Abstract

A questionnaire was used to study the perception of conformity in Postgraduate Medical Education. The goals were to describe: (1) the extent of perception of pressure to conform in PGME, (2) factors that influence pressure to conform, and (3) trainees’ perception of how conformity influences their educational experience. 166 residents participated (21.3% of all residents). Individual characteristics (age, sex, PGY level, educational background) and residency program characteristics (surgical/nonsurgical, size) were not associated with a significant difference in perception of pressure to conform. Participants’ higher hierarchy rank, scenarios during off-service rotations and informal educational encounters were associated with significantly higher perception of pressure to conform. An equal number of residents perceived conformity as having a positive and negative influence on acquisition of knowledge and skills. In conclusion, although individual or program characteristics were not associated with differences in perception of pressure to conform in PGME, educational scenario characteristics were.
Acknowledgements

I would like to sincerely thank everyone who helped me during this incredible experience. My supervisors, Dr. Tanya Beran and Dr. Elizabeth Oddone Paolucci, thank you very much for all your guidance, support and stimulating feedback. Dr. Aliya Kassam, Dr. Kent Hecker and Dr. John Ellard, my committee members, thank you for your time and expertise. I would also like to thank my program director, Dr. Lloyd Mack and the Division of General Surgery for all the support that enabled me to pursue this goal.
I would like to dedicate my thesis to my true love, my amazing wife Petra.
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<td>PGME</td>
<td>Postgraduate Medical Education</td>
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<tr>
<td>RCPSC</td>
<td>Royal College of Physicians and Surgeons of Canada</td>
</tr>
<tr>
<td>CFPC</td>
<td>College of Family Physicians of Canada</td>
</tr>
<tr>
<td>CMQ</td>
<td>Collège des Médecins du Québec</td>
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<td>TOA</td>
<td>Tolerance of Ambiguity</td>
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<tr>
<td>IMGs</td>
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<td>CHREB</td>
<td>Conjoint Health Research Ethics Board</td>
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<tr>
<td>PGY</td>
<td>Postgraduate Year</td>
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<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
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Chapter One: **Background**

Over the last several years, there has been a change in medical practice and medical education with an increasing emphasis towards teamwork. In an era of subspecialization and rapid growth of evidence based medicine, it is becoming increasingly difficult for just one physician to assure the most up-to-date patient care. Multidisciplinary teams have been created in response to this change. The importance of this shift in our health care system is evident through the Royal College CanMEDS roles (Frank, Snell, & Sherbino, 2015). This framework describes core competencies of Canadian specialist physicians and categorizes them into seven key roles – Medical Expert, Communicator, Leader, Health Advocate, Scholar, Professional and Collaborator. Compared to the 2005 CanMEDS framework, there is increased emphasis on physicians as the driving force for implementation of system level changes (Frank et al., 2015). Implementation of any change within any of the key roles is not possible without open communication and the opportunity to express differences of opinion between members within multidisciplinary teams. Conformity research is therefore relevant to medical education in each one of the CanMEDS roles.

Potential pitfalls associated with the trend towards multidisciplinary healthcare teams include ineffective communication and decision-making. More specifically, team members may feel the pressure to conform to others, creating reluctance to communicate information and propose alternative ideas. This type of pressure may be particularly acute for residents as they encounter various learning situations. Examining this possibility is the aim of this research project.
Another emphasis in the 2015 update of the CanMEDS framework (Frank et al., 2015) is the competency-based model of medical education. The framework was developed with a focus on learner needs within a lifelong learning continuum, as well as on outcomes desired in a physician (Frenk et al., 2010). Key abilities for each stage along this continuum are defined. Learners must reach predefined markers before moving on to the next stage of training. Rather than ensuring the same amount of length of time of training for each individual, the emphasis is on the achievement of the same goals in the form of knowledge, skills and attitudes. This new requirement has a potential to influence the way trainees and teachers interact. That is, from a conformity perspective, it has the potential to create pressure towards open dialogue rather than conformity. Trainees would be more motivated to seek clarification and provide more explanations for why their opinions differ from other team members’ opinions. The motivation is in reaching the predefined milestones more quickly. Alternatively, it has a potential to create an increased pressure to conform. It is reasonable for trainees to expect denied accelerated access to critical milestones if they are perceived as problematic on a personal level. Therefore they may feel pressured to being a good team member and not to be “rocking the boat” too much. Research in describing the actual change in pressure to conform will be necessary, once the competency-based education system is implemented.

In addition to the new pressures in multidisciplinary teams and the context of a competency-based model of medical education, Postgraduate Medical Education (PGME) in Canada is experiencing forced implementation of work hour restrictions. In the future there is also the possibility of a further decrease in the number of hours residents are allowed to consecutively spend at work (CAIR, 2012). The reduction in work hours has a potential detrimental effect on multiple areas including patient outcomes and safety, residents’ quality of
life, and quality of resident training (Block et al., 2014; Blum, Shea, Czeisler, Landrigan, & Leape, 2011; Cedfeldt, English, El Youssef, Gilhooly, & Girard, 2009; Desai et al., 2013; Fabricant, Dy, Dare, & Bostrom, 2013; Fitzgibbon, Chen, Jagsi, & Weinstein, 2012; Lachance et al., 2014; Peterson, Diaz, Dickerson, Player, & Carek, 2013; Roberts, 2013). In addition, work hour restrictions decrease the amount of time available for discussing differences of opinion. Therefore, it will be critical to improve processes and abilities in identifying and resolving differences, as well as to create opportunities that foster productive and fluid working relationships.

1.1 Residency Education

Residency education in Canada typically requires 2 to 6 years of PGME depending on the specialty. It utilizes formal and informal sessions that address specialized areas. Formal sessions consist primarily of academic half days. This is protected time when residents are not expected to perform clinical duties and are required to attend scheduled educational sessions. Basic requirements for these sessions are summarized in the General Standards (RCPSC, 2014) developed by the Royal College of Physicians and Surgeons of Canada (RCPSC), College of Family Physicians of Canada (CFPC) and College de Medicins du Quebec (CMQ). Each residency program is evaluated and accredited based on meeting these specific standards. Informal teaching occurs during daily clinical activities – bedside teaching during rounds, work in clinics and in the operating room. Formal, structured, and informal, “work-based learning” (Swanwick, 2005) play an important role in daily acquisition of knowledge and skills.

Informal learning occurring on a day to day basis in the clinical environment is dependent on initial discussions between preceptors and trainees to identify specific goals for the clinical encounter and to define objectives (Ramani & Leinster, 2008). In structured sessions these goals
and objectives are predefined. Discussion of the goals and objectives improves efficiency of learning. It has been shown that knowledge retention is improved by the active involvement of trainees in formal teaching sessions (Bruner, 1961; Greenstreet, 1992). Differences of opinion are common in clinical medicine and open communication of these different opinions is essential and improves learning. Conformity in medical education likely results in the opposite effect on communication by creating pressure to minimize the opportunity for such discussions. Trainees often accept information or perform tasks without agreeing or understanding the rationale. They avoid seeking clarification or suggesting alternative solutions. This has a potential to interfere with retention and effective use of learned information.

In an attempt to improve medical education, identification of actionable factors that contribute to this pressure to conform is desirable. To date, no research describing or quantifying factors associated with the pressure to conform in formal or informal medical education exists. This study represents a first step in identifying and quantifying factors perceived by residents as associated with conformity in medical education.

1.2 Conformity

Conformity refers to matching ones behavior or opinion to the group consensus (Guo, Tan, Turner, & Xu, 2010). People constantly compare themselves to others in groups to determine the appropriateness of their behavior. It has been reported that this comparison creates pressure to succumb to others’ behaviors. The ongoing comparison and pressure to conform may worsen or improve one’s behaviors (Maxwell, 2002; Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). Both positive and negative influences of conformity on behavior have been described in the literature. Negative influence may result in increased rates of antisocial or self-
destructive behaviors. For example, teenagers under peer pressure are shown to engage in high risk behaviors (such as initiation of alcohol, tobacco and marijuana use) more than those not exposed to such pressure (Maxwell, 2002). Negative influence of conformity on medical education has also been described by Beran et al (2013). The research showed a significantly higher rate of improper performance of a procedure when trainees believed, that their peers also performed the procedure incorrectly. Alternatively, positive influences of conformity include improved adherence to social norms and attitudes. For example, a sample of Californians displayed improvement in their energy conservation practices and recycling practices when they were led to believe that their neighbors were engaging in such practices (Nolan et al., 2008). In the literature there is no example of positive influence of conformity on trainees in medical education. We can only extrapolate the results of research such as Nolan’s (2008) to medical education. One example could be an observation of a group of resident physicians who due to high work load neglect proper communication with patients and their families. Nolan’s (2008) research would suggest improvement on the skill if they were lead to believe by their attending that one of them is doing an exceptional job in this particular skill.

Although the word “conformity” is often given a negative connotation, in and of itself, conformity is neither “good” nor “bad” (Efferson, Lalive, Richerson, McElreath, & Lubell, 2008). Instead it is the situation that determines whether conformity is a desired behavior or not (Hodges & Geyer, 2006). For example, a person that is convinced that driving on the right side of the road is the only proper way of driving should conform to the social and legal norm of driving on the left side when visiting countries where driving occurs on the left. Following social norms is typically considered desirable.
Conformity is also not necessarily an act of obedience, nor should nonconformity be considered public disobedience or authority disobedience (Bocchiaro & Zamperini, 2012). For example, during a riot some antiestablishment protesters may believe that the government is correct, but, due to peer-pressure and a desire to belong to a certain group, they may conform to the group norm and join the riot. This shows that obedience is not synonymous with conformity.

