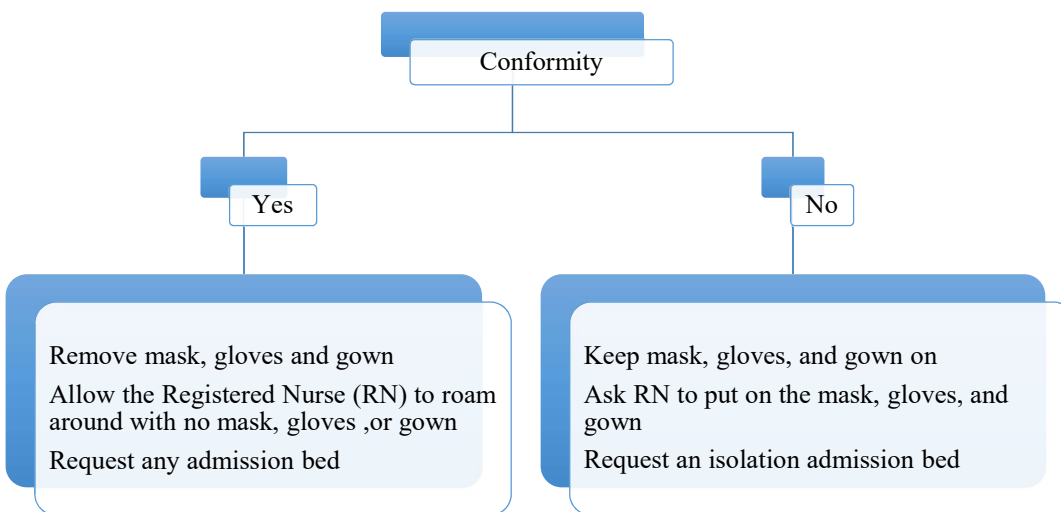
***Script.***

- Step 1: Initial IM consultation will be introduced by the ER RN by stating, “We have a consultation to IM for admission of this patient with fever. We already put the patient in isolation because she is coughing a lot.” The RN is wearing gown, gloves, and a mask.
- Step 2: While the team is taking the history, a confederate ER doctor will present her/himself within 10 minutes, and thank them for seeing the patient promptly. This interaction has to happen after the x-ray is available and the ER doctor shares that s/he already looked at the x-ray and thinks the patient has CAP. Then s/he asks the RN why isolation is needed. S/he shares that the most common pathogen is *Streptococcus pneumoniae* in all settings including outpatient, inpatient, and the ICU. S/he states that isolation is not required in this situation, knowing that most of the times the cultures are not sensitive enough to identify the responsible organism and actually relying on epidemiological data. Also, s/he shares the fact that they found in some studies how isolated patients may not be cared for and assessed by teams as frequently as other patients who are not put in isolation in addition to the cost and time to put on and take off gloves. Finally, s/he will conclude by saying “Why don’t we just ask the patient to wear a mask and use a tissue when coughing? I think he can do that.”
- Step 3: RN takes off own gloves, mask and gown.
- Step 4: RN asks at end of scenario if the team wants a regular bed or isolation bed.

***Deception plan.*** This plan will be the second scenario in this series of deception cases.

The pressure is arising from sharing correct information about the utility of culture studies in

CAP, the fact that Step Pneumonia is the most common pathogen in all settings, the fact that isolated patients may receive fewer doctor visits and/or assessments, some patients may be able to follow coughing etiquette in addition to the use of isolation materials and a delay in admission to a regular bed pending an isolation hospital bed. All of this information stands in contrast to following the protocol of isolation in cases with febrile illness and cough. If a protocol is initiated, it has to be followed, and will be terminated only by infection control.



### ***Debriefing Plan.***

Yes, conformity:

- Elicit knowledge and facts related to isolation protocol for afebrile illness with cough.
- Elicit knowledge and facts related to pathogens causing CAP including percentages.
- Inquire about what they felt when information was presented by the ER doctor sharing his practice of not adhering to isolation protocol in this clinical presentation.
- Inquire about what they were thinking when the ER doctor was discussing his information and practice.

No, conformity:

Elicit knowledge and facts related to isolation protocols for febrile illnesses with cough.

- Elicit knowledge and facts related to pathogens causing CAP including percentages.
- Inquire about what they felt when information was presented by the ER doctor leading to the practice of not adhering to isolation protocol in this clinical presentation.
- Inquire about what they were thinking when the ER doctor was discussing information and practice.

