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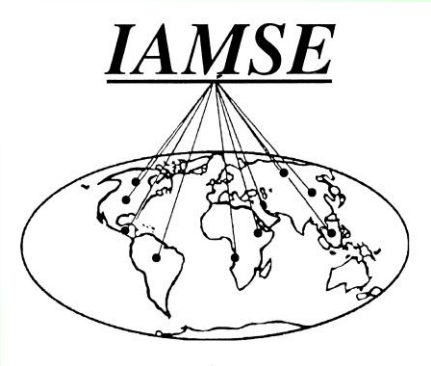

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Message from Editor-in-Chief

Uldis N. Streips, Ph.D.
Editor-in-Chief

Welcome to the first issue of volume 20 of JIAMSE. As always, we have a variety of manuscripts to present to the reading public. I am sure everyone will find something to learn or apply in this issue. We, more than any other published journal, have papers which describe utilizable information that can be integrated into your curricula and courses. There is rarely an issue where there aren't a couple of papers that I forward to people in my educational circle and often find emails thanking me for the information. I am sure many of you reading this issue are either doing or have in mind educational advances for your courses and curricula. These would be useful to everyone at IAMSE and beyond and we would be happy to consider them for publication. Send them to me and our review process is extremely user-friendly. I look forward to many submissions!

All best,

Uldis N. Streips, Ph.D.
Editor-in-Chief, JIAMSE

Erratum

In JIAMSE 19-2S, page 110, the wrong authors are mentioned in that specific abstract. The correct abstract is:

ORTHOPAEDICS

Healthy Limb Amputation: Ethical and Legal Issues

I.M. Athanasopoulou

University of Athens
Greece

Introduction: The presentation refers to the ethical and legal issues raised by patients who request to have a healthy limb amputated.

Material and Methods: Given all the possible and suggested origins of the desire for a healthy limb amputation, we present all the for- and against- thesis. Based on the most recent bibliography, court convictions, interviews with amputees and ethical parameteres, we attempt to approach the core of the permissibility or the prohibition of the requested surgery.

Results: Both sides-figthers and adherents of a healthy limb amputation support strongly their thesis. It is really important that each case should be examined in the context of uniqueness and thoughtfulness for the patients' and doctors' benefit and protection.

Conclusion: Given the ethically problematic history and doubtful effectiveness of such surgeries, surgeons should be very cautious before acceding to these requests. On the other hand, the establishment of a body of medical opinion on a healthy limb amputation is necessary for the patients' relief.

Erratum

In JIAMSE 19-2S, page 124, the wrong authors are mentioned in that specific abstract. The correct abstract is:

PATHOLOGY

Morphological and Biochemical Aspects in Cerebral Hypoxia

S. Grosu, V. Melnicov, E. Gotonoagă, M. Rotaru

State Medical and Pharmaceutical University "Nicolae Testemitanu"
Chisinau
Republic of Moldova

Introduction: Being a damaging process for the nervous tissue, especially for the cerebral part of CNS, hypoxia has numerous effects on the function and structure of neurons. In this study are described macroscopic and microscopic changes of the rat brain, precisely cortex and cerebellum, and biochemical serum analysis in search of certain enzymes, ions and pH data concluding the changes. All these regarded the comparative evaluation of hypoxic modifications as a result global incomplete ischemia versus that as a result of global complete ischemia, at the end sustaining the idea the first mentioned type is more aggressive.

Material and Methods: The experimental study was made on 15 Wistar rats (10m, 5f), 8 months age, and weight 170-195 g ±4. They were divided into 3 groups, 2 experimental lots (I and II), each of 6 rats, and one for control (III). To subjects in the first group was applied common carotid artery bilateral ligature and for those in the second – induced hemorrhagic shock, by extracting from the external jugular vein 3.5ml ± 0.4 of blood, in both cases the exposure time lasting 5 minutes. Serum analysis had interest for Ca2+ ions, lactic acid and alkaline phosphatase (ALP) also the histological and morphological observations were done.