Conformity is a complex concept that has been studied over many decades in the field of social psychology, primarily. In the subsequent sections, studies that demonstrate conformity, its types, and associated factors will be presented.
Chapter Two: Review of literature

Since the first research on conformity, that was published eight decades ago, researchers identified multiple reasons why people conform as well as multiple factors that increased or decreased perceived pressure to conform. A comprehensive overview of relevant research is presented in this chapter.

2.1 Initial Conformity Research

The first conformity experiment was performed in 1935 by Sheriff. This experiment examined the impact of social influence on perceptions of the autokinetic effect. Specifically, he observed how individuals respond differently to an optical illusion whereby people were placed in a dark room and asked to report if a small stationary point of light was moving. Each participant underwent multiple trials to estimate the distance the light moved, and developed a reference point to become consistent in the estimates. Subsequently, Sheriff placed groups of two or three participants in a room together and the group was asked to agree on an estimate of the distance the point of light travelled. Participants’ estimates changed, compared to the first phase, to match the group reference. The distance ranges converged as a result of compromising. More importantly, after the test participants were asked: "Were you influenced by the judgments of other persons during the experiments?" Only 25% responded affirmatively. This was the first study to show that an individual’s experience can be influenced by a group, without even realizing this influence.

Fifteen years later Solomon Asch (1951) developed a different experiment to study the social influence of individuals’ perceptions. In this study, volunteers were recruited to participate in a visual perception test. The task, which was to match the length of a standard line on one half
of 18 cards to one of three comparison lines of different lengths on the other side of the card, was completed in groups of six. Only one of the people in the room was the participant. The other five were confederates instructed to give the wrong answer on 15 tasks after giving three initial correct answers. As a result, 75% of participants conformed in at least one of the critical tasks. Answering the incorrect answers meant that participants denied what they saw with their own eyes and, instead, agreed (i.e., conformed) with the group.

After these initial trials researchers, developed multiple variations to study different factors influencing the pressure to conform. One of them was Richard Crutchfield’s modification where he reproduced the same experiment with one difference; he did not use confederates in a face-to-face setting. Instead, he placed each participant in a booth and used a system of switches to represent answers of other participants (Crutchfield, 1955). Since there was no need for multiple confederates, all five participants could be tested at the same time. This produced a more efficient experiment. Despite similar results, his modification of the experiment was criticized for attempting to compare the results to the original Asch experiment. Multiple reasons for the criticism were cited, including the fact that he used military personnel as participants, who were, in fact, trained to comply with orders, which could be viewed as a form of group conformity. Also, Crutchfield increased the privacy of the response, a potentially important factor influencing conformity. This may have fundamentally changed the pressure to conform in his study. Furthermore, this suggests that he created an important variation of the experiment with a semi-anonymous response.

All of the initial studies (Asch, 1951; Crutchfield, 1955; Sheriff, 1935) served as proof that people conform to the majority. Differences in methods and in results, as described above,
serve as the basis for further research attempting to identify the potential motivation behind conformity and factors that have the potential to influence the amount of pressure to conform.

2.2 Types of Conformity

Participants in the Asch (1951) experiment provided a variety of explanations for conforming to incorrect responses. During debriefing, all participants expressed a certain degree of self-doubt. Some participants decided to conform because they thought that the majority must have had more or better information. Others decided to agree with the group despite believing the group was wrong in an effort to avoid ruining the experiment or so as not to appear to be against the group (Asch, 1951). These reflect two types of conformity – informational and normative conformity.

Normative conformity is an act of public compliance without private acceptance of the group’s norm (Deutsch & Gerard, 1955). Regardless of who is actually correct, some individuals are convinced that the group is wrong, but in an effort to belong to the group or avoid conflict, they publicly deny their real opinion and conform to the group.

Alternatively, sometimes individuals are not completely sure about the correct answer or correct behavior. In these situations they may assume that the group has more accurate information and will display more appropriate behavior. The group norm is then internalized. This type of conformity is more pronounced in ambiguous situations or in situations with very strong implications. It is called informational conformity (Deutsch & Gerard, 1955; Kelman, 1958) and can result in both public compliance and private acceptance.
2.3 Reasons Why People Conform

2.3.1 Accuracy

People are driven to conform for different motives. Accuracy can be a goal of conformity (Cialdini & Goldstein, 2004). A striking example of this type of motivation, and subsequent informational conformity, is described by eyewitnesses of a criminal event when recalling details of the act. In a study by Gabbert et al. (2003), participants observed videos of a crime and were asked to come to conclusions about the guilt or innocence of the main character. What they did not know was that there were two versions of the video and not all participants saw the same version. As a result, following group discussions, 71% of the witnesses recalled and reported erroneous details. Impressively, 60% of witnesses who actually did not see the crime take place in their version of the film, reported that the character was guilty of the crime. Alternatively, 33% of witnesses who did see the crime happen reported the character was not guilty after the discussion with co-witnesses who saw the other version. Gabbert and her colleagues (2003) suggested that the extraordinary nature of the event and the severity of the implication of the witness’ answer resulted in an increased need for accuracy, and, thus, higher pressure to conform. For example, if other people’s lives depend on the group consensus, individuals are more likely to accept and internalize information presented by the group despite the previous disagreement such information provided. The primary type of conformity in this setting was informational conformity. It is reasonable, therefore, to expect this type of conformity to occur more frequently in the setting of high acuity decision making in clinical medicine.

In other studies (Lerner & Tetlock, 1999; Quinn & Schlenker, 2002), the goal of accuracy associated with accountability decreased pressure to conform. In other words, if somebody is
personally accountable for the result, he or she is motivated to perform better and to come to a correct conclusion. This improved judgement comes with the limitation that a previously known opinion of the audience negates the level of non-conformity (Quinn & Schlenker, 2002). For example, a hypothetical situation that would illustrate this influence is if a group of teachers were deciding whether to continue to teach using a well-established method or whether to try a new approach. If one member of this group was personally responsible for the success of students studying at this institution in province-wide examinations, this person’s opinion of using the traditional method would not likely change under the group’s pressure to try the new method. Rather, this person would likely try to “steer” the group towards a decision that (s)he considered to be correct. Hence, personal responsibility with the associated need for accuracy would decrease perceived pressure to conform.

2.3.2 Desire to belong to the group

Commonly held and well known group opinions as well as social norms result in another drive to conform, the desire to be associated with the group. It is also described as the desire for psychological nearness and propinquity (Cialdini & Goldstein, 2004). This begins with external behavioral mimicry whereby people who are trying to become a part of a group begin to subconsciously mimic motor behavior – postures and facial expressions of the group (Chartrand & Bargh, 1999). In addition, participants may develop an increased affinity to confederates who mimicked their motor behaviors (Chartrand & Bargh, 1999). This may result in increased rates of informational conformity (Leander, Chartrand, & Wood, 2011), which plays a role in the development of rapport and strengthening the sense of belonging to the group or increased psychological nearness. That means that external mimicry strengthens sense of belonging to the
group and vice versa; a stronger sense of belonging to the group increases the frequency of external mimicry.

Occasionally individuals consciously alter their behaviors or express opinions that are against their previous beliefs in order to match those of the group. This was also observed in the initial Asch (1951) experiment when some participants conformed despite obvious disagreement with the group. Cultural background plays a crucial role in this type of conformity and the perceived pressure. Conformity was more prevalent among residents of countries with collective principles when compared to residents of individualistic countries (Bond & Smith, 1996). The reason for this normative conformity can be a desire to gain social approval, to build a relationship that will result in a reward, or to avoid the impression that the individual is going against the group (Cialdini & Goldstein, 2004).

In summary, accuracy, responsibility and desire to belong to a group are important factors that influence the extent of conformity to the majority. Interestingly, these are also the important characteristics of PGME. Since residents are often personally responsible for many decisions that may significantly impact peoples’ lives, the need to be accurate is critical. Also, most residents travel away from their usual support systems to different cities for their residency and other residents become their most important, and sometimes, only support system. Help from their colleagues, particularly from more senior residents who know the city and the system in the hospital, is crucial for a smooth transition and for successful residency training. The dependence on their colleagues most likely results in a strong desire to belong to the group of residents.


2.4 Factors Influencing Conformity

There are many factors that influence pressure to conform, many of which have been suggested to be limitations of the Asch (1951) experiment that prevent generalization of the results. These factors, such as age, sex, group size, ambiguity of the task and other factors will be discussed in this section. One of the factors is the nature of the task. Asch, for example, used an artificial task (comparison of lines of different length on a card) that did not have real life applicability. Another factor is participant selection and from that resulting bias in terms of participants and the limitation of generalizability to other populations. A criticism of the Asch experiment was that it was purely a “child of its time”, meaning that American students in the 1950s were more prone to conformity and obedience as opposed to the era of individualism that started in the 1960s. The latter factor was shown in a study that replicated the original experiment in 1980 in the UK on a sample of chemistry, mathematics, and engineering students (Perrin & Spencer, 1980). Out of 396 trials only once did the participant join the group in the wrong assessment of line length. Similar results were obtained when a more ambiguous result was presented (Lalancette & Standing, 1990) with the three comparison lines differing in length by only 1-3%.