### **Case three: UGIB in a Jehovah's Witness patient.**

In this scenario, the learners have to assess a patient in a hypovolemic shock caused by UGIB. The patient is not responding to resuscitation with IVF and requires a blood transfusion. The team, upon acquiring consent, finds out that he is a Jehovah's Witness as documented in a pocket card signed and dated in 2005. Here, the standard and ethical procedure is to respect the patient's autonomy and his decision not to receive any blood products. Potentially, the team may inquire if the patient agrees to receive Albumin that can sometimes be accepted by some patients.

#### ***Script.***

- Step 1: Initial IM consultation will be introduced by the ER RN by stating, "We have a consultation to IM for admission of this patient with suspected UGIB. We have already called GI and they want you to see the patient first. He was a bit hypotensive on arrival, but improved with 2 L of 0.9 NS."
- Step 2: While the team is assessing the patient (history and physical examination), the vital signs will deteriorate gradually as reflected by a drop in blood pressure and an increase in heart rate. The patient states that he is feeling dizzy and nauseous. The

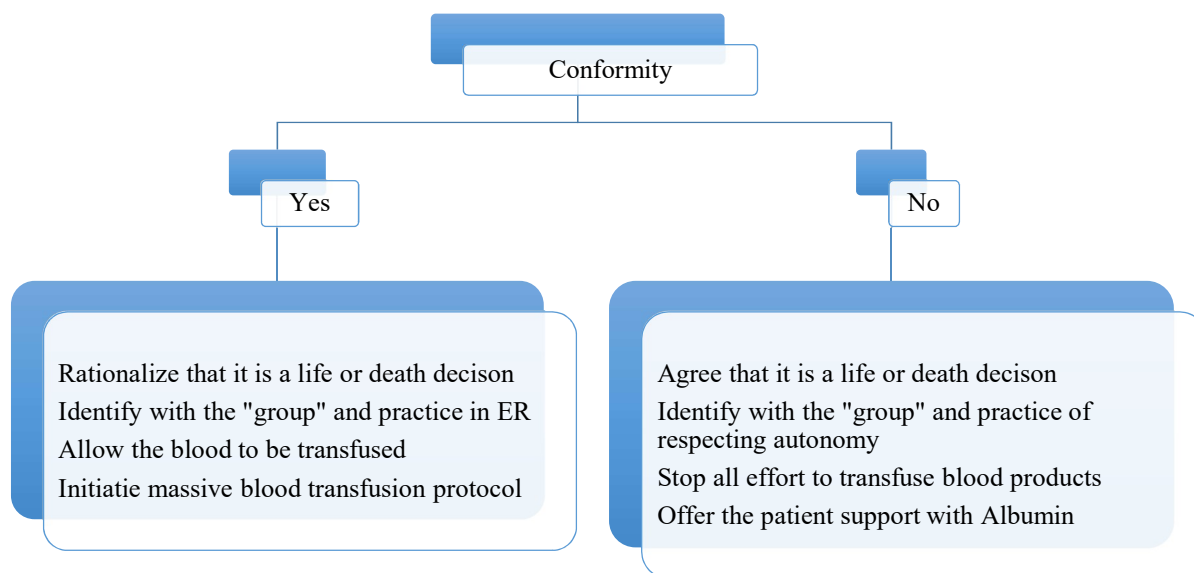
patient will throw up a couple of times and the RN will state it is coffee ground emesis. Hemoglobin will be made available with a reading at 39 g/l.

- Step 3: The hemodynamic status continues to deteriorate with no response in BP and HR, and actually no response to any amount of IVF given. Patient continues to feel dizzy, weak, eyes half closed alternating with closed, and patient is slower to respond. When the team initiates a conversation to obtain consent for a blood transfusion, the patient will declare that this transfusion is not an option for him because he is a Jehovah's Witness. Nurse is to provide the signed card to the team. The goals of care remain at R1.
- Step 4: The ER doctor will arrive while the team is still assessing and asks about the status of the patient and if GI has seen the patient yet. S/he will look concerned with the deteriorating vital signs and wonder about blood transfusion. S/he will be notified about the patient's wishes and preferences. S/he will look more concerned and start the conversation by questioning if the patient is competent under those conditions or not and asserts that if the patient does not get blood, then he will die. S/he states:  
"Now that you are starting to see and assess patients in emergency rooms just like any other emergency room physician, I hope that you can appreciate how all of us feel the pressure to make some difficult decisions in life and death situations. We all have seen it many times—how patients may change decisions made when they were healthy, but it is another story when you actually dying. I am not really sure if this patient actually comprehends what is really happening to him right now. My experience and my beliefs as a physician dictate focusing on saving lives and personally I have had three cases similar to this situation when the patient later

thanked me for just doing that. I had to save their life and give blood. I really think we have to do the right thing for the patient and decide like emergency room physicians who save lives.

- Step 5: After the ER doctor leaves, the RN will ask, “Shall we trigger the massive transfusion protocol?”

