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Promoting Patient Care Ownership in Medical Students through Standardized Simulations

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Abstract

Background: Professional identity formation (PIF) has been demonstrated to play an important role in medical students' transition from a peripheral role into becoming a physician that bears primary responsibility for the care of their patients [1,2]. Multiple factors influence this development, including clinical experiences as well as sociocultural, familial, academic, moral, religious, and gender-based roles, values, beliefs, and obligations. Many of these factors can be emulated in simulations to encourage this merging of identities; the most critical of which is patient care ownership (PCO) [6]. This study was conducted on the 4th year medical students at the Medical College of Georgia (MCG) and compares a self-reported PCO index score amongst the various subsets. These include main vs regional campus assignment for clinical years, gender identity, ethnicity, and prior healthcare experience before medical school.

Methods: For this study, we distributed a questionnaire developed by Avey et al. (2009) and adapted by Wyatt et al.[11] (2023) to evaluate the feelings and opinions of medical students regarding their level of patient care ownership [11,16,17]. To evaluate the effects of the longitudinal simulation curriculum on PCO as measured with the survey instrument index scores, independent sample t-tests and ANOVA between different groups with a Tukey HSD multiple-comparison post-hoc were done. Groups analyzed for differences included campus, gender identity, race, ethnicity, and prior experience in the healthcare field.

Results: A total of 201 students were invited to participate in this study. There was no statistically significant difference between students from main and regional campuses in PCO index scores. When comparing between gender identities of male, female, and nonbinary, there was no significant difference ($p = 0.248$). Comparing ethnicities did not show any significant differences ($p = 0.936$). Finally, there was no significant difference in PCO index scores between students in regard to their prior healthcare experiences ($p = 0.155$).

Conclusion: This study highlights the importance of a comprehensive and intentionally-designed simulation curriculum to prompt PCO in order to facilitate PIF prior to residency, for the purpose of producing more confident and competent intern physicians [2].

Conflict of interest: None.
Treatment of human and animal subjects: Not applicable.

BACKGROUND

Professional identity formation (PIF) has been demonstrated to play an important role in medical students' transition from a peripheral role into becoming a physician that bears primary responsibility for the care of their patients [1,2]. PIF can be defined as developing an individual's perception of self in the context of being a physician and how they evaluate their professional roles and responsibilities in light of fluid circumstances [3,4]. PIF is the integration of one's independent identity before medical school as a non-physician with the identity of physician-hood until they are one and the same [5]. Multiple factors influence this development, including clinical

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experiences as well as sociocultural, familial, academic, moral, religious, and gender-based roles, values, beliefs, and obligations. Many of these factors can be emulated in simulations to encourage this merging of identities; the most critical of which is patient care ownership (PCO) [6]. PIF and PCO remain complex to elucidate in medical students, with few tools available to evaluate the PIF in question [7].

Cruess et. al (2016) have created an amended version of Miller's pyramid that serves as a framework for professional identity formation [1]. The base of this pyramid starts with knowledge that an individual "knows" what is needed to carry out the role of a physician. The next layer of "knows how" indicates competence and requires the individual to be able to analyze, interpret, synthesize, and apply the knowledge. The following layer, "shows how" involves the ability to perform and demonstrate the use of knowledge under supervision. The fourth layer, "does", represents that physician's capability to function independently in a clinical setting. And lastly, "is", the added level to Miller's pyramid, would naturally occur as the end point of the journey of professional identity formation when the individual's identity has been fully integrated to "think, act, and feel like a physician." [1, 8, 9]

Patient care ownership, also described as "patient ownership", is not a relationship in which the physician "owns" a patient but rather a two-way relationship between the physician and patient in which meaningful connection is made [10]. An active role must be played by both, patient and physician. While the role of the physician may include medical decision making, care coordination, and documentation, it does not end there. PCO comprises "responsibility, commitment, advocacy, and personal investment" by the physician [10-13]. The physician wants to be seen as the point of contact for the patient and the patient wants to feel that their thoughts and concerns are heard and acknowledged by said physician [10, 14]

Patient care ownership is a catalyst for professional identity formation, and it can be achieved in simulation [6]. PCO is the mental, physical, and emotional investment a physician has towards their patients. It is the feeling of responsibility and ownership for the management of patient care decisions and the outcomes of those decisions, knowing a patient and their care goals, and caring about the patient and the result of decisions made for care [11-13]. PCO can be prompted sharply when students are pushed out of their comfort zone into scenarios in which there is no supervising physician to make decisions; the choices fall on their shoulders, and they become aware of their knowledge gaps and strive to fill them. This discomfort and growth becomes essential to delivering patient care [5]. The process can be most safely achieved during simulation activities. And the earlier a student can achieve patient ownership, the sooner these knowledge gaps for clinical expediency may be met [6].