More recent studies also examined the issue of conformity. Neto (1995) replicated Asch’s original experiment at the end of 20th century with psychology students in Portugal. The experiment revealed significant conformity (59% of participants made at least one “mistake” during critical tests compared to 27% of controls). This shows that conformity in that particular task is not limited to American students in the 1950s. There are many factors that potentially influence pressure to conform and multiple variations of the conformity experiment have
assessed these factors in different populations. Further, most of us still conform daily to our society’s social norms. Conformity, therefore, may be an unstable phenomenon rather than a predictable fact (Lalancette & Standing, 1990).

2.4.1 Age

One of the limitations of the initial experiments (Asch, 1951; Asch, 1955; Asch 1956; Crutchfield, 1955) was generalizability to groups other than young male psychology students. It was suggested that with increasing age, people are less concerned about being judged on their own opinion (Reifman, Klein, & Murphy, 1989) and less interested in generating social partners (Carstensen, 1995). Consequently, their perception of pressure to conform may be reduced and their self-confidence higher compared to young people.

Influence of age on pressure to conform was studied in one of the variations of the experiment (Pasupathi, 1999). Two different age groups of participants (young adults and seniors) were faced with a 2-task experiment in which they were asked to compare ambiguous geometric shapes and facial emotional expressions. Older participants conformed less frequently, especially in the emotional stimuli tasks, compared to their younger counterparts. The results of this study suggest that age is a significant factor influencing pressure to conform and that generalizability of the results of various studies looking at conformity is problematic.

2.4.2 Sex

Another factor suggested to influence pressure to conform is participant sex. Multiple systematic reviews and meta-analyses evaluated the relationship between sex and conformity (Bond & Smith, 1996; Cooper, 1979; Eagly, 1978; Eagly & Carli, 1981). Overall, there were consistently slightly higher rates of conformity among female compared to male participants.
This was found to be statistically significant, but the effect size was minimal (Cohen’s d was 0.1-0.2). Date of publication does not seem to explain this effect for sex (Bond & Smith, 1996). There was also no difference in the mean effect size with the inclusion of stimulus ambiguity or response anonymity, suggesting that the observed sex difference is robust and not a consequence of these two confounding variables (Bond & Smith, 1996).

A study by Sistrunk and McDavid (1971) was specifically designed to compare participants’ sex and level of conformity. In this study, the researchers compared the effect of male and female confederates on male and female participants while undergoing masculine, neutral and feminine tasks. They found that in tasks designated as neutral there was no difference in conformity between the sexes and that both male and female participants conformed significantly less in their gender specific tasks. Therefore, to simply suggest that female participants conform more frequently overall is incorrect since conformity seems to be influenced by the task itself.

2.4.3 Group size

In one of the variations of his own trial, Asch (1955) designed the same experiment with a differing number of confederates giving wrong answers. With only one confederate giving erroneous answers, the number of errors reported by participants was 3%. This rose to 14% with two confederates and to 32% with three confederates. After that the error rates plateaued and a gradual decrease in the conformity levels was observed when the number of confederates rose above 7 to a total of 15 confederates. This may have implications in the setting of medical education with the gradual shift from large group to small group teaching.
Multiple studies, with variable results, were subsequently performed to address the question of majority size and pressure to conform. Rosenberg (1961) was able to identify a similar curvilinear relationship with the only difference being that the majority size generating maximum pressure to conform was four confederates. In contrast, two other studies (Gerard, Wilhelmy, & Conolley, 1968; Nordholm, 1975) identified a linear relationship between the majority size and conformity. Other studies (Insko, Smith, Alicke, Wade, & Taylor, 1985; Tanford & Penrod, 1984) identified complex functions relating to majority size and pressure to conform. The complexity of this relationship is supported by the recent meta-analysis (Bond, 2005), where 125 studies were grouped to analyze a more complex relationship between group size and response type (i.e., public and private). In studies where a response was given to the group, there was a significant but weak linear relationship that signified minimal increase in pressure to conform once the majority group size grew beyond 3 confederates. In the studies using private response there was a bigger effect of increasing majority size. This difference makes studies using private and public answers in larger groups difficult to compare. Thus, in summary, the relationship between majority size and pressure to conform is significant but more complex than initially described.

2.4.4 Ambiguity of the task

In the Crutchfield (1955) variation of the Asch experiment, participants were placed in individual booths and responses were private. They were asked to respond to many tasks. Some of them were unambiguous, just like the original line length comparison test or determination of the subsequent logical number in the line. Other tasks were more ambiguous, such as comparisons of relative sizes of different objects or judgment of pairs of words. The most
ambiguous tasks were comparisons of objects identical in size, comparison of words with completely unrelated meaning, or a “logical line” of numbers that had no logically correct completion. Ambiguous tasks were associated with significantly stronger pressure to conform. These results were consistent in multiple other studies summarized in a meta-analysis (Bond & Smith, 1996).

2.4.5 Response anonymity

As described above, the Crutchfield (1955) variation of the Asch experiment in which participants were placed in individual booths, enabled comparisons between Asch’s publically announced and Crutchfield’s private responses. It sounds logical that one would expect the pressure to express one’s opinion in front of a particular group to increase frequency of conformity. Alternatively, the feeling of safety with a response which cannot be traced to the tested participant would decrease pressure to conform. This was similarly illustrated in multiple other trials (Argyle, 1957; Deutsch & Gerard, 1955; Insko et al., 1985; Insko, 1983; Levy, 1960), designed to compare type of responses and subsequent pressure to conform.

Taken together, these studies differed in the samples they used. While all studies employed convenience sampling methods of young university students, two studies (Insko et al., 1985; Insko, 1983) included only female undergraduate psychology students in the United States, while another study (Argyle, 1957) enrolled young male students from the Cambridgeshire High School in Oxford UK. Levy (1960) described his study sample as a heterogeneous group of young male participants.

In terms of methods used to study the phenomenon of conformity, there was significant variation across studies. While some (Deutsch & Gerard, 1955; Levy, 1960) used variations of
the original Asch (1951) and Crutchfield (1955) experiments, others used unique experiments. For instance, Argyle (1957) asked their participants and confederates to discuss their opinions of the quality of a painting and mark it on a scale from “very bad” to “very good” without a neutral opinion. The two studies by Insko and colleagues (Insko et al., 1985; Insko, 1983) used multiple tasks differing in ambiguity. Despite differences in samples and methods used to study influence of how anonymity of response changes pressure to conform, all of the mentioned studies identified increased pressure with public response. This suggests external validity of the result, thus greater ability to generalize this result to other populations.

In summary, the results of the current available research on conformity suggest that: (1) there is significantly higher pressure to conform when one’s opinion is expressed publically compared to a private response; and (2) individuals forced to openly express their decision in front of a group with a known opinion tend to conform significantly more often than in cases where they are protected by anonymity.

2.4.6 Unanimity of confederates’ answers

The initial description of conformity comes from experiments where all confederates unanimously selected the wrong answers during critical tests. In subsequent variations of the same experiment (Asch, 1951; Asch, 1955; Asch, 1956), Asch considered examining the influence of a confederate that would disagree with the group. He identified a decrease in conformity by up to 80%. This occurred even in scenarios where the non-conforming confederate selected a different wrong answer than the rest of the group.

This can be explained in terms of both normative and informational conformity. If the participant rethinks his or her own view of the situation and reconsiders additional factors that
might have overlooked but that the group could have noticed, then the individual may believe the
group is correct. This reflects informational conformity, and pressure to conform is decreased if
doubt is introduced. Alternatively, if the individual is confident in knowing the right answer but
is motivated to be a proper member of the group and is uncomfortable with the thought of being
seen as different or even difficult, normative conformity occurs. With the introduction of a
person that breaks this stigma of being the only individual against the whole group, a drop in
pressure to conform is expected and typically seen (Asch 1951; Asch, 1955; Asch, 1956). As a
result, we can conclude that unanimity creates an extreme pressure and increases normative and
 informational conformity.

2.4.7 Summary

There are many factors that influence conformity. It is possible that some factors are
influencing rates of conformity in different populations in different directions. For example,
being a male medical student might be associated with lower rates of conformity while
performing a specific task compared to female medical students. But the same task performed by
a male engineering student may be associated with higher rate of conformity as compared to
female engineering student. Such factors may limit generalizability of results from experiments
performed on selected populations in the past, and may compromise assessment of current
pressure to conform in real life situations. Therefore, it is important to continue to study
conformity in specific populations separately in order to identify potential relevant factors.

Despite some skepticism that people in this day and age are stronger individuals who
conform less (Lalancette & Standing, 1990; Perrin & Spencer, 1980), this phenomenon has been
shown to still exist in our current society (Neto, 1995; Nolan et al., 2008). It may be that only the
situation required to elicit conformity is different, but that the people, factors, and overall frequency of conformity are unchanged. An additional factor that may be related to the occurrence of conformity is ambiguity towards the task.

2.5 Tolerance of Ambiguity

Ambiguity of the task has been described as an important factor that influences conformity. Ambiguity is defined as “having more than one meaning” (Gillon, 1990) or “the quality of being open to more than one interpretation” (Oxford University Press, 2014). For example, lexical ambiguity is the use of homonyms (i.e., words with multiple specific distinct meanings), which have multiple possible interpretations. The context and individual’s previous experience determine which one of the meanings is correct for that situation (Lester, Seal, Nightingale, & Field, 2010). Difficulty with identifying the one correct solution determines ambiguity.

