



The Internet Journal of Allied Health Sciences and Practice

<http://ijahsp.nova.edu>

A Peer Reviewed Publication of the College of Health Care Sciences at Nova Southeastern University

Dedicated to allied health professional practice and education

<http://ijahsp.nova.edu> Vol. 10 No. 1 ISSN 1540-580X

Assessing Knowledge Acquisition of Students: Impact of Introduction to the Health Professions Course

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CITATION: Hawkins S, Hertweck M, Salls J, Laird J, Goreczny AJ. Assessing Knowledge Acquisition of Students: Impact of Introduction to the Health Professions Course. *The Internet Journal of Allied Health Sciences and Practice*. Jan 2012. Volume 10 Number 1.

ABSTRACT

Purpose. Undergraduate students interested in health careers often possess limited knowledge regarding the scope of practice of various health professions, particularly in allied health. Because of this, students sometimes enter a course of study in a field that is not compatible with their career plans or abilities. To date, there has been limited research exploring strategies to assist students in gaining knowledge of health careers. The purpose of this study was to investigate effectiveness of an Introduction to the Health Professions course on students' acquisition of knowledge of these professions. **Methods.** Sixty-one undergraduate students who enrolled in an Introduction to the Health Professions course over five years were administered a pre and post course questionnaire related to their knowledge of seven allied health professions, including allopathic, naturopathic, osteopathic, and chiropractic medicine; physician assistant; occupational therapy; and physical therapy. For four of these professions, information was presented by a professional from that discipline. **Results.** A repeated measures multivariate analysis of variance indicated an overall statistically significant increase in accuracy of information regarding professional domains from pre to post test. Univariate repeated measures of analyses for each profession revealed a significant increase in knowledge regarding four of the seven professions (allopathic medicine, naturopathic medicine, physician assistant, and occupational therapy). In the disciplines where a clinician from that discipline presented the information, three of the four demonstrated significant increase in knowledge. **Conclusion.** Offering an Introduction to the Health Professions course may be an effective strategy for increasing student knowledge of various professions, particularly when information is presented by a clinician from that discipline. These courses have the potential to assist students in making informed decisions regarding their career path.

INTRODUCTION

Mentoring of undergraduate students with an expressed interest in the allied health professions is an important component towards shaping their career goals. Mentoring occurs in a variety of venues that include individual advising sessions, formal introduction to the health professions courses, and individual lectures by practicing clinicians.¹ Undergraduate students appear to have limited knowledge of the variety and characteristics of health professions, admissions requirements for graduate education leading to health profession careers, and academic strategies that will enhance their eligibility for matriculation into such

graduate programs. To address these concerns, some colleges and universities have developed curricula to meet the needs of undergraduate students who are in a pre health science academic track. A primary objective of those curricula is to introduce students to the variety of health profession careers beyond the most commonly recognized fields of allopathic medicine (i.e., M.D.), nursing, and dentistry. Some universities have instituted an Introduction to the Health Professions Course during the first year of undergraduate study to address this objective. The course typically involves guest speakers from the medical, dental, and allied health professions such as occupational therapy (OT), physical therapy (PT), physician assistant (PA), nursing, and optometry.² Contact with a health professional, even if not in a student's subsequent field of study, was found to be a significant predictor for enrollment in the professions of dental hygiene, OT, PT, and PA.³ Such introductory courses may also describe the educational requirements for entry into those professions as well as employment opportunities.^{2,4} Courses may also address issues related to the undergraduate transition from high school. These include teaching time management, study skills, and exam taking skills with the purpose of enhancing student retention. Advisors for the health professions actively solicit input from health professionals such as physician assistants in order to better inform their student advisees of entrance requirements.⁵ An honors premedical academy at Baylor College of Medicine prepares underrepresented minorities for medical school through formal courses in anatomy and physiology and medical communication, clinical experiences, and workshops on the medical admissions process.⁶