Results: Macroscopic signs revealed were edema of the white matter in the hemispheres, in hippocampus, corpus callosum, cerebellum and per diapedesis hemorrhage. Histological observations revealed pericellular and intracellular edema, extravasation blood particles nearby vessels, neuron nucleus hypercromativity, irregular neuron and glial cells form, vessels' rupture, Purkinje cells' alteration. All these signs were better illustrated in the subjects of the first experimental lot. Biochemical analysis showed: a) Ca2+ (C% mM/l): I-3.35±0.21, II-4.06±0.20, III-5.27±0.21; b) Lactic acid (C% mM/l): I-6.2±0.39, II-5.6±0.34, III-4.96±0.44; c) ALP (A Nm/s*l): I-0.63±0.12, II-0.53±0.12, III-0.39±0.09.

Conclusion: This study demonstrated that global incomplete ischemia is more damaging than the complete form, considering the morphological and biochemical data obtained. In such way the hemorrhagic shock form is less destructive for the CNS, especially it's cerebral part.

SHORT COMMUNICATION

The Development of an Interclerkship Curriculum on Methamphetamine Abuse and Dependence

Kathryn N. Huggett[1]*, Ph.D., Eugene J. Barone[2], M.D., Amanda S. Lofgreen[1], M.S., William B. Jeffries[3], Ph.D.

[1]Office of Medical Education
Creighton University School of Medicine
2500 California Plaza
Omaha, NE 68178
[2]Department of Family Medicine
[3]Office of Medical Education
University of Vermont College of Medicine
The Courtyard at Given, N117
89 Beaumont Avenue
Burlington, VT 05405
USA

* Corresponding author

Keywords: Curriculum, Medical Student, Substance Abuse Education, Methamphetamine Abuse Education, Interclerkship

Phone: (+) 1-402-280-2826 Fax: (+)1-402-280-2046 Email: KathrynHuggett@creighton.edu

ABSTRACT

Methamphetamine abuse is a significant medical problem in our region. We developed and investigated an interclerkship curriculum to educate medical students about the significance of methamphetamine abuse and dependence and its effects on the individual and society. Topics covered include neuropathology, neuropharmacology, diagnosis, treatment, law enforcement issues and social services.

The primary care physician plays an important role in the identification of substance use in adolescents and adults.[1] Approximately 20% of patients seeing a family physician have substance abuse problems.[2] Physicians in training must understand they will see patients who suffer from substance abuse and dependence. They need to learn to recognize the red flags in the patient history, as well as specific physical findings related to substance use.[2] Even though primary care physicians could treat substance abuse problems in their clinical setting, it is often prudent to refer patients to consultants who specialize in substance use disorders. Primary care physicians should know the appropriate resources in their region to facilitate appropriate referrals.

In 2007, Creighton University School of Medicine was named by the National Institute on Drug Abuse (NIDA) as one of four Centers of Excellence (COE) for Physician Information. The Centers of Excellence were established to serve as national models for the advancement of addiction awareness, prevention and treatment in primary care practices. Each NIDA COE identified drug addiction knowledge gaps and developed educational materials for physicians in training to address these gaps. Curricular materials were developed to provide information about methamphetamine abuse. Methamphetamine was chosen because it remains a serious problem in many Midwestern states, including Iowa, Minnesota, Montana, North Dakota and Nebraska, where our medical school is located. The production, transportation, distribution, and abuse of

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methamphetamine pose significant challenges for law enforcement and healthcare providers.

We developed a specialized, interclerkship module curriculum on methamphetamine. Interclerkship experiences, sometimes called intersessions, are employed by medical schools to address topics that are not emphasized in clinical clerkships but are relevant to clinical learners.[3] Some schools have developed interclerkship experiences to provide students with information about emerging issues, such as bioterrorism, while other interclerkships are designed to address core content such as professionalism and evidence-based medicine.[4–9] At least one interclerkship experience was developed to assess medical student attitudes toward and knowledge about substance abuse disorders and their confidence in conducting substance abuse assessment and intervention.[10] These focused curricula are typically offered between clinical clerkships and use small group and other interactive learning methods.

The goal of this interclerkship module is to educate medical students about the significance of methamphetamine abuse and dependence, its effects on the individual and society and its treatment. Although designed for third-year medical students, the curriculum could be adapted for other medical students or residents. The learning objectives address 1) prevalence data on methamphetamine abuse and dependence, 2) diagnostic information, 3) neuropathology and neuropharmacology, 4) treatment options and goals, 5) educational resources and 6) local resources for the treatment of methamphetamine abuse and dependence.

