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The Effect of Involvement in a Student-run Free Clinic Project on Attitudes toward the Underserved and Interest in Primary Care

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Abstract

Methods—The authors designed a survey instrument to examine the effect of involvement in a student-run free clinic project (SRFCP) on medical student self-reported attitudes toward the underserved and interest in primary care. From 2001–2010, first- and second-year medical students in an introductory service-learning elective course rated each of 15 statements on a seven-point Likert scale pre/post survey. Wilcoxon’s signed rank test was performed on all matched pairs and an intent-to-treat analysis included unmatched pairs.

Results—The response rate was 97.9%, with 914 of 934 students enrolled participating. Significant increases were seen in each of the 15 items in matched pre/post survey pairs, $N = 433$ (47.4%), or with an intent-to-treat analysis, $N = 914$ ($p = .002$ for all).

Conclusions—This study found that medical student involvement in a SRFCP improved student knowledge, skills, attitudes and self-efficacy with the underserved, interest in work with the underserved after graduation, and interest in primary care.

Keywords

Students, medical; attitude; medically uninsured; primary health care; physicians, primary care

Data from the 2012 U.S. Census Bureau showed that 48 million people were uninsured in the United States.¹ The National Health Interview Survey conducted by the Centers for Disease Control estimated that 58.7 million people were uninsured for at least part of the year.² Even after full implementation of the Affordable Care Act, the Congressional Budget

Office estimates that approximately 30 million people will remain uninsured.³ Additionally, the United States faces a significant primary care shortage that is expected to worsen due to increasing demand from 32 million patients newly insured through the ACA and decreased supply as current physicians retire and fewer than 18% of medical students are expected to practice primary care.⁴ The primary care shortage is expected to exceed 45,000 physicians by the year 2020.⁵

With the remarkable number of uninsured people, the shortage of primary care physicians in our country, and increasing focus on health disparities and access to care, it is timely and pertinent for medical schools to offer educational experiences in settings that provide care to the uninsured and underserved while promoting a sense of social responsibility. The Association of American Medical Colleges (AAMC) Medical School Objectives Project (MSOP) states that medical schools must ensure that a student demonstrate “Knowledge of the important non-biological determinants of poor health and of the economic, psychological, social, and cultural factors that contribute to the development and/or continuation of maladies.”^{6[p.8]} The MSOP also states that physicians must be altruistic, dutiful and “advocates for improving access to care for everyone, especially those who are members of traditionally underserved populations.”^{6[p.8]}

Typically, medical students embark on their training with empathy, compassion and a desire to make a difference. However, several studies provide evidence that attitudes towards the underserved and empathy decline as students progress through their medical education.^{7–11} It has been postulated that a hidden curriculum plays a role in the change of student attitudes.^{12,13} In contrast to the formal curriculum, which is content based, easily identified through lectures, transmitted through syllabi, and tested on exams, the hidden curriculum is transmitted unknowingly through a wide array of informal interactions with students, residents, faculty, and other health care providers throughout medical training. The concept of a hidden curriculum recognizes the important part of medical education that occurs as a socialization and enculturation process, where students learn a set of customs and values through their daily experiences that reflect values of the profession of medicine, without overtly being taught.^{12–14} In contrast to acknowledged values of empathy and compassion, students often observe behaviors that model detachment and self-interest.¹⁴

Various interventions have been proposed to attempt to protect students from the hidden curriculum including socially relevant service-learning opportunities during the pre-clinical years.¹⁴ Medical schools can encourage innovative projects that foster idealism and social responsibility. Programs that offer opportunities for students and residents to work with the underserved under the mentorship of community role models have a positive impact on students’ attitudes toward working with the underserved and may increase the likelihood for future underserved work.^{15–20}

For a number of years, medical students themselves have been looking beyond the traditional medical school environment and creating clinical experiences that allow them to serve those in need. According to data published from a 2005 survey, 49 U.S. medical schools (over half of survey respondents) had a student-run free clinic (SRFC).²¹ A more recent preliminary report from the Society of Student-run Free Clinics (SSRFC) states that

this number has significantly increased over the past several years, with approximately 100 medical schools now hosting SRFCs.²² While many of these SRFCs were established in the last decade, some of these clinics have been in existence since the 1960s.^{21,23}

Despite the significant presence of SRFCs at our academic institutions, the body of literature on SRFCs is still limited. The effect of SRFCs on student knowledge, skills, attitudes and behaviors is not well described. This study was designed to determine if involvement in a SRFC impacts student self-perception of knowledge, skills and attitudes toward working with the underserved, perceived self-efficacy of working with underserved patients, and interest in primary care.