Despite the common practice of having such courses, there has been very little reported data that indicate these courses are effective in enhancing students' knowledge of various health professions. One study using a retrospective pre/post survey of students' experience in a summer enrichment program revealed significant gains in knowledge of medical school admissions processes, understanding of medical practice, and the importance of patient-provider communication.⁶ Another study revealed increased retention of premed students enrolled in an Introduction to Health Professions Course by 12% as compared to non-enrolled premed students.⁴ Studies examining impact of an undergraduate health professions course on knowledge of medicine and allied health professions, however, are limited in number. This is important because evaluating the effectiveness of a pre health professions course can help inform both advisors and faculty about course design that facilitates students' learning about health professions. The purpose of the current study was to: 1) determine if students' knowledge of clinical roles increases from the beginning to the end of the course; 2) assess whether students' knowledge of a particular clinical role is enhanced with the addition of a speaker from that profession; and 3) assess accuracy of student perception of gender distribution in different health professions.

METHODS

Participants

Data were collected from five cohorts of students enrolled in a 14-week undergraduate course (Introduction to the Health Professions - see course description below) at Chatham University over a five year period. Chatham University is an all-female institution at the undergraduate level, therefore all participants were female. Of the 61 total students, all were Caucasian other than two African American students. Number of students by year was 12 students in 2006, 9 students in 2007, 20 students in 2008, 11 students in 2009, and nine students in 2010. All students but five were intending to apply for health professions-related graduate programs, with the majority reporting an intention to apply to a physician assistant program. Those not intending to enter a health profession were majoring in business, public relations, or health policy. The majority of students were first or second year undergraduate students, with less than 20% being juniors or seniors, and two were graduate students. Further demographic data were not collected. Exclusion criteria were students who did not complete both the pre and post questionnaires. In each of the five years, one student withdrew from the course before completion of the study.

Introduction to the Health Professions Course

Chatham University has offered an Introduction to the Health Professions course to undergraduates since 2004. The purpose of the course was to familiarize students with the variety of health care careers, including their scope of practice and educational requirements. The structure of the course allowed for small group discussion, lecture, and presentations by practitioners from various health care professions. This course included guest speakers from various professions, a problem-based learning case, researching a medical topic, and viewing and discussing a film with medical content. Data were collected for the most recent five years (2006-2010). Guest speakers consistently included four of the professions (physician assistant, occupational therapist, naturopathic physician, and physical therapist), never included two of the professions (osteopathic physician and chiropractor), and included an allopathic physician in one of the five years. Students conducted an interview of a health professional in four of the five years. The course was taught by a physician assistant for three of the five years, and team-taught by a physician assistant and a biologist with experience teaching in medical school for two of the five years.

Procedure

As part of the regular expectations of the course, all students were required to complete identical pre and post course

questionnaires asking for information about their knowledge of the scope of practice for a subset of health professions, including physical therapy, occupational therapy, physician assistant, chiropractic, and physician (allopathic, naturopathic, and osteopathic). Students were asked to describe their perceptions regarding scope of practice for each of the professions. The pre test took place on the first day of class. If a student missed the first day of class, she could take the pre test prior to the second day of class. The post test took place on the last day of class. No one missed the last day of class.

Students were also asked to identify the ratio of male to female practitioners in specific health professions on the questionnaire as part of the assessment of students' knowledge. We determined whether students believed there were more men, more women, or equal numbers of individuals in each field and compared these to actual data for the professions.

Questionnaire and Scoring Development

The course questionnaire was developed to assess effectiveness of the course on students' acquisition of information regarding a group of health professions. The questionnaire asked students to describe scope of practice and ratio of men to women in each of the following professions: physician, physician assistant, physical therapist, occupational therapist, and chiropractor. Information regarding number of years of schooling required for each profession was also collected, but because this information changed for several of the professions during the course of the research, it was not analyzed. Under the physician category, one additional question asked the difference between allopathic, osteopathic, and naturopathic physicians.

In order to develop scoring criteria, health professionals from the occupations above were asked to list scope of practice for their professions. They were also asked to list areas that were not part of the scope of practice for their profession. These were then used to develop a scoring sheet to assign point values to the students' responses on the pre and post tests.