The methamphetamine interclerkship module was introduced as part of the interclerkship course, Dimensions of Clinical Medicine (DCM), in 2008–2009. This course was introduced in 2002–2003, and has proven effective for presenting clinically relevant content to third-year students.[11] Consistent with adult learning principles, the course offers students knowledge and skills at the time they are most likely to need them, i.e., during their first clinical year.[12] Other course module topics include legal issues, palliative care, alternative medicine, substance abuse and human sexuality. The common thread is that these topics represent important competency areas, but are unlikely to receive adequate coverage in clerkships.

Interclerkship course modules occur bi-monthly, are composed of two half-day sessions or a one-day session and are mandatory. The modules employ multiple instructional methods, including lectures, small groups, panel discussions, and other interactive activities designed to promote student engagement and a cooperative learning environment. The school's Educational Policy Committee appoints the course director for the entire DCM course, and the course director recruits course directors for each module. The course director for the methamphetamine interclerkship experience is a faculty member in the Department of Family Medicine who has interest and expertise in substance use disorders and treatment issues.

Although the course directors decided to introduce the methamphetamine interclerkship curriculum as a single half-day module, it could be offered as a one-day (8 hours) course or two half-day (4 hours) courses. The curriculum was developed to fit the Dimensions of Clinical Medicine course format, and was designed to promote active learning. The course directors for both the methamphetamine interclerkship module and Dimensions of Clinical Medicine course developed the course content, using NIDA resources. Feedback obtained from students after the pilot implementation will be used to revise the curriculum.

The methamphetamine module includes lectures on the diagnosis and treatment of methamphetamine abuse and dependence, law enforcement aspects of methamphetamine abuse and the neuropathology and neuropharmacology of methamphetamine abuse and dependence. The curriculum also features video clips from the NIDA/HBO production "Addiction" and a facilitated panel discussion with community members such as methamphetamine dependent individuals in treatment, social workers, community agency representatives and treatment professionals. Options for breakout sessions include a training session for diagnosing methamphetamine dependence with standardized patients, meeting with individuals recovering from methamphetamine dependence (consenting volunteers in recovery) and an introductory training session for motivational enhancement therapy (MET). The course ends with a debriefing and learning assessment. Sample course schedules for both 4- and 8-hour periods are presented in Table 1.

One hundred sixteen third-year medical students completed the methamphetamine interclerkship module—59 males (50.9%) and 57 females (49.1%). The directors of the methamphetamine interclerkship module and Dimensions of Clinical Medicine course are faculty in the departments of Family Medicine and Internal Medicine, respectively. Presenters from outside the university (e.g., law enforcement representative, attorney, and social worker) were invited by the course directors. The course directors oriented the presenters to the course goals and objectives before the session.

To evaluate the pilot implementation of the methamphetamine interclerkship module both quantitative and qualitative data were collected. Two instruments, a standard course evaluation and a brief learning assessment, were developed to assess student satisfaction and course impact. Both were administered at the conclusion of the course (Time 1) and six months later (Time 2). The program evaluation asked students to rate items on a Likert-style scale of 1 (*strongly disagree*) to 5 (*strongly agree*) and contained general items used in other interclerkship evaluations as well as items specific to the

methamphetamine component. The program evaluation was available online immediately following the module. Six months afterwards, an abbreviated program evaluation was distributed electronically. The program evaluation results for Time 1 and Time 2 are reported in Table 2.

Table 1. Sample Course Schedules

4-Hour Course Schedule	
8:00 a.m. – 9:00 a.m.	Advanced lecture on the diagnosis and treatment of methamphetamine abuse and dependence*
9:00 a.m. – 9:30 a.m.	Methamphetamine abuse and dependence: A legal/law enforcement perspective
9:30 a.m. – 9:45 a.m.	Break
9:45 a.m. – 10:15 a.m.	Panel discussion and question-and-answer session with students
10:15 a.m. – 11:15 a.m.	Lecture on neuropathology and neuropharmacology and treatment of methamphetamine abuse and dependence
11:15 a.m. – 12:00 p.m.	Debriefing and wrap-up
8-Hour Course Schedule	
8:00 a.m. – 8:30 a.m.	Registration and breakfast
8:30 a.m. – 9:30 a.m.	Advanced lecture on the diagnosis and treatment of methamphetamine abuse and dependence*
9:30 a.m. – 9:45 a.m.	Break
9:45 a.m. – 10:15 a.m.	Methamphetamine abuse and dependence: A legal/law enforcement perspective
10:15 a.m. – 11:15 a.m.	Review video clips from the NIDA/HBO production "Addiction"
11:15 a.m. – 12:00 p.m.	Facilitated panel discussion and question-and-answer session with students (methamphetamine-dependent individual in treatment, social worker, community agency representative [e.g., social services], treatment professional)
12:00 p.m. – 1:00 p.m.	Lunch
1:00 p.m. – 2:00 p.m.	Lecture on neuropathology and neuropharmacology and treatment of methamphetamine abuse and dependence*
2:00 p.m. – 4:00 p.m.	Breakout sessions with options of: • Training session for diagnosing methamphetamine dependence with standardized patients • Meeting with a recovering methamphetamine-dependent individual (with consenting volunteers in recovery) • Training session for motivational enhancement therapy
4:00 p.m. – 4:15 p.m.	Debriefing and learning assessment