Program description

The University of California San Diego (UCSD) Student-run Free Clinic Project (SRFCP) was started in January of 1997 by a group of students and key faculty at one site one night a week, in conjunction with a meal program for the poor and homeless at a church.²⁴ Since that time, the program has expanded to serve four sites, is open five days a week and has become a significant part of the curriculum at the UCSD School of Medicine School of Medicine (SOM). Enrollment in a service-learning elective course during the first or second year is required for pre-clinical students to participate in the SRFCP. Additional elective classes are available to students at all stages of training throughout the four years of medical school. The level of involvement has continued to increase over the years, with 88% (112 of 127) of first-year medical students electing to participate in this introductory service-learning class during the 2009–2010 academic year. More than 90% of medical students chose to be involved with the SRFCP at some point in their training, making this the most popular elective at our institution. A recent cross sectional survey of the student body demonstrated that students perceived the SRFCP as a highly valuable educational experience and they felt the teaching was excellent.²⁵ Over 1,700 medical students have participated in the SRFCP since inception.

While the SRFCP has grown and expanded over the last 17 years, it has remained true to the vision of a student-led program with faculty supervision designed to serve those without access to care. Medical students perform core administrative duties of the clinic as well as obtaining the initial history and physical exam for patients. Students present their cases to faculty physicians, then a licensed physician sees and examines all patients, and helps the students carry out an appropriate treatment plan.

Pre-clinical students interested in participating entered a lottery system and 35–40 students were accepted each quarter. By the end of the academic year, all students interested in participating were able to enroll. The introductory elective class remained consistent over the course of this study period, consisting of attending five clinical half-day sessions at the SRFCP, 10 weekly two-hour didactic sessions, as well as structured oral and written reflection activities. Each class session opens with 30 minutes of group reflection followed by a didactic on core topics such as the history and philosophy of the clinic, social resources, access to care, health education, and clinic flow. During three of the clinical sessions, students participate in primary care, whereas one session is focused on social work, and one

is dedicated to laboratory services. Student managers start each clinic session by reminding all students and clinicians of the SRFCP core philosophies including: humanism, empowerment, a transdisciplinary approach, and the role of the community and patient as teachers.

The SRFCP patient population includes the working poor, homeless, immigrants and the medically indigent. While Medi-Cal and County Medical Services covered many underserved patients, there were still over 528,000 people uninsured in this county (17.4% of the population).²⁶ Community health centers provide the safety net for these patients in our community. Patients who come to the SRFCP are those who cannot afford to be seen even on the modest sliding fee scale of these community health centers. There is no local county or public hospital for uninsured patients.

During the timeframe of this study, the patient population from all clinic sites was as follows: 41% Hispanic, 39% White, 7% African American, 3% Asian, 5% other, 5% not recorded; 51% Female, 49% Male; 32% Homeless, 62% Housed, 6% did not specify housing status; 85% indicated that they did not have medical insurance, 6% had no response recorded for health insurance status and 9% had some other type of health coverage but faced barriers to accessing care at that source (such as prohibitively high co-payments). For reference, San Diego County is 48% White, not of Hispanic origin, 33% Hispanic, 11% Asian, and 5% Black.²⁶ Most patients were between the ages of 18 and 65 years old. Over 85% of SRFCP patients had a chronic disease such as diabetes, hypertension, hyperlipidemia, asthma, or depression. A physician and social worker screened all people interested in becoming new patients to determine if they may qualify for any other health programs. If people did qualify for government programs, social workers and social work interns provided detailed information and assisted them with the application process.

Students managed nearly all functions of the clinic including patient check-in, clinic flow, phlebotomy, hazardous waste permits and disposal, coordination of various specialty clinic consultations, ordering supplies and fundraising, all under close faculty supervision and guidance. This provided students with a unique hands-on experience in the health care field that extends beyond providing clinical care for their patients. Medical students at SRFCs had the experience of attempting to meet the health care needs of real people who have fallen through the cracks of our system. Changes in national, state, or county policies can have a deep and immediate effect on the resources available to our patients, requiring faculty and students to keep up to date with local and state health policy decisions. Under the supervision of faculty physicians who themselves were strongly committed to underserved medicine, students became expert in local resources, health care advocacy, and qualifications for various health programs.