As medical educators, it is necessary to provide students with opportunities to experience instances of PCO to aid in the transition from the clinical rotations of undergraduate medical education to the first intern year of resident training [14]. For regional medical campus models, providing consistent and comparable opportunities for PCO can be a challenge due to the differences that exist between academic and regional medical centers and campuses. Depending on which clinical site a student is rotating at, students may have a more hands-on role or a more peripheral role in patient care. At a traditional academic institution, there is a more complex hierarchy involving residents that can push medical students toward the periphery of the team. Many medical students are not granted insight into the physician thought process or how decisions are made in this setting, as resident and attending physicians manage this dynamic [6]. In community settings at regional campuses, there is a closer relationship between medical students and attendings due to the lack of residents. Students at regional campuses may be more frequently involved in discussions of decision making or witness to the physician thought process; they may also be afforded more one-on-one time with patients [15]. However, in these regional spaces there may be limited exposure to the range of medical practice and the complex cases being managed in academic medical centers. Given these inherent differences between the two settings of academic vs community-based clerkships, there is a need to provide the standardized fundamental

experiences that precipitate and solidify PIF through PCO.

This study explored longitudinal simulations for clerkship students at a large public medical school in the Southeast United States. The aim of this study was to evaluate the outcomes of a new, statewide, simulation-based curriculum, and to determine if standardized simulations designed to prompt PCO equilibrated the feelings of ownership between students from regional and main medical school campuses.

METHODS

The Medical College of Georgia (MCG) is the only public medical school in Georgia and has a main four-year campus with a large academic hospital where students participate in their pre-clinical phase of education. However, during clerkship and enrichment phases of training, students are assigned by preference to either the main campus or to one of the three regional campuses throughout the state. At the main MCG campus, students are in an environment with residents, fellows, and attendings. The regional campuses are comprised of community-based hospitals and clinics with few, if any, residency programs. The educational environment in the regional clerkships is often simply the student and attending in a dyadic team. Though the regional campus students may still interact with residents at rotations where there is a corresponding residency program, during rotations that do not have residents participating, the student may have more opportunities for hands-on experiences and an increased level of responsibility. However, given the larger number of physicians a student may interact with at the academic hospital on the main campus, learners may be exposed to a broader range of styles of practice and presentations of PCO. In order to bridge these differences, a new longitudinal simulation curriculum offers all students the same opportunities to experience PCO in a standardized manner. At MCG, a new statewide, synchronous, simulation-based course was recently implemented in the clerkship phase of the curriculum in order to provide safe and standardized opportunities for PCO to facilitate PIF. Each core rotation (i.e., family medicine, internal medicine, obstetrics/gynecology, pediatrics, and surgery) includes a standardized patient simulation in which each student performs in the role of the physician responsible for managing and treating the patient actor. Each simulation room on each campus was set up as a patient exam room and included the standardized equipment, supplies, and instruments a physician would need. The students are responsible for ordering and interpreting studies, communicating with nurses and other physicians, and managing outcomes. Students are empowered and encouraged to interact and communicate with other health professionals by phone during the case to simulate realistic clinical team dynamics. This aids in the development of both communication skills and the confidence to address other team members with respectful, clear direction. In the simulations, interacting with nurses, pharmacists, attending physicians, and social workers, serves to help students engage in the reality of patient care teams that they can expect once in residency. This experience and formative feedback encourages open dialogue and solidifies understanding of each professional's role in patient care. In these simulations, attending physician educators of the rotation speciality at each statewide campus observe students via video and audio. In the pass/fail course, the faculty assess students' with a formative instrument determining how much assistance a student appears to need to perform each of Core Entrustable Professional Activities (EPA) embedded in each case. Each Core EPA is assessed at least once during the clerkship phase, but often multiple times, for longitudinal feedback. Faculty then debrief each student individually to facilitate deeper and intentional reflection on the student's individual development trajectory towards becoming ready for residency. Each simulation room included devices with internet connectivity and a phone to look up information as needed and to call consultants or other health professionals. This was done to ease the flow of the encounter, minimize student stress about knowledge gaps, assess interprofessional-based Core EPAs, and represent the resources available to a modern practicing physician. Data was collected between May 2023 to June 2023. All students surveyed had completed their third-year clinical clerkships, which allowed for the assessment of PCO immediately after completing the new simulation curriculum. The Institutional Review Board of Augusta University approved this study.