*The lecture slide presentation was developed by the module director. Content for the slide presentation was compiled primarily from NIDA resources. The slide set will be available to the public along with a companion lecture guide when Center of Excellence work is completed.

Students rated the interclerkship positively and all items were rated above average. Group means for all items were compared between administrations and results are reported in Table 2. Student written comments also provided valuable evaluation data. Many of the comments were general but positive, such as "*This was a necessary program for M3 students because most of us have not had exposure to this form of drug abuse. I would highly recommend keeping it with the curriculum next year."* Other student comments noted the value of inviting presenters from the community. For example, one student wrote, "*The law enforcement panel did a great job contextualizing the magnitude of methamphetamine use in the community and illustrating the social ramifications of this epidemic in the community*." Several students commented on the value of introducing basic science and

clinical content. As one student noted, "*I learned more about what to look for in users of this drug that I didn't know before, and more about pharmacology and social implications of drug abuse*."

Although students successfully completed the learning assessment at the conclusion of the course module (Time 1), they demonstrated limited retention of this knowledge six months after the course (Time 2). We were not surprised by this result because the assessment measured recall of discrete facts and statistics unlikely to be addressed during clinical rotations. The learning assessment administered at Time 2 also asked two questions about student use of information presented at the session. When asked "*Have you consulted any resources (e.g., NIDA web site) for additional information since the*

Table 2. **Program Evaluation**

		At the Conclusion of the Course (Time 1) *M* (*SD*)*	6 Months After Completing the Course (Time 2) *M* (*SD*)	*t*	Effect Size (*d*)	*p*
1.	This program was well designed and organized.	3.74 (0.77)	--	--	--	--
2.	The goals for the program were clear.	3.84 (0.73)	--	--	--	--
3.	The program followed a logical sequence.	3.75 (0.76)	--	--	--	--
4.	The time allotted for this program was about right.	3.38 (1.01)	--	--	--	--
5.	This approach was an effective format for learning about this aspect of Dimensions of Clinical Medicine.	3.78 (0.69)	--	--	--	--
6.	The facilitators were helpful to my learning.	4.03 (0.57)	--	--	--	--
7.	I had adequate opportunity to participate.	3.48 (0.81)	--	--	--	--
8.	I recommend offering this program to next year's Year 3 students.	3.76 (0.86)	3.94 (0.71)	1.46	.16	.15
9.	I was pleased with the format.	3.55 (0.89)	3.62 (0.91)	0.49	.05	.63
10.	I was pleased with what I learned about methamphetamine abuse.	4.09 (0.68)	3.86 (0.76)	2.36	.25	.02
11.	The panel discussion was helpful to my learning.	3.54 (0.86)	3.82 (0.89)	1.98	.21	.051
12.	This program improved my knowledge and understanding of the neuropathology and neuropharmacology of methamphetamine abuse and dependence.	3.88 (0.79)	3.74 (0.74)	1.17	.13	.25
13.	I know where to go to find information on methamphetamine abuse and dependence as a result of this program.	3.91 (0.66)	3.76 (0.72)	1.47	.15	.15
14.	I am familiar with resources for the treatment of methamphetamine abuse and dependence in my community as a result of this program.	3.72 (0.82)	3.53 (0.81)	1.61	.17	.11

*Mean (Standard Deviation)

The course faculty developed a five-item multiple choice question learning assessment to assess key objectives. Paper copies were distributed at the conclusion of the module (Time 1) and then distributed electronically six months later (Time 2), along with the follow-up program evaluation. These results are demonstrated in Table 3.

session last September?" 10 students (11.0%) indicated yes and 81 (89.0%) students responded no. However, when asked "*Have you used information presented at the Dimensions of Clinical Medicine: Methamphetamine Abuse Program during your clerkship*?" almost one-third of the students (n=28, 30.8%) indicated they had used information from the session.