Methods

Study population

This study surveyed first- and second-year medical students during the introductory pre-clinical elective course as described above. Over 90% of students in this class are first-year

medical students and less than 10% are second-year students. The UCSD University Institutional Review Board approved this study.

Survey design

In 1997, a review of the literature was conducted to determine usual methods of surveying medical student attitudes toward working with the homeless and medically underserved, self-efficacy with these populations and interest in primary care. We were unable to identify a well-validated survey instrument that met our needs. Faculty with significant clinical experience in underserved medicine worked together with medical students to design a survey that had nine statements, each followed by a seven-point Likert scale. The results of this preliminary survey design, testing, and outcomes assessment from 1997–2000 are documented in a medical student's Independent Study Project Dissertation on file in our university library.²⁰

The initial survey instrument focused primarily on care of the homeless, as our first clinic site served a primarily homeless population. After opening two additional sites, faculty and student leaders revised the survey in 2001 by group consensus to include the additional underserved patient populations we were serving. Seven additional statements regarding the care of underserved women, children and minority families were added and one item from the original survey was removed. This study reflects data obtained from the current survey instrument with 15 Likert-scale items, collected between January 2001 and December 2010.

Survey administration

At the beginning of the first didactic session of the course each quarter, faculty members distributed paper surveys to all students in the classroom. Students were informed that participation was voluntary and that it would not affect their course grade. Students signed consent forms and submitted their completed surveys during class. Students were asked to write in unique identifiers to allow pairing of pre-post tests. Students completed the post-intervention survey nine weeks later at the end of the last didactic session of the quarter.

Survey content

Fifteen survey items were presented on a seven point Likert-type scale. Thirteen of these items were rated on a scale labeled from one “not at all” to seven “a great deal.” Two items that surveyed attitudes toward the homeless and underserved had anchors of one “very negative” to seven “very positive.” Respondents were asked to circle the number that best fit their response to a series of statements. Statements were written in the first-person. For example, assessment of capability of caring for the homeless corresponded to the statement “I feel capable of caring for the homeless.” (Table 1).

The 15 Likert-scale items were grouped into the following four categories: knowledge (four items), skills (two items), attitudes (two items) and self-efficacy with the underserved (five items). Interest in working with the underserved after graduation and interest in primary care were each assessed by a single item.

Two additional questions allowed for free text responses regarding previous work with the underserved and future residency career plans. Students reported demographic information including age, gender, and ethnicity at the end of the survey.

Data analysis

Cronbach's alpha was determined for internal consistency. The Shapiro-Wilk test was used to examine if data was normally distributed. Descriptive statistics were calculated including mean, standard deviation (SD), median and interquartile range [IQR]. For all 15 Likert-type survey items, pre/post test scores were compared using the Wilcoxon signed rank test to avoid the Gaussian distribution assumptions of t-tests. Survey scores were summed by category, then divided by the number of questions per category, generating an average score per category for each student. Wilcoxon signed rank tests were used to compare pre- and post-course scores in each category.

We also conducted an intent-to-treat analysis, where any pre-test survey without a matching post-test survey, or vice versa, was treated as having no change and was included as a more conservative analysis than excluding unpaired data. The free text responses were not included in this analysis due to low response rate and inconsistent patterns of responses. Statistical analyses were performed using IBM SPSS software version 21.0. (SPSS Inc., Armonk, NY). P-values less than .05 were considered statistically significant.

Results

Enrollment records from the SOM show that 934 students enrolled in the introductory SRFCEP service-learning elective course from the years 2001–2010. The survey response rate was 97.9% (914/934). Unique identifiers were used to pair matched surveys whenever possible. Matched pre/post survey pairs were available for 47.4% of respondents (433/914). Unmatched pre-test surveys represented 32.7% (299/914) of respondents and unmatched post-test surveys represented 19.9% of respondents (182/914).

Demographic characteristics

The demographic characteristics of survey respondents reflect those of the UCSD SOM. Respondents were 50% females and 49% males, with 1% not indicating gender. The mean age was 24 years old (standard deviation 2.7 years, ranging from 20 to 45 years old). Student respondents indicated their ethnicity as 31% Asian, 30% White, 8% reported mixed ethnicity, 7% Latino, and 1% African American; 23% did not respond to this optional question. Data are not available regarding survey completers *versus* non-completers.

For comparison, the demographics of the SOM student body for 2009–2010 were as follows: 51% Male, 49% Female; 41% White, 37% Asian, 8% Latino, 2% African American, 12% not identified. The mean age at enrollment was 24 years old with a range from 19 to 49 years old

Internal reliability

Cronbach's alpha estimate of internal reliability for the pre-course survey was 0.87 and Cronbach's alpha estimate for the post-course survey was 0.91.