When individuals face ambiguous situations they can experience different levels of anxiety and depending on their personal predisposition, may be more or less motivated to identify the correct solution. The amount of anxiety, or alternatively comfort, with ambiguity and the drive to come to a conclusion is determined by a person’s tolerance of ambiguity (TOA) (Budner, 1962). This psychological construct was first introduced by Frenkel-Brunswik (1949) and subsequently by others (i.e., Bors, Gruman, & Shukla, 2010; Budner, 1962; DeForge & Sobal, 1989; Geller, Faden, & Levine, 1990; Herman, Stevens, Bird, Mendenhall, & Oddou, 2010; Merrill et al., 1994; Shaw, Lewis, & Katyal, 2010; Sherrill, 2001), who assessed and validated assessment tools to measure TOA. Some of them were fairly specific in their focus on a particular population (DeForge & Sobal, 1989; Geller et al., 1990; Merrill et al., 1994), while
others were developing questionnaires for broad multicultural settings (Budner, 1962; Herman et al., 2010). A low score is associated with an individual’s “tendency to perceive ambiguity as a source of threat” and a high score represents the “tendency to perceive it as desirable” (Budner, 1962). Since its development, in-depth reliability and validity assessment of the Budner (1962) score has been repeatedly performed (Benjamin et al., 1996; Furnham & Marks, 2013; Peterson, 1994). As a result of the assessments we can conclude, that reliability assessed by the test-retest method is high (test-retest reliability coefficient 0.85 after 2 weeks), but internal consistency reliability was relatively low with Cronbach’s alpha ranging from 0.39 to 0.62 (Benjamin et al., 1996). Herman et al (2010) proposed a different measure of TOA. Items were changed to better address cross-cultural phenomena in a new context-dependent measure, rather than the original Budner’s generalized conception. This was done using the addition and removal of items with exploratory factor analyses, assessment of internal consistency, and item-total correlations (Furnham & Marks, 2013; Herman et al., 2010). By doing this the internal consistency reliability measured by Cronbach’s alpha increased to 0.73. The high internal consistency and uniqueness of cross-cultural context makes this tool an important instrument of measuring TOA (Furnham & Marks, 2013). Therefore it was considered as the tool for TOA assessment in our study.

2.6 Conformity Research in Medical Education

Several studies (Caldicott & Faber-Langendoen, 2005; Hicks, Lin, Robertson, Robinson, & Woodrow, 2001; Satterwhite 3rd, Satterwhite, & Enarson, 1998) examined medical students’ perspectives on unprofessional behavior during observed clinical encounters and concluded that trainees conform because of fear of reprisal. While these can be considered studies that identified conformity among medical students, they did not describe conformity in medical education per
se. A current search of the literature identified only two studies (Beran, McLaughlin, Al Ansari, & Kassam, 2013; Kaba & Beran, 2015) that used a task relevant to medical education to study conformity. Beran et al (2013) observed medical students while performing knee arthrocentesis in simulation after a short teaching session that provided specific instructions on how to perform this procedure. One subset of students performed the procedure on a model with no marks, while another subset did so on a model that had multiple puncture wounds, suggesting attempts during previous exams. What these students did not know was that these wounds were made by the research team in the wrong place and were intended to give the impression that other students considered this location previously. As a result, medical students who performed the knee arthrocentesis on the model with puncture wounds were significantly more likely to insert the needle in the wrong place, signifying presence of pressure to conform during the performance of this task (Beran et al, 2013).

While it is likely that conformity similar to that described in the knee arthrocentesis study (Beran et al, 2013) exists in undergraduate as well as PGME, it has not yet been examined in postgraduate populations. Moreover, like the population of medical students where conformity interfered with acquisition of a particular skill, a similar influence could be possible among those in PGME.

It is important to consider conformity an important factor that may prevent effective knowledge and skill acquisition. For example, a medical or surgical resident that is attending a lecture on pathophysiology of a certain disease, who is convinced that the pathophysiology of the disease is different from what is being presented, can conform during a discussion. One of the reasons can be a belief that the group has better knowledge and more accurate information. The information could be internalized, leading to informational conformity. The learner will consider
this to be “learning” regardless of whether they conformed to correct or incorrect group information. Alternatively, if they conform without believing that they are doing the right thing, this will represent normative conformity. Again, normative conformity will occur regardless of whether the learner conformed to correct or to incorrect information. Normative conformity prevents development of a discussion that could lead to an educational experience for the individual or for the group. Decreasing pressure to conform can improve the possibility to discuss different opinions. If we want to reduce conformity to inaccurate information, it is necessary to identify factors related to it and that increase the likelihood of it occurring. This understanding could have implications for educational planning and delivery.

2.7 Research Objectives

To our knowledge, there currently is no research that describes perception of pressure to conform in PGME as a barrier of effective communication and effective learning. Therefore, the overall purpose of this research is to determine residents’ perception of pressure to conform and factors that might be associated with it.

2.7.1 Objective 1

With preliminary evidence (Beran et al., 2013; Kaba & Beran, 2015) that conformity occurs in experimental conditions in medical education, the first objective of this study was to identify the presence and extent of trainee-perceived pressure to conform during educational sessions in PGME.
2.7.2 **Objective 2**

The second objective was to identify factors that may be related to perceived pressure to conform. We used variables such as age, sex, level of expertise or group size, TOA that were previously studied and found to significantly influence conformity. We also introduced multiple factors specific to the context of PGME, such as comparison between residents in surgical and non-surgical specialties, scenarios during residents’ home program encounters versus similar scenarios during off-service rotations, perception of pressure to conform during formal and informal teaching scenarios, and influence of desire to become a member of the team depending on whether the resident attended medical school in Canada or abroad.

Although this is an exploratory study, based on previous research we anticipated that pressure to conform would be perceived as higher by female as compared to male residents, younger compared to older, more junior compared to more senior residents, and IMGs compared to Canadian graduates. With a lack of guidance in the literature, personal experience led us to anticipate that perception of higher pressure to conform would occur during off-service rotations compared to home program rotations, among surgical residents compared to their non-surgical peers, and more so during formal as opposed to informal teaching sessions.

2.7.3 **Objective 3**

It has been suggested that normative conformity in education interferes with engagement in discussions, resulting in less efficient knowledge retention (Bruner, 1961; Greenstreet, 1992). The third objective of this study was to identify resident opinions on how normative conformity influences acquisition of knowledge and skills during PGME.
2.7.4 Summary

In summary, the present study was expected to describe the overall prevalence of conformity in a sample of residents, to identify relevant factors associated with increased perceived pressure to conform, and to describe resident perception of how conformity influences acquisition of knowledge and skills.
Chapter Three: Methods

This study received approval from the University of Calgary Conjoint Health Research Ethics Board (CHREB) E-24552 in July 2012.

3.1 Study design

This is a cross-sectional study using a questionnaire designed to describe the extent of trainee-perceived pressure to conform among residents enrolled in an accredited postgraduate residency training program at a Canadian University. Questionnaires were distributed to the study cohort between October 2012 and February 2013.

3.2 Study population

According to enrolment data provided by the PGME office at a Canadian University, the total number of residents registered in accredited training programs during the period of data collection was 750. All enrolled residents were eligible to participate in this study. There were no additional inclusion or exclusion criteria.

3.3 Questionnaire Development and Formatting

Please, refer to Appendix I for a copy of the questionnaire. Survey items were generated using results from studies described in the literature review, a previously validated tool called Tolerance for Ambiguity Assessment (Herman et al., 2010), and ideas from brainstorming sessions with the research team. Items were reviewed and then reduced to eliminate redundancy, increase participants’ interest, and improve the response rate. Wording was selected to mimic residents’ daily terminology and experiences. The three domains assessed were amount of perceived pressure to conform during common situations during residency (objective 1),
participant and program characteristics (objective 2), and assessment of residents’ perception of the effect of conformity in PGME (objective 3).

The first section of the questionnaire consisted of 21 questions describing participants’ age, sex, level of training, residency program, IMG / CIMG status and TOA. The latter was assessed using the Tolerance for Ambiguity Scale developed by Herman et al. (2010). It is a 12-statement questionnaire with 5-point Likert scale answers (i.e., strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree). The minimum score obtainable in the assessment is 12, with a maximum score of 60. Higher scores indicate higher TOA. Out of multiple TOA assessment tools available in literature, this questionnaire was selected because it offered the cross-cultural individual TOA assessment, without a focus on specific culture, age, group or occupation (Furnham & Marks, 2013). Moreover, we found that these attributes made it the most suitable tool for use in our population.

The second section of the questionnaire included a description of conformity along with 14 scenarios reflecting the majority of formal and informal training experiences in PGME. These scenarios included clinical rounds, discussions with peers, operating room encounters and academic half days. To assess the role of hierarchy during teaching encounters, this second section evaluated perceived pressure to conform when participants are at different levels of training or expertise (i.e., staff, fellows, senior and junior residents, medical students, observers, nurses, other health care professionals), as well as patients and their families. The latter was included even though patients and their families seemingly did not belong to the hierarchy of medical professionals. Nonetheless, based on personal experience it was clear that their involvement during both clinical and educational scenarios was associated with severely altered
dynamics within the medical team. Therefore patients and their families were considered an important part in the “perceived pressure to conform” hierarchy relevant to this study.

