Title

The Effect of an Enhanced Geriatrics Curriculum on Medical Students' Knowledge: A Cohort Study

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Publication Date

2004

The Effect of an Enhanced Geriatrics Curriculum on Medical Students' Knowledge: A Cohort Study

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As the United States' population over 65 has continued to grow, medical schools have turned their attention to strengthening curricula in geriatric medicine. The United States Census Bureau has predicted that the 65 year-and-older population will grow about 3 1/2 times faster than the nation as a whole over the next 25 years, reaching 20% of the total population by 2030. It has already been documented that patients in this age group have more than twice as many contacts with physicians than younger persons and account for almost half of all days of hospital care.[1] This disproportionate share of health care utilization will increase dramatically as the elderly population increases. The physicians who will provide care for these elderly persons are beginning to be trained now. It is unreasonable to expect that the responsibility for providing this medical care can be assumed by geriatricians. Despite increased enrollment in geriatrics fellowship programs,[2] the vast majority of medical care of older persons will be provided by generalists.[3] Physicians in all specialties will treat increasing numbers of older persons which will require a basic understanding of how their medical care differs from that of younger adults.[4]

Since the publication of Core Competencies for the Care of Older Patients by the Education Committee Working Group of the American Geriatrics Society[5] in 2000 and increased funding opportunities for geriatrics education from agencies such as the AAMC, the John A. Hartford Foundation, and the Reynolds Foundation, many medical schools[6] have turned their attention to the improvement of education in this area. The *AAMC Graduation Questionnaire* completed by senior medical students each year reflects the impact of this shift in the results for the graduating class of 2004 in which the percent reporting inadequate amounts of geriatric education fell below 30% for the first time since the term "geriatrics" was added.[7]

Although UCLA has a national reputation for leadership in geriatrics, the strength of the UCLA program has been largely concentrated at the post-graduate level with only 25 hours of direct instruction in geriatrics for medical students. In 1999, stimulated by the passage of a bill by the California state legislature requiring increased geriatrics education for health care providers and students and supported by funding from several foundations and agencies, we began to focus on medical student education. By the fall of 2001, we had

added 36 new hours of geriatric education across the first three years of medical school[8] (see Table I).

The purpose of this study is to evaluate the effect of this enhanced three-year geriatrics curriculum on students' knowledge about aging and clinical geriatric assessment, following one cohort of students from the beginning to the end of the required curriculum at the David Geffen School of Medicine at UCLA.

METHODS

Subjects

We followed the cohort of medical students entering UCLA in the fall of 2001 during their first three years of medical school using a repeated measures design. We administered the first survey in October 2001 just two months into medical school before students had any formal exposure to a geriatrics curriculum (baseline), and then again at the end of the first, second, and third year curricula. Over the three-year period, the cohort experienced 61 hours of structured education in geriatrics, 36 of which were new curricular components. The UCLA Internal Review Board approved this study as exempt. Students' participation was voluntary.

Instrument

We used an 18-item geriatrics knowledge test previously developed and validated by the authors for use in assessing medical students' knowledge about aging (6 items) and clinical geriatric assessment (12 items).[9] The test included a "Don't Know" response option to discourage guessing and to allow a more accurate assessment of knowledge mastered over the period of the study.

Data Analysis

We calculated the sums of raw scores and percentages of each of the answer types,

correct, incorrect and "Don't Know." We also calculated the two statistics on the aging facts items and clinical geriatric assessment items. To compare changes in geriatrics knowledge across years for the Class of 2005 as a group, we conducted a multivariate analysis of variance (MANOVA), comparing results for each of the three answer types (correct, incorrect and "Don't Know") and the two content domains (aging facts and clinical geriatric assessment). We used one-way ANOVAs and post hoc t-tests with Bonferroni corrections for multiple comparisons[10] to examine significant MANOVA results in order to determine the sources of any significant findings. To compare change across the years within individual students, we conducted a repeated measures analysis of variance for each of the three answer types and the two content domains. Only those students who completed all four surveys were included in this latter analysis. A Student t-test was calculated to ensure that there was no difference in the mean correct score at the baseline between those students who completed all four surveys and those who did not.

All statistical analyses were performed using the SPSS system version 11.5, and $p < .05$ was considered statistically significant.

RESULTS

The participation rates during the four administrations were 91% (n = 137) at baseline, 86% (n=129) at the end of year one, 93% (n=139) at the end of year two, and 80% (n = 145)

at the end of year three. Only 55% (n = 69) of the eligible students completed all four surveys.

When analyzed as a group, students demonstrated a significant increase in knowledge across the years ($F = 60.13$, $df = 9,1324$, $p < .001$) with a significant increase in the number of items answered correctly ($F = 232.64$, $df = 3, 546$, $p < .001$) and a significant decrease in the number of items answered "Don't Know" ($F = 141.2$, $df = 3,546$, $p < .001$) (Table 2). By the end of their core curriculum in geriatrics, the mean percent correct rose from 35% to 75% with those still selecting the "Don't Know" option decreasing from 44% to 5%. The number of items answered incorrectly did not change significantly over the three years, with 21% at baseline and 20% at the end of year three.