Survey items

Results did not follow a Gaussian distribution ($p < .001$). All 15 Likert-type survey items showed significant increases in both the matched pairs (Table 1) and intent-to-treat analysis (Table 2) ($p = .002$ for all). Single items were used to assess interest in work with the underserved after graduation and interest in primary care and each showed significant increases ($p = .002$). The remaining 13 Likert scale items were grouped into four categories (knowledge, skills, attitudes and self-efficacy toward the underserved) and average scores were calculated. Average scores for each category showed significant increases (Table 3) ($p = .001$ for all).

Mean pre/post scores were highest for "My attitude towards the care of underserved minority families is" (6.00(SD1.12)/6.18(SD1.03) in matched pairs, 6.08(SD1.07)/6.16(SD1.02) for intent to treat) and "I believe I can make a difference in the care of the underserved" (5.95(SD1.06)/6.12(SD 0.94) in matched pairs, 5.96(SD1.10)/6.04(SD1.05) for intent to treat). Mean baseline scores were lowest for the two items in the clinical skills category (2.01(SD1.24) and 2.52(SD1.62) in matched pairs, 2.52(SD1.57) and 2.94(SD1.74) for intent to treat). The largest improvements in scores were seen in clinical skills items as mean scores increased from 2.01(SD1.24) and 2.52(SD1.62) to 4.52(SD1.11) and 4.77(SD1.14), respectively, in matched pairs and from 2.52(SD1.57) and 2.94(SD1.74) to 3.70(SD1.64) and 4.01(SD1.66), respectively, in the intent to treat analysis ($p < .001$ for both).

Discussion

To our knowledge, this is the first systematic study to examine the effect of involvement in a SRFC on attitudes toward the underserved. Our findings suggest that providing educational opportunities in a SRFC under the supervision of qualified faculty improves attitudes toward the underserved, including the homeless. In addition to improved attitudes, our medical students reported increased knowledge, skills, self-efficacy, interest in working with the underserved after graduation, and interest in primary care.

While improvements were seen in all categories, the greatest improvements were seen in student ratings of their clinical skills in the care of the homeless and underserved minority families. This is likely due to the direct hands-on clinical care that pre-clinical students are able to provide for these patient populations during the elective course. They are closely supervised by a fourth-year clinical coach throughout the patient interactions, and precepted by a faculty physician during each session. Although all of the pre/post test items examined showed statistically significant increases, it is not known what incremental change on this scale reflects a meaningful difference. The increase of over two points on a seven point Likert-scale in matched pairs seems to reflect a perception of meaningfully increased clinical skills with these underserved populations.

The highest overall scores are seen on items assessing student attitudes toward the underserved and belief that they can make a difference in the care of the underserved. These high baseline and post-course scores may reflect that first year medical students, as a group, arrive at medical school with optimism and idealism. Although they are already quite idealistic, showing scores of approximately six on a scale of seven for each these items, their attitudes toward the underserved and belief that they can make a difference in the care of the underserved increased even further after this class. This is remarkable since there is traditionally a well documented decrease in empathy and attitudes toward the underserved and as medical education progresses.⁷⁻¹¹

Improved outcomes measurements after this short course are likely due to many factors. Students feel empowered to learn in this type of clinic environment as it is designed with both their education and excellent patient care in mind. They are in a setting where they can take as long as they need to see a patient, under the close guidance of a more experienced clinical student, present to attending physicians who often demonstrate humanistic qualities, and feel that they are applying what they have learned in the classroom to real patients. Students often say it reminds them why they came to medical school. Pre-clinical students in a SRFC setting take on a significant amount of ownership and responsibility during a clinical encounter, that seems difficult to replicate in traditional practice settings.

In addition to clinical experiences that include providing care to the underserved, weekly classroom sessions may contribute to these positive outcomes. Students are encouraged to regularly reflect upon their experiences both individually and with their peers, whether they had a positive or negative experience. This is often the first time that medical students work directly with people who are facing significant challenges and realize the consequences of social determinants of health and lack of access to care. We regularly address issues that are often not discussed during the traditional curriculum. Students are taught that service-learning principles dictate that there must be not only service, but also didactic educational sessions, as well as meaningful reflection on these service activities. In 2008, the Liaison Committee on Medical Education implemented a requirement for service-learning in medical schools.²⁷ It is unknown if medical schools implementing various service-learning opportunities will result in an increase in students choosing to work with the underserved or entering primary care. However, it appears that this is an opportunity to institutionalize a set of values that include community service and reflection into our medical education culture and experience. SRFCs are an ideal setting for meeting this requirement.