Recommendations for future iterations of this curriculum include extending the 4-hour session to the full-day format to allow more time for an introduction to Motivational Enhancement Therapy (MET), participation of a former methamphetamine-dependent patient in a panel discussion of the treatment process and additional information about community resources.

Table 3. **Learning Assessment**

		At the Conclusion of the Course (Time 1)		6 Months After Completing the Course (Time 2)	
		Freq	%	Freq	%
1.	For a diagnosis of methamphetamine abuse, a maladaptive pattern of abuse needs to be present over a period of:				
	One month	--	--	56	60.9
	One year*	109	98.2	16	17.4
	One week	2	1.8	20	21.7
	One decade	--	--	--	--
2.	Diagnosis of Methamphetamine dependence requires the presence of the following number of criteria out of the possible seven:				
	Three *	109	98.2	41	44.6
	Four	--	--	47	51.1
	Five	--	--	4	4.3
	Six	2	1.8	--	--
	Seven	--	--	--	--
3.	Approximately the following percentage of people can be expected to have used methamphetamine in the United Sates:				
	10%	2	1.8	19	20.7
	5% *	109	98.2	52	56.5
	2%	--	--	17	18.5
	1%	--	--	4	4.3
4.	Methamphetamine dependence can be successfully treated with:				
	Naltrexone	--	--	8	8.7
	Disulfiram	--	--	2	2.2
	Antidepressant medications	1	.9	14	15.2
	Behavioral therapies*	107	96.4	68	73.9
5.	The treatment of substance use disorders is:				
	Less effective than treatment of other chronic diseases.	17	15.3	48	52.2
	More effective than the treatment of other chronic diseases.	2	1.8	4	4.3
	Has similar efficacy to the treatment of other chronic diseases.*	88	79.3	40	43.5

*denotes correct answer

The pilot implementation of the methamphetamine curriculum was successful and the interclerkship format offers a valuable opportunity to teach third-year medical students about an important substance abuse and dependence topic. Including community agency representatives enriched the curriculum and complemented the basic science and clinical content. This curriculum can be easily modified by other medical schools to fit scheduling requirements or even address other substance abuse and dependence topics.

ACKNOWLEDGEMENTS

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MONOGRAPH

A Group Comparison Between Swedish MD-PhDs of 1991 and 2000

Lars H. Breimer, M.D., Ph.D.

Department of Laboratory Medicine
Örebro University Hospital
SE – 701 85 Örebro
Sweden

Keywords: Higher education policy, gender issue, career mobility, prospective outcomes study, curriculum design and development

Phone: (+) 46-19-602-78-17 Fax: (+) 46-19-602-37-85 Email: lars.breimer@orebroll.se

ABSTRACT

About 70% of Swedish MDs who passed their PhD in 1991 and 2000 published papers in English during the last three years. The proportions with three or more and with 10 or more publications were significantly less in the 2000 than in the 1991 cohort. A smaller proportion of those of 2000 than of 1991 had moved to universities other than where they did their PhD. The age at PhD was skewed towards the older end in the more recent cohort. About 40% of the external examiners of the theses were based abroad. Explanations for the pattern of their publications and changed pattern of working are discussed, including issues of mobility and career opportunities. It is worth encouraging medical students and doctors to engage in research but resources must be provided including opportunities to move to other universities to encourage a broader development.

INTRODUCTION

Research is fundamental to developing new methods of treatment and patient care. Therefore, higher education policy and management view positively the encouraging of medical students and doctors to undertake research. The demographics of PhD graduates and the structure of their theses, including MD-PhDs, have been described in a number of surveys but there is a scarcity of outcomes measures.[1-5] A survey of the European Molecular Biology Organisation (EMBO) Long Term Fellows found that more than 75% were active in research, defined by whether they were publishing a decade after their fellowship.[6] A survey by the Swedish higher education authority published this year found that 30% of the newly starting PhD students in Sweden hailed from abroad and of those who had passed their PhD-examination, about half were still living in Sweden five years after completing their PhD.[7] Sweden has a tradition of a high proportion of their MDs undertaking PhDs.[3-5] This study attempts to describe how the careers of Swedish medical graduates who undertook a PhD developed, with emphasis on whether they continued with research.

