Effect of Socioeconomic Status Bias on Medical Student-Patient Interactions Using an Emergency Medicine Simulation

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OBJECTIVES

Implicit bias in clinical decision making has been shown to contribute to healthcare disparities and results in negative patient outcomes. Our objective was to develop a high-fidelity simulation model for assessing the effect of socioeconomic status (SES) on medical student (MS) patient care.

METHODS

Teams of medical students were randomly assigned to participate in a high-fidelity simulation of acute coronary syndrome. Cases were identical with the exception of patient SES, which alternated between a low SES homeless man and a high SES executive. Students were blinded to study objectives.

Cases were recorded and scored by blinded independent raters using 24 dichotomous items in the following domains: 13 communication, 6 information gathering, 5 clinical care. In addition, quantitative data were obtained on the number of times students performed the following patient actions: acknowledged patient by name, asked about pain, generally conversed, and touching the patient. Fisher's exact test was used to test for differences between dichotomous items. For continuous measures, group differences were tested using a mixed-effects model with a random effect for case to account for multiple observations per case.

RESULTS

Fifty-eight teams participated in an equal number of high and low SES cases. MS asked about pain control more often (P=0.04) in patients of high SES. MS touched the low SES patient more frequently (P=0.01). There were no statistically significant differences in clinical care or information gathering measures.

CONCLUSIONS

This study demonstrates more attention to pain control in patients with higher SES as well as a trend toward better communication. Despite the differences in interpersonal behavior, quantifiable differences in clinical care were not seen. These results may be limited by sample size and larger cohorts will be required to identify the factors that contribute to SES bias.

INTRODUCTION

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Health care provider bias negatively affects patient outcomes[1] and contributes to poor physician-patient interactions.[2] The Institute of Medicine 2003 report, Unequal Treatment, suggests the need for research on how patients' race, ethnicity, gender, and social class may influence the decision-making of healthcare providers.[3] While prior research on bias has concentrated on race, the impact of socioeconomic status (SES) bias on health care delivery has not been studied.[4,5]

SES is an important variable with potential influence on physicians' perceptions of and attitude towards patients, impacting both patient communication and quality of care.[6-8] Previous studies have demonstrated implicit[9] and explicit[10] bias by medical students against low socioeconomic classes. However, these studies have not examined behavioral manifestations of such biases in the patient-care setting.

There are multiple subtle behaviors associated with bias that may be observed during patient interactions (e.g., maintaining a distance or avoiding eye contact.)[11-14] Although these biases are largely outside of personal awareness, patients, especially minority patients, are adept at perceiving such biases.[15]

Medical schools have recently started to address healthcare disparities in their curriculum.[16-18] These curricula focus on exposure to different patient populations in the community and assess the success of the curriculum based on student attitudes towards different patient populations.

There is an assumption that exposure and improved attitude will lead to improved patient outcomes and decreased health disparities. However, while attitudes are being measured, the impact on clinical outcomes has yet to be studied.

Using a simulation laboratory, we tested the hypothesis that SES status would change the behaviors of medical students during their patient interaction. Emphasis was placed on subtle behaviors that indicate the presence of implicit bias. In addition, the impact of patient SES on quality of care was assessed by comparing patient management across both SES cases.

Methods

All aspects of this study were reviewed and approved by the Institutional Review Board. The study was exempt and written informed consent for participants was waived. We used a prospective observational study design to assess care outcomes associated with socioeconomic bias. This study was conducted in the Simulation Center at the authors' institution using medical students during the months of June-November 2013 and January-April 2014.

Participants

Study participants were fourth year medical students (MS) in their emergency medicine (EM) block, which is a required senior clerkship at the authors' institution that includes a mandatory 2 hour simulation session. Medical students participating in the simulation sessions during the months of the study were automatically enrolled. Two medical students participated in each

simulated patient encounter. In addition, a nursing student also participated in each encounter which is standard practice during medical student simulation.

Procedure

Student teams participated in a high-fidelity, mannequin-based simulation of a patient with an acute myocardial infarction. Cases were identical with the exception of patient socioeconomic status (SES). Case A featured a high socioeconomic status patient (high SES) and Case B featured a low socioeconomic status patient (low SES). SES status was simulated using visual and location based cues. The high SES simulated patient was a mannequin dressed in a clean button down shirt, dress pants, and a tie and reported a history of having chest pain while walking to his office building. The low SES simulated patient was the same mannequin dressed in a dirt-covered t-shirt, dirt-covered pants, and flip-flops. This patient reported a history of having chest pain while walking to a homeless shelter. Other aspects of the cases were identical including a history of hypertension and noncompliance with medication. For all cases the mannequin was voiced by the same simulation technician who was trained to maintain case standardization.

Each month, 6 teams of learners completed the simulation; 3 teams completed the high SES case and 3 teams the low SES case. The order of the cases was alternated monthly. During each simulation session, individual teams participated in only one of three possible cases, the study case and two non-study cases. Student teams were randomly assigned to one of the three

cases, resulting in a random sample of one third of all eligible students participating in the study.

Students were aware that they were being observed as part of the standard simulation experience and that a study was taking place, but were kept blind to the nature of the study.

Data Collection

All simulations were recorded using Simcapture® (B-line Medical, Washington D.C.). Six blinded reviewers (2 EM residents and 4 nursing students who had not participated in the simulation) independently viewed the videos and recorded responses from the data collection sheet using REDCap, an electronic data capture tool hosted at the authors' institution.[19] REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources. Each simulation was reviewed by two of the six reviewers. Each reviewer was assigned to either the high SES cases or the low SES cases in order to keep them blind to the nature of the study. Prior to beginning the study, investigators determined that for the study cases, an action would be considered completed if either reviewer scored an action as

having been done. As a measure of inter-rater reliability, all six reviewers also recorded responses from six additional non-study simulations. These cases represented a standard chest pain case.