***Deception plan.*** In this case, the participant is pressured to conform by triggering a feeling of the need to belong and to join the rules and morals of ER physicians in our case. Here, the confederate ER doctor is inviting a decision/behavior and agreement with her/his own frame and actions. The learners are left to either agree with the frames and actions of the “group” as represented by the confederate, or to stand out by calling off any blood transfusion out of an ethical obligation to respect the patient’s autonomy—even if it is a life or death situation.



***Debriefing Plan.***

Yes, conformity:

- Elicit knowledge and facts related to resuscitation of hemodynamically unstable patients caused by hypovolemic shock.
- Elicit knowledge and facts related to the transfusion of blood products and values and preferences of patients who are Jehovah's Witness.
- Inquire about what they felt when the information was presented by the ER doctor sharing her/his frame and experience.
- Inquire about what they were thinking when the ER doctor was sharing the opinion and way of practice of a group.

No, conformity:

- Elicit knowledge and facts related to resuscitation of hemodynamically unstable patients caused by hypovolemic shock.
- Elicit knowledge and facts related to transfusion of blood products and values and preferences of patients who are Jehovah's Witness.
- Inquire about what they felt when information was presented by the ER doctor sharing her/his frame and experience.
- Inquire about what they were thinking when the ER doctor was sharing the opinion and way of practice of a group.
- Elicit their frame and point of reference that resulted in the action of not allowing the transfusion of blood products.

#### **Case four: C. difficile colitis.**

In this scenario, the learners have to assess a patient in a septic shock caused by severe and complicated C. Difficile Colitis. The patient has a history of two episodes of urosepsis with

the most recent one requiring hospitalization. The patient presents with warm shock and the early impression is that she now has another episode of urosepsis that needs workup (ultrasound of kidneys, KUB, ID consult, urine cultures...). The patient has already been treated with a dose of ABX by ER to cover for presumed urosepsis. The patient remains hemodynamically unstable but to a certain level that is still appropriate for MTU admission and care by GIM (i.e., HR ranging between 110-120 and SBP ranging 80-95 mmHg). The patient will have classic symptoms and signs, and radiological findings suggestive of severe and complicated C. Difficile Colitis.

***Script.***

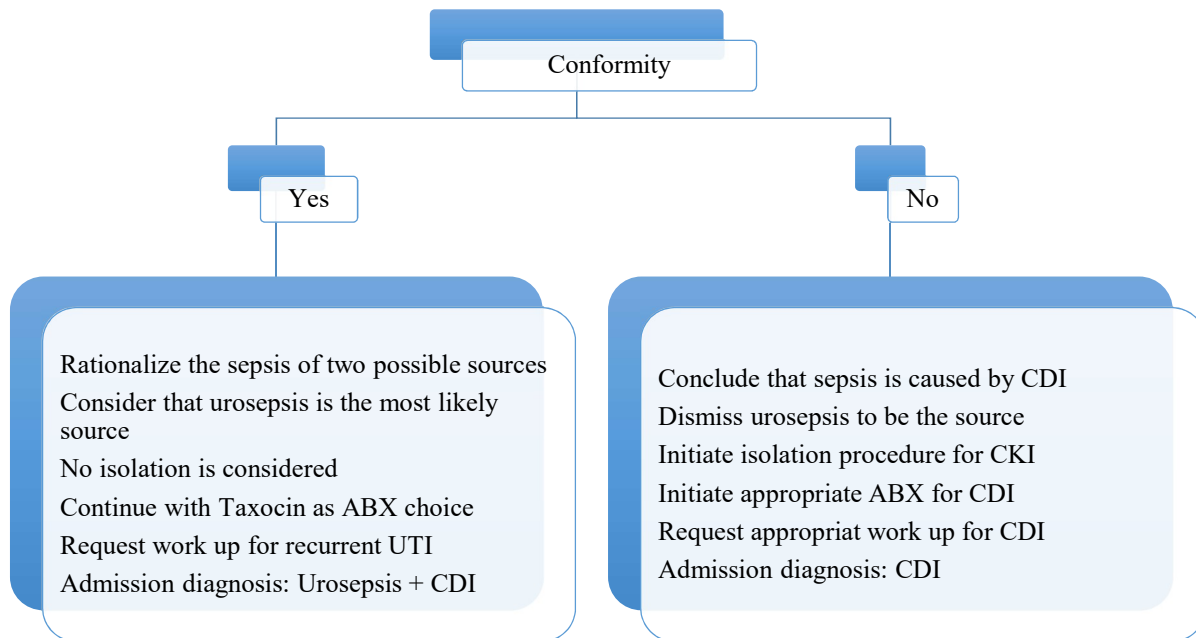
- Step 1: Initial IM consultation will be introduced by the ER RN by stating “We have a consultation to IM for admission of this patient with sepsis. She was hypotensive on arrival, and we gave a couple of liters of IVF and just completed first dose of Tazocin. Her family member brought her from home.” The RN proceeds with providing recent and previous vital signs on triage and prompts that the patient has had two previous episodes of urosepsis over the last three months. She offers that more information is available when needed.
- Step 2: While the team is assessing the patient (i.e., taking the history and physical examination) and within 5-10 minutes, the team’s preceptor on the medical teaching unit (MTU) will arrive to check on the admission and how far are they in assessing the patient, to be followed by asking them how the MTU block is going: are they meeting their learning objectives and are they satisfied with the teaching environment? Then s/he brings to their attention that s/he will be completing their evaluation form this week because s/he received an email with a request to do so.