Data Management and Analysis

Names and dates were removed from the original questionnaires so that pre or post test status and student names were blinded to the scorers. Each questionnaire was scored by two separate faculty members working independently, and scores were averaged. Raters were two physician assistants, one occupational therapist, and one naturopathic physician.

An interrater reliability analysis was conducted comparing ratings of Rater 1 for each subject on each variable with the same comparable ratings by Rater 2. We conducted Pearson r correlations to calculate interrater reliabilities. Most of the correlations were moderately to strongly high, with the exception of pre and post measures for osteopathic medicine and the post ratings for occupational therapy (see Table 1).

Table 1. Table of Inter-Rater Reliabilities for Total Scores

Health Profession Discipline	Pre Course Reliability Ratio	Post Course Reliability Ratio
Allopathic Medicine	.876	.815
Naturopathic Medicine	.788	.661
Osteopathic Medicine	.317	.222
Physician Assistant Studies	.717	.721
Physical Therapy	.648	.643
Occupational Therapy	.531	.164
Chiropractic Medicine	.577	.704

Data were entered onto an Excel spreadsheet and then downloaded into SPSS; the following statistics were utilized. A repeated measures multivariate analysis of variance (MANOVA) was utilized to compare pre and post test data. Mean scores of the two raters were our primary data for analysis. Chi-square analysis was utilized to compare student perceptions about gender dominance in the professions to actual gender data.

RESULTS

A repeated measures multivariate analysis of variance (MANOVA) was performed to determine effect of the course on accuracy of student responses before and after the course. This analysis revealed a statistically significant effect, multivariate $F(8, 53) = 9.31, p = .000$. Subsequently, univariate repeated measures analyses of variance tests were performed, with questionnaire scores (pre and post) for each health profession as the dependent variable. There were significant increases in knowledge for four of the seven health professions, including allopathic medicine, naturopathic medicine, physician assistant, and occupational therapy. Pre and post knowledge scores did not change significantly for three of the health professions, including osteopathic medicine, chiropractic medicine, and physical therapy. See Table 2 for means, standard deviations, F test statistics, and significance levels for all of the questionnaire variables.

Table 2. Means, Standard Deviations, and ANOVA for Pre and Post Course Knowledge Test Using Average of Both Raters

	Pre Mean (\pm S.D.)	Post Mean (\pm S.D.)	F	p
Allopathic Medicine	1.721 (1.23)	2.000 (1.28)	5.14	.027
Naturopathic Medicine	0.213 (0.64)	1.025 (0.85)	48.61	.000
Osteopathic Medicine	-0.008 (0.27)	0.074 (0.42)	1.95	.167
Physician Assistant Studies	1.262 (1.32)	1.762 (1.37)	7.66	.008
Occupational Therapy	0.639 (0.73)	1.123 (0.60)	23.46	.000
Physical Therapy	1.279 (0.83)	1.254 (0.84)	0.04	.841
Chiropractic Medicine	1.025 (0.68)	1.172 (1.01)	1.07	.304

Degrees of freedom for all variables are 1, 53.

Because of the low interrater reliabilities of some of the scores, the same analyses was conducted separately for each rater that we had conducted for the combined scores (see Tables 3 and 4). Results were essentially the same, with the exception that allopathic medicine was significant for Rater 2 and not for Rater 1, though it approached significance.

Table 3. Means, Standard Deviations, and ANOVA for Pre and Post Course Knowledge Test Using Scores from Rater 1

	Pre Mean (\pm S.D.)	Post Mean (\pm S.D.)	F	p
Allopathic Medicine	1.72 (1.25)	2.00 (1.33)	3.73	.058
Naturopathic Medicine	0.23 (0.72)	0.92 (0.88)	31.50	.000
Osteopathic Medicine	-0.02 (0.29)	0.08 (0.46)	1.81	.182
Physician Assistant Studies	1.28 (1.31)	1.77 (1.51)	6.75	.012
Occupational Therapy	0.59 (0.86)	1.10 (0.75)	15.96	.000
Physical Therapy	1.26 (0.85)	1.26 (0.89)	0.00	1.000
Chiropractic Medicine	1.08 (0.71)	1.18 (1.15)	0.379	.540

Degrees of freedom for all variables are 1, 60.