Participants were asked to assess each of the 14 scenarios twice – once as it pertained to their home service, and then once as the scenarios related to mandatory off service rotations (for example, a surgical resident during their internal medicine or anesthesia rotations). Respondents were asked to evaluate their perception of pressure to conform within scenarios using a 5-point Likert scale answer (i.e., almost never, rarely, sometimes, often, and almost always). Higher scores indicated higher rates of perceived pressure to conform.

The third and final portion of the questionnaire contained open and close-ended questions. The open-ended questions allowed residents to describe a specific scenario where they felt pressure to conform during PGME, their reaction, outcome of that reaction, as well as whether they felt was an impact on a patient, and if so, what that impact was. To determine the impact of conformity on their knowledge and skill acquisition during PGME (i.e., the third objective), this section included two direct questions: “In your opinion, what has been the impact of conformity overall on acquiring knowledge / skills in your residency?” Participants responded using a 5-point Likert scale defined as strongly negative, somewhat negative, both negative and positive, somewhat positive, and strongly positive. Higher scores were indicative of perception of conformity, as positive influence on knowledge and skill acquisition.

Formal pre-test assessment of the questionnaire was performed twice. After initial preparation, the questionnaire was presented to program directors during their regularly scheduled PGME meeting. Their comments and suggestions, primarily regarding participant and program anonymity, were incorporated and the proposal was submitted to the university ethics board. Following ethics approval, the questionnaire was again presented at the program
directors’ PGME meeting for any final revisions. This process ensured the acceptability and ease of distribution of the questionnaire. Support from the program directors was gained and then scheduling of distribution commenced.

### 3.4 Sample size calculation

A sample size of 118 participants was calculated to be sufficient to achieve power of 90% at a significance level of 0.05 to detect a moderate effect size of $d = 0.6$ for comparison between group differences for dichotomous groups described in section 3.7. This calculation was performed using the G*Power software (Univiersitat Kiel, Germany), version 3.1.9.2.

### 3.5 Administration

During the regularly scheduled half day, a 30-minute block of time was secured for implementation of the questionnaire. This time period consisted of a 10 minute introduction of the study and questionnaire followed by direct self-administration of a paper copy of the questionnaire. There were no electronic alternatives available. All residents received the schedule in advance and were aware of the administration of the questionnaire.

All 55 accredited Postgraduate Medical Programs were contacted. Seventeen program directors responded and a total of 18 sessions were scheduled. During these sessions a total of 176 residents were present (out of 750 residents enrolled in all 55 accredited programs). A total of 166 residents provided completed questionnaires. Thus, the response rate was 94.3%. This sample represents 21.3% (166/750) of the total population of residents enrolled in the accredited postgraduate programs at the University. Details of distribution with numbers of programs and residents are attached in Figure 1.
During the introduction, the definition and examples of conformity in medical education were read aloud. As per the program directors’ requests, the introduction contained the assurance that we would not compare individual programs and that participants would not be identifiable based on the presented results. Participation in the study was voluntary. Throughout the entirety of the study no participant failed to complete the questionnaire as a consequence of time constraints. All of the questionnaires were collected immediately after completion.
3.6 Statistical analyses

After data were coded, all statistical analyses were performed using STATA 12.1 software (StataCorp, College Station, TX, USA), as well as IBM SPSS Statistics version 22. Descriptive analyses were used to summarize baseline resident and program characteristics. In order to determine if trainee, program, and scenario characteristics were relevant to trainee perceptions of pressure to conform, dummy dichotomous variables were created. Age was dichotomized based on the mean value of 31.6 years (<31 versus 31+). TOA was dichotomized based on the mean value of 40.8 points (<41 versus 41+). Training level was dichotomized into junior resident (PGY level 1-3) and senior resident (PGY 4+) groups. This division did not reflect the exact nomenclature of hierarchy used in different residency programs. For example, internal medicine programs consider second year postgraduate residents (PGY 2) and higher to be senior residents, while residents after their general internal medicine Fellow of Royal College of Physicians of Canada (FRCPC) exam, who are PGY 4 and older are considered fellows. Instead, this dichotomy reflected the distribution of resident responsibilities rather than nomenclature. Residency programs were dichotomized into surgical and non-surgical programs and the size of the program was divided into three categories; small (<5 residents), medium (5-20 residents) and large (>20 residents). This division followed number of residents per year in 5-year programs (<1, 1-4 and >4 residents per year). As previously described, scenarios presented in the second portion of the questionnaire were divided into formal and informal categories. For this categorization, only academic half days were regarded as formal. Informal discussions with peers, clinical rounds and teaching in the operating room were regarded as informal sessions. To describe the possible effect of hierarchy, 5 categories were created: (1) lower rank (medical
students, lower PGY residents), (2) same rank (same PGY residents and psychologically near residents described as “good friends”), (3) higher rank medical professionals (higher PGY residents and staff physicians), (4) nurses and other health care professionals, and (5) non-medical participants (patients and their families). Although “nurses and other health care professionals” as well as “patients and their families,” are not groups one can consider to easily fit into the PGME hierarchy, their presence during educational encounters always changes the group dynamics and therefore needs to be considered an important factor. Also, this study intended on quantifying perception of pressure to conform, and thus sorted these 5 groups according to the perceived pressure each of the groups created. That means, we created a rank based on the mean pressure to conform when the mentioned groups of people were participating. Therefore, this variable was named “hierarchy”. Likert scale answers in questions 13-28 were treated as continuous variables (answer “almost never”=1, “rarely”=2, “sometimes”=3, “often”=4, “almost always”=5).

To determine the presence and extent of perceived pressure to conform reported by residents (objective 1), frequencies, means and standard deviations were calculated for each of the answers in section 2 of the questionnaire. In order to test our hypotheses regarding the difference in perceived pressure to conform among groups based on trainee, program and scenario factors (objective 2), the following statistical analyses were performed. Pearson correlations between continuous variables (age and TOA) and overall perceived pressure to conform were calculated. Two-tailed independent measures t-tests were used to compare the trainee characteristics, that included dichotomized age (<31, 31+), sex, dichotomized level of expertise (junior and senior residents), dichotomized TOA score (<41 versus 41+) and IMG status. In program characteristics, two-tailed independent measures t-test was used to identify
statistical significance of difference between surgical and non-surgical programs and perceived pressure to conform. Analysis of Variance (ANOVA) was used to compare programs based on their size (<5, 5-20, >20 residents). To describe possible association between scenario characteristics and perceived pressure to conform, two-tailed dependent measures t-tests were performed for formal and informal sessions, as well as for home versus off-service rotations, since these are within subject factors. ANOVA was used to study the differences between mean perceived pressure to conform based on involvement of different groups of people in scenarios and perceived pressure to conform. Given a total of 8 t-tests were performed, a Bonferroni correction was calculated and a p<0.00625 (0.05/8) was considered statistically significant. In order to describe residents’ opinion on how conformity influences acquisition of knowledge and skills in PGME (objective 3), descriptive statistics, such as frequencies were computed.
4.1 Questionnaire testing

A pilot test of the questionnaire was completed by five volunteer residents during the first academic half day. Debriefing, using semi-structured interviews was performed. Flow, language, ease of questionnaire completion, and presence of poorly worded or unacceptable questions were assessed. Unanimous support for the survey was obtained and no further suggestions were made by the pilot group. As such, no changes were made to the questionnaire. Content validity, as well as, completeness was assessed by the committee members. Internal consistency of the questionnaire (questions 13a/b-28a/b) was excellent based on an obtained Cronbach’s $\alpha$ of 0.95 in the pilot testing. Based on the high result there was a concern regarding redundancy of the items in the questionnaire. After review of the items it was determined that elimination of any individual item from the questionnaire would result in removal of a particular trainee, program or scenario factor that was studied. Therefore no items were removed.

4.2 Demographics

The characteristics of participants and programs are summarized in Table 1. The mean age of the respondents was 31.6 years ($SD=4.22$) and 55% ($n = 86$) were female. The majority of participants were junior residents (66%; $n = 107$), with almost 36% ($n=58$) of the participants at the PGY1 level of training. The majority (61%; $n=102$) of respondents belonged to large residency programs. Almost 20% ($n = 33$) of the participants attended medical school outside of Canada. Length of training or practice after medical school outside of Canada varied from 0 to
20 years (median 0 years). The median length of time IMGs and CIMGs spent out of practice while waiting to enter residency in Canada was 2 years (IQR 0.25-5 years, range 0 to 10 years). The TOA score ranged from 27 to 53, with a mean score of 40.8 ($SD=4.9$).