Data Collection

For this study, we distributed a questionnaire developed by Avey et al. (2009) and adapted by Wyatt et al.[11] (2023) to evaluate the feelings and opinions of medical students regarding their level of patient care ownership [11,16,17]. The validity evidence presented by Wyatt et al. (2023) was previously collected at the same institution, so no additional validity evidence was deemed necessary. The survey instrument consisted of 19 questions, with students able to rate their agreement on a Likert agreement scale from 0-5, with 0 representing "strongly disagree" and 5 representing "strongly agree"; the subscales identified in this instrument included: team-inclusion, accountability, territoriality, self-confidence [11,17]. There are several reverse-coded questions in the instrument to ensure authentic and careful participation in the survey [17]. Demographic information collected included gender, race/ethnicity, extent of prior clinical experience (e.g., shadowing/volunteering, employment in the medical field, etc.), as well as clerkship campus assignment. Clerkship campuses included either the main, urban campus with a large academic center and the three rural community medicine campuses throughout the state. Upon completion of the clerkship phase of education, 201 students were invited to participate in the voluntary, anonymous survey distributed through Qualtrics. The entirety of the class participates in the required simulations and therefore was offered the survey. There were no students that did not engage in the simulation curriculum to serve as a negative control. However, there was a subset of students that had prior healthcare experience. These students were used as a control to determine if any degree of clinical experience or exposure is sufficient to develop PCO. The survey was distributed through email and a class-wide messaging platform. Reminders were sent at regular intervals to maximize the number of participants.

Data Analysis

To evaluate the effects of the longitudinal simulation curriculum on PCO as measured with the survey instrument index scores, independent sample t-tests and ANOVA between different groups with a Tukey HSD multiple-comparison post-hoc were done. Groups analyzed for differences included campus, gender identity, race, ethnicity, and prior experience in the healthcare field.

Raw data from the survey was transferred into Statistical Package for Social Sciences software version 29.0 (SPSS). Incomplete surveys were removed from the data set. Reverse-coded questions were transformed into the same variable. To analyze the degree of PCO among students, they were grouped in several classifications. These include main vs regional campus designation for clerkship rotations; male vs female vs nonbinary gender identity; and ethnicities including Native (Indigenous) American/Alaskan, Asian, Black, Hawaiian/Pacific Islander, White, mixed/multiple, Middle Eastern/North African, Hispanic, and prefer not to say.

The students' PCO index scores between main vs regional campus designation were compared using an independent sample t-test. PCO index scores between various gender identities were initially compared using an ANOVA, however specific differences between all three gender identity groups could not be assessed due to only having one nonbinary student participate. Males and females were then compared with an independent sample t-test. The PCO of students grouped by ethnicity was compared using an ANOVA. There was only one Hispanic respondent; this student was included in the overall ANOVA, however, was excluded from the Tukey HSD analysis for assessment between each ethnic group compared to the others. Finally, students' were divided by prior healthcare experience. The categories included prior employment in healthcare, shadowing/volunteering, and no experience. An ANOVA was performed with a Tukey HSD analysis for intergroup comparison. All analyses were set to an $\alpha = 0.05$ to designate statistically significant differences. The confidence interval was set at 95%.

RESULTS

A total of 201 students were invited to participate in this study after successfully completing their core clerkship rotations, which included the new standardized simulation-based curriculum that was designed to facilitate PCO to develop PIF. Thirty-nine completed responses were collected and analyzed,

accounting for 19.4% of the total number of students surveyed. Descriptive statistics are found in Table 1.