Table 4. Means, Standard Deviations, and ANOVA for Pre and Post Course Knowledge Test Using Scores from Rater 2

	Pre Mean (\pm S.D.)	Post Mean (\pm S.D.)	F	p
Allopathic Medicine	1.72 (1.28)	2.00 (1.35)	4.16	.046
Naturopathic Medicine	0.20 (0.63)	1.13 (0.99)	48.61	.000
Osteopathic Medicine	0.00 (0.37)	0.07 (0.60)	0.66	.419
Physician Assistant Studies	1.25 (1.55)	1.74 (1.46)	4.58	.036
Occupational Therapy	0.69 (0.81)	1.13 (0.85)	11.37	.001
Physical Therapy	1.30 (0.97)	1.25 (0.96)	0.11	.745
Chiropractic Medicine	0.97 (0.82)	1.16 (1.04)	0.58	.214

Degrees of freedom for all variables are 1, 60.

A comparison was performed on whether students believed there were more men, more women, or equal numbers of individuals in each field using Chi-Square analyses. Both pre and post course, there were statistically significant differences in their beliefs about gender distribution across the health professions. Students assumed there were significantly more men than women who were physicians, physical therapists, and chiropractors but significantly more women than men who were physician assistants

and occupational therapists. Results were similar pre and post course, with no change in presumed gender distributions (see Table 5).

Table 5. Table of Gender Distribution Estimates Using Data Only from Subjects Who Completed Estimates Both Prior To and After Having Completed the Course

Profession	Pre Course Estimates			Post Course Estimates		
	More Women Than Men	Equal Numbers of Women and Men	More Men Than Women	More Women Than Men	Equal Numbers of Women and Men	More Men Than Women
Physician (n=36)	3 (8.3%)	0 (0.0%)	33 (91.7%)	2 (5.6%)	1 (2.8%)	33 (91.7%)
Physician Assistants (n=37)	27 (73.0%)	2 (5.4%)	8 (21.6%)	28 (75.5%)	2 (5.4%)	7 (18.9%)
Physical Therapists (n=32)	7 (21.9%)	7 (21.9%)	18 (56.3%)	9 (28.1%)	8 (25.0%)	15 (46.9%)
Occupational Therapists (n=30)	18 (60.0%)	3 (10.0%)	9 (30.0%)	19 (63.3%)	1 (3.3%)	10 (33.3%)
Chiropractor (n=33)	3 (9.1%)	0 (0.0%)	30 (90.9%)	3 (9.1%)	0 (0.0%)	30 (90.9%)

In order to determine accuracy of student estimates regarding gender ratios, data were recoded for each participant as either having an accurate or inaccurate perception of each profession based on gender estimates obtained from professional organizations and other sources (see Table 6). Percentages were not included in the table or analyzed regarding physicians because the questionnaire combined MD, DO, and ND under one category and the female percentage varies widely in these professions, from 29% for MD⁸ to 80% for ND.⁹

Table 6. Female Gender Demographics

Profession	Chiropractic	Physical Therapy	Physician Assistant	Occupational Therapy
% female	19.6 (2009) ⁷	68.1 (2008) ⁸	65.2 (2009) ⁹	91.0 (2009) ¹⁰

A computed two Chi-Square analyses (one on pre course data and one on post course data) was performed to determine if students had different accuracy estimates for each of the different health professions. Chi-Square analyses revealed statistically significant differences, with the highest rates of inaccuracy for physical therapists and the highest rates of accuracy for chiropractors (see Table 7).