The cohort also demonstrated a significant change in both knowledge domains over the period of the study ($F = 103.51$, $df = 6,1088$, $p < .001$) with a significant increase in the scores for both the knowledge of aging items ($F = 37.32$, $df = 3,545$, $p < .001$) and the clinical geriatric assessment items ($F = 254.25$, $df = 3,545$, $p < .001$) (Table 3). The increase was more prominent in the domain of clinical assessment (a change of mean percent correct score from 27 % at the baseline to 75% at the end of Year 3) than in aging facts (a change from 50% to 74%). The greatest increase in percent correct occurred between the end of year one and the end of year two of medical school for both clinical

assessment items ($t = 13.69$, $p < .001$) and aging facts items ($t = 5.15$, $p < .001$).

When examined for intrastudent growth, the pattern of change for the 69 students who completed all four assessments was similar to that of the larger cohort, with both an increase in correct responses and decrease in the use of "Don't Know" and an increase in the percent correct scores for the two content domains. Students' scores at baseline for the 69 who completed all 4 surveys ($M = 6.25$, $SD = 2.62$) were not significantly different from those of the 44 students who completed only two or three of the assessments ($M = 6.30$, $SD = 2.89$).

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Table 1. Geriatrics Curriculum at UCLA Medical School

Enhanced Geriatrics Curriculum (Total Hours: 36)

Course (level)	Format	Topic	Total Hours
Clinical Applications of Basic Sci. A (1)	PBL case w/video	Osteoporosis	4
Clinical Applications of Basic Sci. A (1)	PBL	Complications of Hypertension and Treatment	4
Clinical Applications of Basic Sci. A (1)	PBL	Dyspnea	4
Clinical Applications of Basic Sci. B (1)			
Physiology (1)	Lecture	Organ effects	2
Pathology (2)	Lecture	Cellular aging	2
Patho-Physiology and Disease (2)	Lecture/ video	Alzheimers	1
Pharmacology(2)	Computer cases	Polypharmacy	1
Patho-Physiology and Disease (2)	PBL	Colon CA	4
Patho-Physiology and Disease (2)	PBL	Hypothyroidism	4
Inpatient Med. Clerkship (3)	Write Up	Geriatric Assessment	1
Ambulatory Care Clerkship (3)	Jeopardy	Facts on aging	1
Ambulatory Care Clerkship (3)	Computer	Gait & Balance	1
Ambulatory	Lecture	Incontinence	1

Care Clerkship (3)			
Ambulatory Care Clerkship (3)	Case Discussion	Pain Management	1
Inpatient Med. Clerkship (3)	Case Discussion	End of Life	1.5
Inpatient Med. Clerkship (3)	Case Discussion	Palliative Care	1.5
Neuro-Psychiatry Clerkship (3)	Case Discussion	Dementia	2

Existing Geriatrics Curriculum (Total Hours: 25)

Course (level)	Format	Topic	Total Hours
Doctoring 1 (1)	SP & video case	Community resources; ADL	6
Anatomy	Video case	Death & dying	1
Clinical Applications of Basic Sci. B (1)	PBL	Complications of Hypertension and Treatment	4
Fundamentals of Clinical Med. (2)	Lecture	Geriatric assessment	2
Fundamentals of Clinical Med. (2)	Nursing home visit	Clinical skills	3
Psychopathology (2)	Lecture	Dementia	2
Psychopathology (2)	Case discussion	Dementia	2
Patho-Physiology and Disease (2)	Lecture	Diseases common in older persons	1
Doctoring 2 (2)	Video & SP case	Pancreatic CA/ end of life	4

Table 2. Comparison of Answers to Geriatrics Knowledge Test across Years[1]

Year	Correct Answer				"Don't Know" Answer				Incorrect Answer			
	Raw Score[2]		Percent Score		Raw Score[2]		Percent Score		Raw Score[2]		Percent Score	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline (n=137)	6.29	2.76	35	15	7.95	4.05	44	22	3.72	2.22	21	12
End of Year 1 (n=129)	7.13	3.10	40	17	6.89	4.23	38	23	3.88	2.43	22	13
End of Year 2 (n=139)	11.32	2.73	63	15	3.12	2.75	17	15	3.50	2.01	19	11
End of Year 3 (n=145)	13.47	1.89	75	10	0.92	1.23	5	7	3.60	1.79	20	10
p-value[3]	.000				.000				.49			

[1] A multivariate analysis of variance (MANOVA) showed an overall significant ($F = 60.13$, $df = 9,1324$, $p < .001$) change in answers to the knowledge test across the years.

[2] The possible range of the raw scores for each answer category is 0 – 18.

[3] The p values reported are based on an one-way analysis of variance (ANOVA) within each answer category.

Table 3. Comparison of Geriatrics Knowledge Domain Scores across Years[1]

Year	Aging Facts				Clinical Geriatric Assessment			
	Raw Score[2]		Percent Score		Raw Score[3]		Percent Score	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline (n=137)	3.03	1.46	50	24	3.26	1.97	27	16
End of Year 1 (n=129)	3.03	1.44	51	24	4.10	2.49	34	21
End of Year 2 (n=138)	3.88	1.29	65	22	7.49	2.01	62	17
End of Year 3 (n=145)	4.46	1.22	74	20	9.01	1.56	75	13
p-value[4]	.000				.000			

[1] A multivariate analysis of variance (MANOVA) showed an overall significant ($F = 103.51$, $df = 6,1088$, $p < .001$) change in the knowledge domain scores across the years.

[2] The possible range of the raw scores for the aging facts domain is 0 – 6.

[3] The possible range of the raw scores for the clinical geriatric assessment domain is 0 – 12.

[4] The p values reported are based on an one-way analysis of variance (ANOVA) within each domain.

1.