**Table 1. Resident and program characteristics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female sex</td>
<td>86 (55.48)</td>
</tr>
<tr>
<td>PGY 1</td>
<td>58 (35.8)</td>
</tr>
<tr>
<td>PGY 2</td>
<td>25 (15.43)</td>
</tr>
<tr>
<td>PGY 3</td>
<td>24 (14.81)</td>
</tr>
<tr>
<td>PGY 4</td>
<td>23 (14.2)</td>
</tr>
<tr>
<td>PGY 5</td>
<td>19 (11.73)</td>
</tr>
<tr>
<td>PGY 6, 7, 8</td>
<td>13 (8.02)</td>
</tr>
<tr>
<td>Junior residents (PGY 1-3)</td>
<td>107 (66.05)</td>
</tr>
<tr>
<td>IMG</td>
<td>25 (15.06)</td>
</tr>
<tr>
<td>CIMG</td>
<td>8 (4.82)</td>
</tr>
<tr>
<td>All foreign trained</td>
<td>33 (19.88)</td>
</tr>
<tr>
<td>Residents from small programs (&lt;5 residents)</td>
<td>10 (6.02)</td>
</tr>
<tr>
<td>Residents from medium size programs (5-20)</td>
<td>54 (32.53)</td>
</tr>
<tr>
<td>Residents from large programs (&gt;20)</td>
<td>102 (61.45)</td>
</tr>
<tr>
<td>Non-surgical programs</td>
<td>99 (59.64)</td>
</tr>
</tbody>
</table>

**4.3 Extent of Conformity**

The first set of results describes the extent of perceived pressure to conform. All participants described some experience with conformity in the setting of PGME. There were 166
questionnaires returned with 32 questions assessing pressure to conform for a total of 5312 questions. Out of those, participants either skipped or answered “not applicable” to 1165 questions, meaning 78.1% (4147 questions) were answered. The overall mean perceived pressure to conform was 2.29 (2=rarely, 3=sometimes). The most frequent response was “sometimes” (32.72%, n=1357), followed by “rarely” (32.63%, n=1353) and almost never (24.74%, n=1026). Only 351 times (8.46%) participants responded “often” and only 59 times (1.42%) in their answer they “almost always” conformed. Only 17 respondents (10%) answered less than “sometimes” for each scenario (i.e., they only used “almost never” and “rarely” in their answers). Alternatively, 84 participants (50.6%) answered “often” or “almost always” at least once in their responses. That means that only a small minority of residents described perception of minimal pressure to conform regardless of educational scenario, but half of the residents identified at least one scenario, where they felt significant pressure to go along with the others.

4.4 Factors Influencing Conformity

The second objective was to describe factors that may be related to conformity. The reporting of results in this section is divided into resident factors, current program and previous training factors, and scenario factors.
Table 2. Mean pressure to conform based on resident, program and scenario factors and p-value (range from 1 to 5; Mean +/- SD reported; p<0.00625 considered statistically significant)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean group 1</th>
<th>Mean group 2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(expected lower perception of pressure to conform)</td>
<td>(expected higher perception of pressure to conform)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>2.25 +/- 0.57</td>
<td>2.35 +/- 0.60</td>
<td>0.269</td>
</tr>
<tr>
<td>Sex</td>
<td>2.24 +/- 0.56</td>
<td>2.37 +/- 0.61</td>
<td>0.170</td>
</tr>
<tr>
<td>Seniority level</td>
<td>2.19 +/- 0.60</td>
<td>2.35 +/- 0.57</td>
<td>0.093</td>
</tr>
<tr>
<td>Tolerance of Ambiguity</td>
<td>2.25 +/- 0.06</td>
<td>2.35 +/- 0.06</td>
<td>0.270</td>
</tr>
<tr>
<td>Medical school</td>
<td>2.25 +/- 0.59</td>
<td>2.47 +/- 0.52</td>
<td>0.059</td>
</tr>
<tr>
<td>Surgical / non-surgical program</td>
<td>2.27 +/- 0.63</td>
<td>2.31 +/- 0.55</td>
<td>0.666</td>
</tr>
<tr>
<td>Formal / informal educational encounter</td>
<td>2.59 +/- 1.04</td>
<td>2.14 +/- 0.94</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Home / off-service rotation</td>
<td>2.26 +/- 0.96</td>
<td>2.31 +/- 0.99</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

### 4.4.1 Resident Factors

Four resident factors are described in this group. They were trainee age, sex, seniority level, and TOA. Correlations between age and perceived pressure to conform \((r(163)=-0.06, p=0.432)\) as well as between TOA and perceived pressure to conform \((r(164)=-0.08, p=0.304)\) did not reach statistical significance. As described in the comparisons in Table 2, there was no statistically significant difference in perception of pressure to conform between groups based on resident factors.
4.4.2 Current Program and Previous Training Factors

Similarly, there was no difference in reported rates of perceived pressure to conform between surgical and non-surgical programs \((p = 0.66)\) as described in Table 2. Comparison of overall pressure to conform based on program size did not reveal any statistically significant difference among small, medium, and large residency programs \((F(2,163)=0.37, p = 0.69)\). Measured means and standard deviations were 2.33+/−0.41 for small size programs, 2.24+/−0.59 for medium size programs, and 2.32+/−0.60 for large programs. The analysis was recalculated for pressure to conform during home program academic half days. This was done because this was the only scenario where size of the program would predictably influence composition of the group. This was also found not to be statistically significant \((p = 0.74)\).

4.4.3 Scenario Factors

Comparison between formal and informal educational encounters revealed significantly higher pressure to conform during informal teaching sessions \((p<0.001)\). Home service and off-service rotations were also considered a scenario factor. Specifically, there was a significantly higher reported pressure to conform during off-service rotations \((p<0.001)\) as described in Table 2.

A comparison of differences in pressure to conform depending on the participants involved in the educational session was performed. There was a statistically significant difference between groups as determined by the one-way ANOVA \((F(4,2803)=65.242, p<0.001)\) with an overall medium effect size (Cohen 1988) partial Eta squared \(\eta_p^2=0.085\). The general hierarchy is outlined in Table 3, together with the mean and SD for each group. Involvement of medical students and lower PGY residents in an educational scenario was associated with the
lowest perceived pressure ($M=1.78$, $SD=0.90$), followed by same PGY year residents and psychologically near residents ($M=2.12$, $SD=0.88$) patients and their families ($M=2.21$, $SD=0.89$), nurses and other health care professionals ($M=2.35$, $SD=0.96$), and finally higher PGY year residents or attendings ($M=2.65$, $SD=0.98$). Educational sessions comprised of medical students and lower ranking physician trainees were associated with statistically significantly lower pressure to conform compared to all other groups ($p<0.001$). Involvement of same rank residents and psychologically near residents created statistically significantly less pressure to conform than higher ranking physicians or other health care professionals ($p<0.001$ for both). Residents also reported higher rates of conformity in scenarios involving staff physicians and more senior residents when compared to all other health care professionals, and to patients and their families ($p<0.001$ for both). A comparison of reported conformity between health care professionals other than physicians and patients or their families did not show statistical significance ($p = 0.085$). These results suggest significant hierarchy among physicians in perceived pressure to conform, as well as significance of presence of other health care professionals and patient families on perception of pressure to conform.
Table 3. ANOVA comparisons of perceived pressure to conform based on participants

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean difference</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerks/lower PGY residents</td>
<td>Same PGY/psychologically close residents</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Patients and their families</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>Nurses and other health care professionals</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>Higher PGY residents/attending</td>
<td>0.87</td>
</tr>
<tr>
<td>Same PGY/psychologically close residents</td>
<td>Patients and their families</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Nurses and other health care professionals</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>Higher PGY residents/attending</td>
<td>0.52</td>
</tr>
<tr>
<td>Patients and their families</td>
<td>Nurses and other health care professionals</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Higher PGY residents/attending</td>
<td>0.44</td>
</tr>
<tr>
<td>Nurses and other health care professionals</td>
<td>Higher PGY residents/attending</td>
<td>0.29</td>
</tr>
</tbody>
</table>

In summary, the results showed higher rates reported during off-service rotations, during informal educational encounters, and during encounters where team members’ rank in hierarchy was above the participating resident. However, rates of conformity did not differ between groups based on resident and program characteristics.

4.5 Residents’ Perception

The proportions of answers regarding the influence of conformity on knowledge acquisition were as follows: 0.65% (n=1) strongly negative, 20.13% (n=31) somewhat negative, 62.99% (n=100) both positive and negative, 12.99% (n=20) somewhat positive, and 3.25% (n=5)
strongly positive. Answers assessing influence on acquisition of skills were 0.65% (n=1) strongly negative, 20.13% (n=31) somewhat negative, 55.84% (n=89) both positive and negative, 21.43% (n=33) somewhat positive, and 1.95% (n=3) positive.
Chapter Five: Discussion

5.1 Summary of Results

The main results of the study are: (1) Trainees in PGME experience pressure to conform to information presented during educational sessions with an overall mean perceived pressure to conform of 2.29. (2) None of the expected differences regarding association between individual resident characteristics or residency program characteristics and difference in perception of pressure to conform were confirmed. Characteristics of the educational scenario, however, are associated with significantly different perception of pressure to conform. (3) Approximately the same percentage of residents perceived normative conformity as having a negative and positive effect on acquisition of their knowledge and skills during PGME.

5.1.1 Extent of Perceived Pressure to Conform in PGME

The results of this study describe rates of perceived pressure to conform in educational scenarios typically encountered by postgraduate medical residents in their daily practice. It was expected that mainly pressure leading to normative conformity would be reported. Informational conformity is characterized by internalization and thus it is primarily an observed phenomenon as opposed to a self-reported one. Also, informational conformity would more likely be regarded as “learning” rather than “conformity” by participants of this study. It is therefore not possible to comment on informational or overall conformity based on the results of this study, since it was not measured.