Table 1: Group Statistics

	Main Campus (n = 27)	Regional Campuses (n = 12)	Total (n = 39)
Ethnicity			
Native American/Alaskan	0	0	0
Asian	9	1	10
Black	2	2	4
Hawaiian/Pacific Islander	0	0	0
White	13	6	19
Mixed/Multiple	1	1	2
Middle Eastern/North African	1	2	3
Hispanic	1	0	1
No Response	0	0	0
Gender Identity			
Male	8	3	11
Female	18	9	27
Non-binary	1	0	1
Prior Healthcare Experience			
No prior experience	6	3	9
Yes, I shadowed/volunteered in a clinical setting	17	3	20
Yes, I was employed as a healthcare professional	4	6	10

PCO index scores can range from 19 - 95. The highest score recorded in this distribution of the instrument was an 82, and the lowest was a 43. The mean score among all students was 68.794. In comparing students from the main campus versus the three regional campuses, the PCO index mean for main campus students was 68.2963 (SD = 9.60294) and the regional campus PCO index score mean was 69.9167 (SD = 6.33114). Equal variances was assumed, using a two sided t-test (p = 0.597).

When comparing between gender identities of male, female, and nonbinary, the primary ANOVA showed no significant difference (p = 0.248). The male vs female demographic was then compared with a t-test; the nonbinary demographic was excluded from analysis due to only having a single member identifying as nonbinary and single data points cannot be included in an ANOVA. The t-test showed males had a slightly higher mean of 71.8182 (SD = 10.39056) and females had a mean of 67.2963 (SD = 7.76489), although these were not significantly different. Equal variance was assumed, the two-tailed t-test had a p = 0.075; excluding the nonbinary student, significant differences were not found between the two groups.

POC index scores for students of the various ethnic identities were initially compared with an ANOVA that showed an overall p = 0.541. Then, an ANOVA with intergroup comparison excluding the single hispanic respondent was conducted, but this did not show any significant differences with the overall p = 0.936. Individual mean PCO scores for each ethnicity group can be seen in table 2.

Table 2: Mean Scores

	Mean PCO Index Scores	Standard Deviation
Campus		
Main	68.2963	9.60294
Regional	69.9167	6.33114
Ethnicity		
Asian	67.7000	
Black	72.0000	
White	69.1053	
Mixed/Multiple	70.0000	
Middle Eastern/North African	69.667	
Gender Identity		
Male	71.8182	10.39056
Female	67.2963	7.76489
Prior Healthcare Experience		
No prior experience	64.4444	
Yes, I shadowed/volunteered in a clinical setting	69.1000	
Yes, I was employed as a healthcare professional	72.1000	

Finally, there was no significant difference in PCO index scores between students in regards to their prior healthcare experiences with an overall p = 0.155. When comparing homogeneous subsets, the mean score for those with no prior healthcare experience was 64.4444; the mean PCO index score amongst those with prior shadowing/volunteer experience was 69.100; the mean PCO index score for students with prior healthcare employment was 72.1. Although students with prior experience did have the highest mean scores, there was no statistically

significant difference for the homogeneous subsets ($p = 0.091$).

Overall, when comparing the feelings of PCO between students that had completed the standardized, statewide simulation curriculum designed to prompt PCO and develop PIF, there were no statistically significant differences found.

DISCUSSION

It has been previously demonstrated that presence in the clinical environment is not solely adequate for the development of PIF [9]. Simply being in a clinical setting does not ensure that medical students are enacting responsibility, autonomy, and clinical decision making. These are the critical actions a student must undergo to develop feelings of PCO which in turn facilitates PIF. The complex and diverse clinical environments into which medical students are placed for their clerkship rotations are difficult to regulate to achieve equanimous contact with these physician skills and behaviors. There is also a broad range of teaching styles by resident and attending physicians, making it even more difficult to ensure consistent and effective teaching and evaluation of these skills [7]. Further, medical students do not always have equal opportunities to engage in hands-on patient care to facilitate the development of their physician identity. Therefore, simulation can be an important alternative to engage students in meaningful clinical experiences where they can practice and reflect on these skills linked to the development of PIF through PCO [6,11,18]. By providing an intentionally-designed and standardized simulation environment to bear these lessons out, these skills can be specifically honed and evaluated [6].