Reviewers used a two-part data collection instrument designed by the study investigators. First, 24 dichotomous items were scored in the following domains: 13 communication, 6 information gathering, and 5 clinical care. Second, data were collected on the following five observable MS behaviors: how often the patient was acknowledged by name, how many times the patient was asked about pain, how many times the patient was physically touched, the total amount of time the student spent conversing with the patient, and the percentage of time that the student faced the patient. The data collection instrument was designed prior to the start of the study and items were chosen based on elements considered best practices by a team of emergency medicine physicians.

Data Analysis

To evaluate inter-rater reliability, all six reviewers reviewed 6 additional standard chest pain cases. Scores were compared and in general, the agreement was high for all dichotomous items. Cases of disagreement were generally one reviewer scoring an item as “no” that the majority had scored as “yes”. This validated our decision to mark an item as completed for disagreements that occurred. Fisher's exact test was used to test for differences for dichotomous items. For continuous measures, group differences were tested using a mixed-effects model with a random effect for case to account for multiple observations per case. To adjust for the

multiple tests, we adjusted p-values for multiple comparisons. Specifically, all p-values within each domain were adjusted using Bonferonni's step-up method of Hochberg's.[20] Inter-rater reliability was calculated using percent agreement and Kappa. The software program used for analysis was SAS v9.4.

Results

A total of 58 teams (116 medical students) participated in simulation cases. Twenty-nine teams had a low SES patient and twenty-nine teams had a high SES patient. Inter-rater agreement for the individual simulation scores were determined by calculating percent agreement. (Table 1) For communication and interpersonal skills, there was substantial agreement of at least 87% on the following three items: acknowledging the patient by name, introducing themselves, and explaining their role. The remaining communication items exhibited moderate agreement, with the percent agreement ranging from 55% to 72%. All data gathering items except past medical history exhibited percent agreement ranging from 82% to 98%. All items from patient management exhibited percent agreement ranging from 88% to 100%.

Table 2 presents our main findings. We observed no difference for the majority (26/29) of items. There were no statistically significant differences for any of the items in the communication, information gathering, and clinical care domains. The three variables that showed statistical significance prior to adjustment were items from the medical student behaviors domains. The three items were the number of times medical students acknowledged the patient by name, asked about pain medication, and physically touched the patient. After adjustment for

multiple comparisons, the data demonstrate that medical students were more likely to ask the simulated patient with high SES about pain control (P=0.04) and more likely to touch the low SES patient (P=0.01).

Discussion

Implicit bias can have a wide reaching effect across many areas of medicine, with potential detrimental effect on both patients and medical care providers. In a simulation environment, the authors were able to investigate what effect a single variable, namely SES, had on both patient care, communication, and healthcare delivery. We found that medical students were more likely to touch the low SES patient model and less likely to ask about pain control. One explanation for increased physical touching is that the student was attempting to display increased compassion towards the low SES patient. However, research has suggested that this form of contact can also be perceived as a display of power.[21,22] Despite these differences in interpersonal interactions, the data gathering and patient management was similar for both the low and high SES patient. We used rigorous methods to assess these differences including inter-observer testing and statistical adjustment for multiple comparisons. These data are the first to quantify SES bias and manifestation in an experimental setting.

Before application of these results, limitations must be considered. The Hawthorne Effect slightly limits this study. Learners were aware that the encounters were being observed and

recorded, but were unaware of what was being studied. Additionally, the learners were familiar with the simulation center and the process of simulation. According to recent literature, the effect of participant reactivity was possibly minimal.[23] Next, while high-fidelity simulation provides realism, there are some limitations as the mannequin lacks the facial expressions and gestures of an actual patient. In addition, the providers worked as a team and not individually, so that the bias of one team member may affect the bias of another. Finally, the study team did not control for learners' prior training and exposure to implicit bias principles. However, the medical students are almost all from the same medical school with similar medical education curriculum. Because of this, we expected their baseline training to also be similar. In addition, case assignments were random which potentially negates some of this effect.

While many were not statistically significant, for each of eight data points regarding explaining the diagnosis and care plan to the patients (telling about additional workup, that an ECG would be obtained, that aspirin would be given, that additional pain medications would be given, that cardiology would be consulted, that the diagnosis was a heart attack, that a catheterization would be done, and explaining what a catheterization is), the medical students communicated with the high SES patient a larger percentage of the time than with the low SES patient. This potentially could represent implicit bias that leads providers to involve higher SES patients in medical decision making more than low SES patients. Unfortunately, because this pilot study was run over the course of only one academic year, we did not have enough student-simulated patient encounters to determine if this was by chance. We are currently conducting additional studies to investigate this possibility.

This study indicates there may be some implicit bias within healthcare providers interacting with low SES patients. There is promise that despite biased interpersonal treatment, patients received the appropriate medical care for the presenting complaint (ie patient received aspirin and was sent for a cardiac catheterization) in both groups More investigation is needed to elicit how this occurred, whether the providers accommodated for their biases or performed well despite these biases. Future studies focused on debriefing these cases with specific questions related to both learner bias and patient care decision making may provide insight. Future work could assess bias across multiple healthcare professions to better understand this topic. These research opportunities will help develop new strategies and education methods. Improved education of subtle behavioral and implicit bias has the potential to benefit the healthcare community, providers, and patients.

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