This study has several limitations. First, the current study lacks of a control group. With 88% of the first year class participating in the SRFCP, it is difficult to find a meaningful control group. An experimental versus control group comparison was done during the development and testing of an earlier version of this survey in the year 2000.²⁰ At that time, intervention group showed higher scores than the control group on each item, with seven of nine items reaching statistical significance. There was no significant difference between participants in the SRFCP with non-participants in terms of age or gender.²⁰ However, since studies have shown a well-documented decline in medical student attitudes toward the underserved as their training progresses,⁷⁻¹⁰ it would not be expected that a control group would have similarly improved attitudes toward the underserved.

Second, change was measured after only a ten-week course. It is not known if these changes persist or what effect participation in this SRFCP service-learning course has on medical students over time including not only on self-perceived attitudes, self-efficacy, and knowledge of the underserved, but also in working with the underserved, volunteerism, specialty choice, and eventual practice settings.

Third, these surveys were conducted over the course of 10 years and many external factors including political climate, variations in the course structure, and variation of course participants may have resulted in differences between years that were not examined. Additionally, student-self perception is not an objective measure and has inherent bias. Although this is clearly subjective, it is often used as a measure in assessing educational interventions.

Finally, there were a significant number of unmatched pre-tests and post-tests. This may have occurred for many reasons as the surveys were handed out at the beginning and end of a didactic session, which means the students may have simply been absent, arrived late, left early, or did not turn in their paper survey. An analysis of matched pairs followed by a conservative intent-to-treat analysis was done assuming no change in non-completers. Both analyses resulted in significant improvements in all measures ($p < .002$ for all), however we are unable to determine if this group of non-completers may have had different outcomes.

Future areas of inquiry include prospective longitudinal studies to follow students over time from the first year of medical school through residency and into practice. Additional studies are planned to determine if students who were involved in the SRFCs are more likely to be providing care to the underserved as attending physicians, including practice in a medically underserved area (MUA). Multi-institutional studies are needed to assess outcomes from SRFCs across the country to make generalizable conclusions.

In summary, this study demonstrated that involvement in a SRFC improved attitudes toward working with the underserved and interest in primary care. It is possible that involvement in SRFCs may reverse the trend of declining attitudes toward the under-served typically seen as medical education progresses. Our hope is that these programs will play an increasing role in medical education and have the opportunity to provide a buffer to some of the negative effects of the hidden curriculum in medical training.

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Notes

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Table 1

Medical Student Responses to Seven Point Likert-Scale Items Before and After Introductory Pre-Clinical Service-Learning Elective Class With the Student-Run Free Clinic Project (SRFCP) 2001–2010 (Matched Pairs) N = 433*

	Pre-test Mean(SD), Median[IQR]	Post-test Mean(SD), Median[IQR]
Knowledge (4 items)		
My degree of knowledge about the problems of the homeless is:	3.56(1.28), 4[1]	5.19(0.92), 5[1]
My degree of knowledge about the problems of underserved minority families is:	4.14(1.54), 4[2]	5.16(1.03), 5[1]
My degree of knowledge about underserved children's health is:	3.34(1.51), 3[2]	4.32(1.31), 4[2]
My degree of knowledge about underserved women's health is:	3.28(1.52), 3[2]	4.51(1.27), 5[1]
Skills (2 items)		
My clinical skills in the care of the homeless are:	2.01(1.24), 2[2]	4.52(1.11), 5[1]
My clinical skills regarding the problems of underserved minority families are:	2.52(1.62), 2[3]	4.77(1.14), 5[2]
Attitudes (2 items)		
My attitude towards the care of the homeless is:	5.56(1.17), 6[2]	6.06(1.00), 6[2]
My attitude towards the care of underserved minority families is:	6.00(1.12), 6[2]	6.18(1.03), 6[1]
Self-efficacy (5 items)		
I feel capable of caring for the homeless.	4.04(1.75), 4[2]	4.91(1.18), 5[2]
I feel capable of caring for underserved minority families.	4.40(1.83), 5[3]	5.14(1.18), 5[2]
I feel comfortable taking care of the homeless.	4.68(1.61), 5[2]	5.53(1.15), 6[1]
I feel comfortable caring for underserved minority families.	5.26(1.56), 6[3]	5.73(1.16), 6[2]
I believe I can make a difference in the care of the underserved.	5.95(1.06), 6[2]	6.12(0.94), 6[2]
Interest in future work with the underserved (1 item)		
My interest in working with the underserved after I graduate is:	5.48(1.31), 6[2]	5.62(1.22), 6[2]
Interest in primary care (1 item)		
My interest in being a primary care physician is:	4.13(1.67), 4[2]	4.51(1.73), 5[3]

* p values all $\leq .002$ using Wilcoxon signed rank test.