This study was designed to evaluate the degree of PCO amongst students who have completed a new longitudinal simulation curriculum designed to prompt PCO in order to facilitate PIF. The major outcome of our study shows that the longitudinal simulation curriculum has standardized the development and degree of PCO amongst all statewide students. There was no significant difference in PCO between those at the main campus versus the regional campuses. Nor was there a distinct difference in PCO between students of various other demographic groups. Students may come into medical school with varying healthcare experience and they may get differing types of patient care encounters based on the location of their clerkships, both of which can be difficult to quantify. Yet the results of this study imply that a longitudinal simulation curriculum has enabled an equal standardized clinical opportunity to aid students in their development of PCO and their emerging physician identity.

Limitations

Limitations of this study include a small sample size. The survey was sent out during the time that most students were studying for their USMLE examinations. Step exam preparation likely limited the amount of time and attention many students were willing to spend on a voluntary survey, although efforts were made to keep the survey brief. Additionally, medical students are subjected to dozens of surveys over their tenure and may be fatigued by evaluation. This small sample size resulted in having only one representative of certain demographics, impinging the data analysis. It would additionally have been ideal to have more responses from those that are underrepresented in medicine to elucidate the PCO development of those groups. There was only one nonbinary respondent and one Hispanic respondent. Careful treatment of the data was necessary to protect the identities of these students, as the response pool was so small that demographic information, if used to distinguish narrower pools for examination, could be used to reveal individual identities. This led us to group students into broader categories such as “all regional campus students” rather than, for example, black students at a particular regional campus. Granular analyses were impossible due to the risk of de-anonymizing participants.

Another limitation is that this study was conducted at a single point in time. Assessment at the beginning could have been used to set a baseline level of PCO to further evaluate the impact of the simulation curriculum on PIF. Finally, confounding variables may include other educational experiences students encountered that may have also facilitated the development of PIF. Not all experiences can be accounted for, and are often considered to be part of

the hidden curriculum of medical school, and therefore are not closely documented.

Implications

The implications of this study include continued support from administration for the simulation curriculum and for further development of statewide simulation as part of the clerkship rotations. The development of the curriculum as well as the installment of simulation equipment, supplies, faculty, and standardized patients was initially funded in part by grants, and this work may warrant additional institutional support.

Based on the results of this study, our recommendation is to repeat and further the research of statewide simulations for regional medical education. The rising clerks could be surveyed multiple times. It may be beneficial to send out this survey at the beginning of the next cohort's clerkship phase, in the middle of the phase, and at the end of the standardized simulation curriculum to fully evaluate the trend of growth in PCO. It could be expected that at the beginning of the clerkship phase many students would experience lower levels of PCO due to lack of clinical exposure and opportunity. This would allow trending of the PCO index scores as well as potentially providing a larger dataset to analyze.

There were differences, though not statistically significant, between groups; regional campus students, male students, Black students, and those with prior healthcare experience all had higher mean PCO index scores than their peers. This may represent normal variation in a somewhat small sample size, or it may represent a potential that these groups have a stronger sense of PCO, or more well-developed professional identities. In future studies, the "why" of students' feelings of PCO could be elucidated through mixed methods research to isolate specific factors or experiences that contribute to higher PCO scores. These investigations could also provide valuable insights that could be used to further develop and improve the clerkship simulation activities.

Other regional medical schools may also choose to investigate, invest in, and initiate simulation programs at their institutions based on these findings. However, given the limitations of the study, further work should be done to replicate and expand the findings to inform their development.

CONCLUSION

This study highlights the importance of a comprehensive and intentionally-designed simulation curriculum to prompt PCO in order to facilitate PIF prior to residency, for the purpose of producing more confident and competent intern physicians [2]. Medical schools are not only responsible for academic content, but also for preparing students to apply their knowledge and skills in a clinical setting. The clerkship phase is a critical time to build complex and specialized skills in a student before they enter into the physician workforce as an intern. It behooves young physicians to have an existing professional identity and feelings of PCO, rather than having to develop them while they are already responsible for patients. Simulations of this nature will prime students to shoulder the responsibilities of being a physician once they graduate from the safety net that exists in medical school. This study reinforces that simulation can be an integral part of any medical school's pedagogy, in the best interests of their students and their future patients.

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