S/he shares that they are doing well from their own perspective and doesn't see issues with passing the block.

- Step 3: As the preceptor starts to leave, s/he requests that the participant needs to do a complete assessment and order workup for recurrent urosepsis (such as Ultrasound, KUB....) and continue with appropriate ABX to cover possible resistant organisms. S/he will be calling ID for them to follow up on cultures and the result of the workup.
- Step 4: The hemodynamics become a bit unstable with increased HR and drop in BP, requiring support with IVF and consideration of the accurate source of infection and an appropriate course of ABX.
- Step 5: RN prompts that she will need to give her report to the unit and request to know the admission diagnosis.

***Deception plan.*** In this case, the team is pressured to conform by replicating a situation where thoughts about the relationship with the preceptor are triggered, in addition to the actual status of a preceptor who usually completes the evaluation form of residents working with him/her during that the last week of the MTU block. Hierarchy, authority, fear of evaluation, and self-perception are operating in this context because the real preceptor, who is working with the learners, will be playing this role.





### ***Debriefing Plan.***

Yes, conformity:

- Elicit knowledge and facts related to resuscitation of hemodynamically unstable patients caused by septic shock.
- Inquire what they felt when their own preceptor was talking about the end of block evaluation.
- Inquire what they were thinking about when their own preceptor was talking about the end of block evaluation.
- Inquire if they have been in previous situations when authority, hierarchy, feelings and thoughts about the need to pass a block were mixed with patient care decisions.
- Elicit knowledge and facts related to risk factors and, symptoms, signs, and complications of CDI.
- Inquire what they really thought the patient had—urosepsis or CDI.

- Inquire what the most powerful drive was that made them agree with the urosepsis diagnosis.

No, conformity:

- Elicit knowledge and facts related to resuscitation of hemodynamically unstable patients caused by septic shock.
- Inquire about what they felt when their own preceptor was talking about the end of block evaluation.
- Inquire about what they were thinking when their own preceptor was talking about the end of block evaluation.
- Inquire if they have been in previous situations when authority, hierarchy, feelings and thoughts about the need to pass a block were mixed with patient care decisions.
- Elicit knowledge and facts related to risk factors and, symptoms, signs, and complications of CDI.
- Inquire about what they were feeling when they made a decision contrary to the suggestion by the preceptor.
- Inquire if they were worried about any consequences resulting from deviating from what they were told to do.
- Inquire what strategies (frames) helped them proceed with their own decision.

## **5. General debriefing strategies and protocol:**

Pre-briefing: simulation educator will orient the learners during the first session of the MTU block to the simulation modality and environment.

It will be important to include in the orientation on the first day (or could be repeated as needed) the statement: “We use this modality to replicate the clinical setting and presentation to practice the application of our knowledge and skills in addition to how we deal with some of the challenges in clinical practice for making clinical decisions—for example, situations when there is a lot of uncertainty or different kinds of pressures.”

Debriefing strategy: we will follow the PEARLS approach to debriefing

<http://www.ncbi.nlm.nih.gov/pubmed/25710312>

Descriptive phase: The simulation educator will include a descriptive phase in debriefing of all four cases to create a baseline understanding of a general outline of learning objectives of the case.

### Sim-PICO

WHO	WHAT	WHEN	WHERE	WHY
Dr. Altabbaa	PEARLS Mixed Method	Immediate post scenario	Simulation area	Advocacy/Inquiry

**Sim:** Cross-sectional study

**P:** MTU residents and students (1-2 per session)

	Conformity trigger	Direct observation	Debriefing	Post session
Case 1	Knowledge	-Yes or No -Conformity tool	<b>Explore:</b> Knowledge Frames Emotions Experiences	Interview
Case 2	Information influence			
Case 3	Normative influence			
Case 4	Evaluation influence			

**O:** Conformity YES or NO, Conformity tool validation