IQR = Interquartile Range

Table 2

Medical Student Responses to Seven Point Likert-Scale Items Before and After Introductory Pre-Clinical Service-Learning Elective Class With the Student-Run Free Clinic Project (SRFCP) 2001–2010 Intent-To-Treat Analysis N = 914*

	Pre-test Mean(SD), Median[IQR]	Post-test Mean(SD), Median[IQR]
Knowledge (4 items)		
My degree of knowledge about the problems of the homeless is:	3.88(1.39), 4[2]	4.65(1.31), 5[2]
My degree of knowledge about the problems of underserved minority families is:	4.34(1.50), 4[2]	4.82(1.31), 5[2]
My degree of knowledge about underserved children's health is:	3.52(1.53), 3[3]	3.98(1.47), 4[2]
My degree of knowledge about underserved women's health is:	3.44(1.52), 3[3]	4.02(1.48), 4[2]
Skills (2 items)		
My clinical skills in the care of the homeless are:	2.52(1.57), 2[3]	3.70(1.64), 4[3]
My clinical skills regarding the problems of underserved minority families are:	2.94(1.74), 3[3]	4.01(1.66), 4[2]
Attitudes (2 items)		
My attitude towards the care of the homeless is:	5.70(1.16), 6[2]	5.93(1.08), 6[2]
My attitude towards the care of underserved minority families is:	6.08(1.07), 6[1]	6.16(1.02), 6[1]
Self-efficacy (5 items)		
I feel capable of caring for the homeless.	4.29(1.72), 4[3]	4.69(1.47), 5[2]
I feel capable of caring for underserved minority families.	4.61(1.74), 5[3]	4.96(1.45), 5[2]
I feel comfortable taking care of the homeless.	4.89(1.56), 5[2]	5.30(1.36), 6[1]
I feel comfortable caring for underserved minority families.	5.37(1.50), 6[2]	5.60(1.31), 6[2]
I believe I can make a difference in the care of the underserved.	5.96(1.10), 6[2]	6.04(1.05), 6[2]
Interest in future work with the underserved (1 item)		
My interest in working with the underserved after I graduate is:	5.51(1.27), 6[2]	5.58(1.23), 6[2]
Interest in primary care (1 item)		
My interest in being a primary care physician is:	4.21(1.66), 4[2]	4.39(1.69), 5[3]

* p values all $\leq .002$ using Wilcoxon signed rank test.

IQR = Interquartile Range

Table 3

Medical Student Responses to Seven Point Likert-Scale Items Before and After Introductory Pre-Clinical Service-Learning Elective Class With the Student-Run Free Clinic Project (SRFCP) Average Scores for Each Category: Knowledge, Skills, Attitudes and Self-Efficacy With the Underserved 2001–2010*

	Pre-test Mean(SD), Median [IQR]	Post-test Mean(SD), Median [IQR]
Matched survey pairs N = 433		
Knowledge	3.58(1.23), 3.5[2.0]	4.79(0.92), 4.75[1.0]
Skills	2.26(1.30), 2.0[2.0]	4.64(1.03), 5.0[1.5]
Attitudes	5.78(1.05), 6.0[2.0]	6.11(0.94), 6.0[2.0]
Self-efficacy	4.85(1.28), 5.0[2.0]	5.48(0.91), 5.6[1.2]
Intent-to-treat N = 914		
Knowledge	3.79(1.25), 3.75[2.0]	4.36(1.18), 4.5[1.75]
Skills	2.73(1.55), 2.5[3.0]	3.86(1.56), 4.0[3.0]
Attitudes	5.89(1.02), 6.0[2.0]	6.04(0.96), 6.0[2.0]
Self-efficacy	5.02(1.24), 5.2[1.8]	5.31(1.07), 5.4[1]

* p values all < .001 using Wilcoxon signed rank test.

IQR = Interquartile Range