Table 7. Pre and Post Course Gender Distribution Accuracy Estimates for Allied Health Professions

Profession	Pre Course Estimates		Post Course Estimates	
	Inaccurate	Accurate	Inaccurate	Accurate
Physician Assistants	n = 13 31.71%	n = 28 68.29%	n = 17 32.69%	n = 35 67.31%
Physical Therapists	n = 29 80.56%	n = 7 19.44%	n = 38 73.08%	n = 14 26.92%
Occupational Therapists	n = 14 42.42%	n = 19 57.58%	n = 18 36.00%	n = 32 64.00%
Chiropractor	n = 4 11.11%	n = 32 88.89%	n = 7 14.29%	n = 42 85.71%

$$\chi^2 = 38.04, df = 3, p = .000$$

$$\chi^2 = 38.86, df = 3, p = .000$$

DISCUSSION

Students interested in health professions often have limited knowledge about the specific roles and scope of practice of various health care disciplines. Students may make decisions about their future careers based on insufficient knowledge regarding the range of health professions. Professions with which a student is already familiar may not be the best fit for that student's interest or capabilities. Results of this study suggest that providing a pre health professions course may increase knowledge and understanding of various professions, which in turn may help students make informed decisions about a career path. As noted in previous research, exposure to a practicing health care professional is an effective strategy for recruiting prospective students.^{3,11} Consistent with these findings, in our study, significant differences in pre and post course knowledge were noted in all professions where the speaker was a practicing clinician, with the exception of physical therapy. One explanation for this lack of change in pre and post course knowledge might be that physical therapy is a well-known profession; a speaker from the profession may be more important for less familiar allied health professions, such as physician assistant and occupational therapy. This can have implications for faculty as they are designing introductory health professions courses.

Students were inaccurate in their estimation of gender make-up of all professions studied with the exception of chiropractic medicine, for which 85-90% of students correctly identified gender distribution. The inaccurate estimation that physical therapy is a predominantly male profession is particularly interesting, given that all of the subjects were female, that there was a female physical therapy speaker in the course, and that the percentage of females in that profession is 68% (according to data from 2008 – see Table 6). A reason for the overestimation of males may be that, although physical therapy is well-known as a profession, there may not be general awareness of the gender make-up of that profession. Few of the subjects were pre physical therapy students, who might be familiar with the gender make-up of the profession.

One limitation of the study is the all-female population necessitated by the undergraduate women's college in which the course is situated. A future study examining male student perceptions (perhaps involving multiple institutions) could help clarify if our results represent a gender bias or are generalizable to both male and female undergraduate students. Additionally, participants may have had differing interpretations of the meaning of the term "ratio" utilized on the questionnaire with regard to gender distribution. Some student responses were quantitative, while others were qualitative. For future studies, the word "percentage" could be substituted for "ratio," or students could be given an example of a ratio response. Another limitation is that the raters were not represented by members of all the professions studied. Despite this, there was a high degree of interrater reliability in all but two professions (osteopathic medicine and occupational therapy). For future studies, the criteria for these two professions could be revised to ensure that rating categories are discrete. Another limitation was the fact that the primary instructor was a physician assistant, which may have resulted in more pre-PA students enrolling in the course than other students. Finally, there was a small cohort in each class. We were able, however, to overcome this limitation by combining data from multiple years. Because the course content, speakers, instructor, and proportion of students interested in the various health professions were similar from year to year, the effect on validity of combining data was probably minimal.

It is evident that having a pre health professions course increases student knowledge base, particularly if there are guest speakers who are practicing in that profession. If the university offers health professions programs, a pre health professions course could support enrollment in those programs by utilizing faculty as speakers, and also by raising student awareness of these program offerings at their university. Additionally, community-based practitioners could create networking opportunities for students in the professional community and serve as a model for professional mentoring, thereby dispelling some of the inaccurate perceptions of the health professions. Universities having undergraduate students interested in health professions could utilize this information to create pre health professions courses for the benefit of their students. In addition to those already identified, other future directions for study could be assessing students' knowledge-base regarding educational requirements for each profession, strategies for being successful in application to the professions, requirement for business acumen, and collaboration with other health professionals.

ACKNOWLEDGEMENTS

The authors would like to thank Brittany MacConnell, Justine Kassay, and Allison Jedinak, M.S. for their assistance with data entry and management.

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