As a result of this study we suggest, that residents perceived pressure to conform during educational sessions in PGME. Furthermore, the frequency with which participants perceived this pressure to conform was described as “sometimes” or more frequently than sometimes (includes “often” and “almost always”) in almost half of the responses. Out of all respondents,
almost 51% answered “often” or “almost always” to at least one of the scenarios. These high numbers stand in contrast to the rate of observed conformity in the original conformity study, which showed that as little as 3% of participants conformed at least during one of the critical tests, depending on the number of confederates and unanimity of the confederates (Asch, 1955). Overall, though, the literature contains a multitude of experimental studies which identified a wide range of conformity rates. The described percentage of participants that consciously conformed against their belief during at least one of the critical tests during these studies was 3-75% (Asch, 1951; Asch, 1955; Beran et al, 2013; Crutchfield, 1955; Insko et al, 1985; Kaba & Beran, 2015; Neto, 1995; Sheriff, 1935). The difference between rates described in current study and previous research can still be perceived as high. This may be due to difference not only in the methods involved, observed versus self-reported rate, but also in the outcome measured. While previous research was objectively measuring acts of conformity during artificial experiments, we described self-reported rates of what participants perceived as pressure to conform during several years of real life experiences. These differences precluded any direct comparison between the results of the current study and historical conformity research.

5.1.2 Factors Associated with Conformity in PGME

After demonstrating the presence of conformity in PGME, it is important to identify factors that significantly influence the perceived pressure to conform. Normative conformity may interfere with initiation and facilitation of open discussion, thereby limiting the effective attainment of knowledge and skills. By identifying the reasons and strongest predictors of increased pressure to conform, we have the theoretical opportunity to modify these factors within educational scenarios, and most effectively increase the opportunity to allow a discussion of differences in opinions.
Some variables with the potential to significantly influence the pressure to conform evaluated in the current study were guided in by previous research findings. For example age, sex and TOA were included during the development of the questionnaire. In addition to these, factors specific to PGME (for example, surgical versus non-surgical residency program, IMG status and junior or senior residency level) were also included.

The results of the analyses in this study suggest that none of the individual resident characteristics expected to be associated with increased perception of pressure to conform in PGME were found to be significant. Also residency program characteristics were not associated with increased perception of pressure to conform. We assumed that trainees had their own opinion in situations when they were subjected to pressure to conform. In that case, the lack of observed differences between resident and/or program characteristics suggests that all residents perceived pressure to conform similarly. This is different from previous studies all of which identified individual characteristics that significantly influenced pressure to conform.

There are several potential explanations to this observation. One of them is that all residents initially went through the same selection process to get accepted into medical school. This may have resulted in selection of candidates with similar personalities and opinions. Another possibility is that since all residents went through the same training during medical school, they may have adopted similar ways of reacting to uncertainty and pressure. Even obvious differences in characteristics and requirements of individual postgraduate programs were not able to alter the basic principles indoctrinated during previous undergraduate and medical training. Another possible explanation is that observed and self-reported rates of conformity differ. It is possible that, despite describing similar subjectively perceived pressure to conform, observed subconscious modifications of residents’ behaviors would differ.
The results of this study suggest that the primary factor influencing our outcome of interest, pressure to conform, is the situation (i.e., the scenario in which teaching occurs) rather than the individual participant. Despite the expectation that informal teaching sessions offer better opportunities for learners to discuss differing opinions, the present study identified greater pressure to conform during these sessions as compared to formal teaching sessions. An examination of the formal and informal sessions offers several potential explanations. An example of a formal teaching session is an academic half-day during which a large number of residents, many of whom are at the same PGY level, are taught by one senior resident or staff. In contrast, clinical rounds, teaching in the OR and/or informal “hallway” teaching typically includes a limited number of trainees who are at different stages of training (i.e. medical student, junior resident, senior resident, fellow and a staff). In these informal teaching situations there is an obvious power differential and hierarchy as opposed to a more homogeneous formal teaching session, creating the potential for conforming behaviors.

Still, care must be taken in interpreting the difference between formal and informal teaching sessions. First of all, informal sessions are more prevalent, better targeted to relevant topics, and flexible in stressing the relevant point for different levels of trainees than formal teaching sessions. Also, the explanation of the same topic by people from differing stages of training and practice offers an invaluable opportunity to learn. The important message to be taken from these results regarding the difference between the two types of sessions is that educators need to recognize the decreased likelihood of lower PGY level trainees to ask for clarification or present alternative explanations during informal teaching sessions. Educators need to be more vigilant in ensuring that junior learners are deliberately invited to question, challenge, and clarify when acquiring, creating and consolidating skills and knowledge. As a
result of this study, potential modifications to overcome the higher pressure to conform during informal teaching include initiation of a discussion rather than a “teaching session”. Furthermore, it is recommended that several lower level trainees be involved in the discussions relevant to their level of training and that they are involved early, before discussing details with more senior trainees. These important steps taken to structure the learning environment may minimize power differentials within these sessions and have the potential to make the informal session an effective teaching opportunity for all learners.

Another factor that significantly influenced perceived pressure to conform was participant’s core service rotation versus off-service rotation setting. During home rotations the pressure was lower than during off-service rotations. For example a general surgical resident was more likely to discuss a differing opinion during a teaching session during his/her own general surgery rotation as opposed to during an off-service internal medicine or anesthesia rotation. Residents on off-service rotations may feel less a part of the team, have less accountability, pressure to be accurate is lower and tasks may seem more ambiguous. As a result of the decreased likelihood of seeking clarification during the off-service teaching session rotations, the learning experience is potentially compromised.

The difference between home service and off-service rotation pressure to conform can lead to several suggestions. The differences between rotations (i.e. inclusion in the team, lower accountability, and ambiguity of tasks) should be minimized. Off-service residents should be treated as equal team members, they should be given responsibilities during teaching sessions, and they should feel that learning of the whole group depends in some way on their performance. In theory, these modifications have the potential to improve learning.
Another main finding in our results is the importance of the power differential and hierarchy on the pressure to conform. It is also a factor that is difficult to directly influence. We do not advise that staff physicians or more senior learners avoid educational sessions or that their authority be questioned. However, junior residents need to be given permission and encouragement to question and seek clarification on information given by more senior colleagues. Also, greater awareness of impact of the medical hierarchy as a factor related to conformity may aide in better recognition of certain high-risk scenarios.

Although it is certainly possible to alter this strict hierarchy in many situations/session, other sessions may not allow for such modifications. One such example is the operating room (OR), which in this study was the scenario that showed the highest rate of conformity. Work in the OR is characterized by acute decision-making, high levels of accountability for decisions and for outcomes, as well as a need for time efficiency and greater supervision. This type of environment affects the amount and type of teaching that is possible. The opportunity to engage in prolonged discussions explaining different opinions during a procedure is often not realistic or feasible. It is important for the educator to realize that trainees are less likely to share and discuss both correct and incorrect knowledge in the OR. Trainees are less likely to present their opinions on a new method recently described in a scientific paper or the step in a procedure they misunderstood when reading about it in a textbook. Thus, in order to overcome the pressure during the procedure, the teacher can create an opportunity to initiate a discussion at the scrub sink prior to starting or immediately after finishing a surgical procedure while the details of the situation are still in the learner’s recent memory. It is possible that these modifications will further improve the effectiveness of the unique and invaluable teaching that occurs in the OR.
In summary, the results of this study show a comparison of the ability of participants to discuss different opinions during teaching sessions. While it is desirable to utilize sessions which offer lower pressure to conform, even the highest pressure scenarios can be useful because they offer unique teaching opportunities. It is up to the teacher to: (1) identify pressures to conform that may prevent participants from offering alternative ideas, and (2) attempt to alter these factors in order to negate this pressure. In so doing educators may increase the learning opportunities available to trainees of all levels.

5.1.3 Influence of Conformity on Acquisition of Knowledge and Skills in PGME

At the individual learner level, the openness to conformity research is evident from the high percentage of participation. Of the 10 residents that refused to participate, three expressed an opinion that promoting non-conformity in medical education is equal to promoting rebellion and may lead to the delivery of inadequate care by multidisciplinary teams. These opinions occurred despite the introduction that described conformity in the context of the “Collaborator” and “Communicator” CanMEDS roles. Alternatively, at the University and Residency Program level the perception of conformity research is likely different. Despite positive comments and an inviting atmosphere during the introduction of the research project, surprisingly only 17 out of 55 postgraduate programs allowed us to include their residents in this study. While it is not possible to determine the exact reason, it is plausible that this low number may reflect a negative attitude towards the research on conformity in PGME.

Alternatively, it is also surprising that almost a fifth of participants (15%, n=25) considered normative conformity to be a positive influence on the acquisition of knowledge. This number was even greater, almost a quarter (23%, n=36), when influence on acquisition of new skills was described. Negative attitude towards conformity was expressed by almost a quarter of
participants (21%, n=32) in both skills and knowledge questions. Further qualitative research with semi-structured interviews would likely be the most suitable method to describe these attitudes.

5.2 Limitations

Conformity is a complex phenomenon and it is likely that there are other relevant factors that have not been considered in this study and that could potentially impact the results. In order to minimize the possibility of missing an important variable, the current literature was extensively surveyed and a brainstorming session was used.

Another limitation of this study is that it was performed at a single university. This limits generalizability of the results to other universities and residency programs. Furthermore, given the overall low rate of response from residency programs it is possible that sampling bias significantly influenced the results of this study. It is possible that residents enrolled in programs that were not interested in participating in this study may have expressed more polarized attitudes (either negative or positive) towards conformity when compared to the residents from programs involved in the current study sample.

5.3 Future Research and Implications

There are several important implications resulting from this study. One of them is the identification of factors that influence perception of pressure to conform in PGME. In order to give the description of these factors practical meaning, a study comparing traditional sessions with test sessions where factors identified in this study are systematically modified could be made. Modifications should include involvement of similar level learners and teachers (for
example junior residents teaching medical students or seniors teaching juniors) as opposed to sessions with multiple different level learners and teachers. Another strategy should be an attempt to set up a more formal teaching session with an announced schedule and content in advance as opposed to immediate discussion during a patient encounter. A most suitable outcome measuring learning outcome would be knowledge retention, as measured and compared between the 2 groups several weeks after the respective sessions.

Regarding the description of residents’ attitudes, a qualitative approach could be used to obtain a detailed and thematic description. This would allow a more comprehensive assessment of factors and opinions.

A possible practical outcome of the current study is the development of a course with a structured curriculum intended to educate clinician teachers actively involved in PGME. The aim of the course would be to learn how to identify factors that prevent trainees from full participation in discussions during educational sessions and present strategies to improve active trainee involvement in the sessions. Similarly, another opportunity is that of developing a similar course for residents, during which they would be taught strategies on how to ask for clarification more effectively. Ultimately, responsibility for improved learning rests with both learners and educators.

5.4 Conclusion

In conclusion, this study identified that there is a perceived pressure to conform in PGME. However, despite our expectations, no resident or residency program factors were associated with significant differences in perception of pressure to conform. Based on the results of this study, the perceived pressure to conform is determined by scenario factors, such as formal
and informal session, hierarchy of the participants or location where the encounter occurs. As a result, an attempt to decrease barriers to open discussions during educational encounters in PGME could be universal as opposed to developing program specific strategies. The ability of these strategies to decrease pressure to conform should be assessed in the context of a new study.
References


Understanding the clinical dilemmas that shape medical students' ethical development:
Questionnaire survey and focus group study. BMJ (Clinical Research Ed.), 322(7288), 709-710.


Lester, K. J., Seal, K., Nightingale, Z. C., & Field, A. P. (2010). Are children's own interpretations of ambiguous situations based on how they perceive their mothers have


Appendix 1: Survey for Residents

Year of birth: _____________________                  Sex (Circle one): Male   Female

Residency program: _______________________ Year in program (Circle one): 1 2 3 4 5 6 7 8

Are you an International Medical Graduate (IMG)? (Circle one): Yes   No

Are you a Canadian International Medical Graduate (Circle one): Yes No

If Yes: How long have you been practicing prior to coming to Canada? ______________

What was your specialty prior to coming to Canada? ______________________

How long have you been out of practice prior to starting the residency in Canada?

________________

e-mail address if interested in follow-up interview:____________________________________________

Please, circle the answer that describes your attitudes most:

1. I avoid settings where people don’t share my values.

   Strongly disagree   Disagree   Neither agree nor disagree   Agree   Strongly agree

2. I can enjoy being with people whose values are different from mine.

   Strongly disagree   Disagree   Neither agree nor disagree   Agree   Strongly agree

3. I would like to live in a foreign country for a while.

   Strongly disagree   Disagree   Neither agree nor disagree   Agree   Strongly agree

4. I like to surround myself with things that are familiar to me.

   Strongly disagree   Disagree   Neither agree nor disagree   Agree   Strongly agree

5. The sooner we all acquire similar values and ideas the better.

   Strongly disagree   Disagree   Neither agree nor disagree   Agree   Strongly agree

6. I can be comfortable with almost all kinds of people.
7. If given a choice, I will usually visit a foreign country rather than vacation at home.

8. A good teacher is one who makes you wonder about your way of looking at things.

9. A good job is one where what is to be done and how it is to be done are always clear.

10. A person who leads an even, regular life in which few surprises or unexpected happenings arise really has a lot to be grateful for.

11. What we are used to is always preferable to what is unfamiliar.

12. I like parties where I know most of the people more than ones where all or most of the people are complete strangers.

Residents may find themselves in clinical situations where they feel pressure to go along with other people’s ideas, even when these ideas seem wrong (called conformity). Please indicate the percentage of decisions made during an average rotation in residency when you’ve been in this type of situation __________%.

Please, describe your experience in these settings during both the on-service and off-service rotations:

To what extent have you had this experience when in (circle one):

13. Clinical rounds

On-service...........not applicable almost never rarely sometimes often almost always

Off-service...........not applicable almost never rarely sometimes often almost always

14. Academic half days
<table>
<thead>
<tr>
<th>Activity</th>
<th>On Service</th>
<th>Almost Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>15. Discussion with peers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Off Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td><strong>16. Operating room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Off Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td><strong>17. Other situations (please specify):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Off Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
</tbody>
</table>

To what extent have you had this experience when with (circle one):

**18. Preceptors**

<table>
<thead>
<tr>
<th></th>
<th>On Service</th>
<th>Almost Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Off Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
</tbody>
</table>

**19. Same year residents**

<table>
<thead>
<tr>
<th></th>
<th>On Service</th>
<th>Almost Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Service</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Category</td>
<td>On-service</td>
<td>alb</td>
<td>lcl</td>
<td>slm</td>
<td>ofn</td>
<td>ald</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Residents who are also friends</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Lower year residents</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Higher year residents</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Clerks</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Nurses</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
<tr>
<td>Other health professionals</td>
<td>not applicable</td>
<td>almost never</td>
<td>rarely</td>
<td>sometimes</td>
<td>often</td>
<td>almost always</td>
</tr>
</tbody>
</table>
26. Patients
On-service.........not applicable  almost never  rarely  sometimes  often  almost always
Off-service.........not applicable  almost never  rarely  sometimes  often  almost always

27. Family members of patients
On-service.........not applicable  almost never  rarely  sometimes  often  almost always
Off-service.........not applicable  almost never  rarely  sometimes  often  almost always

28. Mixed groups of people
On-service.........not applicable  almost never  rarely  sometimes  often  almost always
Off-service.........not applicable  almost never  rarely  sometimes  often  almost always
(Specify groups)

29. Please describe an event you may have had as a resident when you experienced pressure to go along with others (What did you do, how many people were there, what role did they have - clerk, junior, senior resident, fellow, staff, nurse):___________________________________________________________
_________________________________________________
_________________________________________________
_________________________________________________

30. What did you do?________________________________
__________________________________

31. What was the outcome? _____________________________________________________________
32. Was there any impact on a patient? ____________________________________________________

33. What percentage of residents in your group do you think had a similar experience?
   _______%

34. What percentage of these residents do you think would go along with the pressure?
   _______%

35. If you experienced pressure to go along with others, why did you feel pressured (circle all that apply):
   Short of time       Lack of expertise       Authority figure present (preceptor)
   Other reason

   Other people present were  friends  patient  family members of patients

36. If you have seen another resident experience pressure to go along with others, why do you think they felt pressured (circle all that apply):
   Short of time   Lack of expertise   Authority figure present (preceptor)
   Other reason

   Other clinicians present were friends persistent patient   persistent family members of patients

37. Please rate the severity of this type of issue in residency (circle one):

   Not at all  A bit  Somewhat  Severe  Very
   severe  severe  severe  severe

38. Has it resulted in any medical errors or adverse events (circle one)?

   None  Few (1-2)  Several  Many  A lot

   Please specify ____________________________________________

39. In your opinion, what has been the impact of conformity overall on acquiring knowledge in your residency?

   Strongly  Somewhat  Both negative  Somewhat  Strongly
   negative  negative  and positive  positive  positive
40. In your opinion, what was the impact of conformity overall on acquiring clinical skills in your residency?

<table>
<thead>
<tr>
<th>Strongly negative</th>
<th>Somewhat negative</th>
<th>Both negative and positive</th>
<th>Somewhat positive</th>
<th>Strongly positive</th>
</tr>
</thead>
</table>

67
Appendix 2: Tolerance of ambiguity score calculation

Copied from the original paper by Herman et al (2010):

1. I avoid settings where people don’t share my values. [Reverse Coded]
2. I can enjoy being with people whose values are very different from mine.
3. I would like to live in a foreign country for a while.
4. I like to surround myself with things that are familiar to me. [Reverse Coded]
5. The sooner we all acquire similar values and ideals the better. [Reverse Coded]
6. I can be comfortable with nearly all kinds of people.
7. If given a choice, I will usually visit a foreign country rather than vacation at home.
8. A good teacher is one who makes you wonder about your way of looking at things.
9. A good job is one where what is to be done and how it is to be done are always clear. [Reverse Coded]
10. A person who leads an even, regular life in which few surprises or unexpected happenings arise really has a lot to be grateful for. [Reverse Coded]
11. What we are used to is always preferable to what is unfamiliar. [Reverse Coded]
12. I like parties where I know most of the people more than ones where all or most of the people are complete strangers. [Reverse Coded]

All items are scored on a 5-point Likert scale, ranging from ‘‘1 = Strongly Disagree’’ to ‘‘5 = Strongly Agree’’ and a‘‘3 = Neither Agree nor Disagree’’ option in the middle. (This scoring pattern is inverted for items followed by [Reverse Coded], above.)
Appendix 3: Sample size calculation