MATERIALS AND METHODS

Details of Swedish biomedical PhDs are provided in structured announcements in the Swedish Medical Journal (Läkartidningen). The information also includes the name and country of the primary external examiner. I surveyed the announcements for the years 1991 and 2000. To identify those who were medical graduates, listings of registered doctors in Sweden were manually consulted.[8-10] In cases of common names, the date of birth provided a unique identifier. The years of cohorts were chosen so that the doctors' careers could be expected to have stabilised. They would have had a chance to complete their specialist training and reach "attending" ("consultant") status but not too many would have retired or died. The most up to date location and type of work (such as teaching hospital, general practice, pharmaceutical industry) were identified. A Medline (PubMed) analysis was performed of the

publications in English listed under the names (name and initial) of each person using the function for the last three years. Those identified in this way were considered by definition to be active in research. An output of three or more papers was considered to indicate a higher level of output. Because of name redundancy, to avoid overestimating the number publishing or the number of publications per name, each of the entries was checked for consistency of the research topic and co-authors, though because a person may change research direction after completing a PhD this methodology runs the risk of underestimating those still active. Statistical analysis used the GraphPad on line system (at http://www.graphpad.com). The results are shown in Tables 1-3.

RESULTS

Demographics. Overall 255 MDs in 1991 and 264 in 2000 were identified to have undertaken a PhD. The age distribution was skewed towards the older end in the 2000 than 1991 cohort (Table 1). In both 1991 and 2000 there was a subgroup (about 20%) of MDs who did their PhDs before completing their full registration with the Swedish General Medical Council (Socialstyrelsen). They did not differ in proportion, sex or age distribution between the two cohorts. They had the same median age of 31 years. For those who did their PhD after obtaining registration the median age (range) was 39 (29-60) in 1991 and 43 (29-61) in 2000.

Academic activity. About 70% of both those examined in 1991 (178/255) and in 2000 (184/264) were actively publishing in English during the last three years. Four persons were identified as professor (all in the 1991 cohort), and there were 27 chiefs of service in the 1991 and nine in the 2000 cohort. Such relative numbers would be expected and supports the validity of the databases. Overall, there were more doctors with three or more publications and 10 or more publications in the 1991 cohort than the 2000 cohort (p=0.003 and 0.0001, respectively) and less with only one single publication (not

Table 1. Demographics of the MD-PhDs of 1991 and 2000.

	Year of PhD	
	1991	2000
	n=255	n=264
Female n (%)	47 (18%)	88 (33%)
Age (years): median (range)	37 (24-60)	41 (26-61)
Number (%) aged >45 years	21 (8%)	67 (25%)
Number (%) aged >50 years	7 (3%)	25 (9%)
Number (%) who achieved registration after PhD	45 (18%)	51 (19%)
Female: n (% of this subgroup)	7 (16%)	10 (20%)
Age (years): median (range)	31 (24-43)	31 (26-44)

Table 2. Distribution of MD-PhDs who had publications in English during the last three years [178 of 255 (70%) and 184 of 264 (70%) in 1991 & 2000, respectively] as categorised by one, three or more or 10 or more publications, set out by gender and cohort.

	1991			2000			Comparison of Totals
	Female	Male	Total	Female	Male	Total	p-value
n (%)	35 (20%)	143 (80%)	178 (100%)	62 (34%)	122 (66%)	184 (100%)	1.0
Publications							
One only	6 (3%)	14 (8%)	20 (11%)	13 (7%)	17 (9%)	30 (16%)	0.17
Three or more	29 (16%)	103 (58%)	132 (74%)	37 (20%)	72 (39%)	109 (59%)	0.003
Ten or more	8 (4%)	38 (21%)	46 (26%)	4 (2%)	14 (8%)	18 (10%)	0.0001

Table 3. Location of working (2009) in relation to city where the PhD was examined.

	Year of PhD	
	1991 (n=255)	2000 (n=264)
Same university hospital system	139 (55%)	156 (59%)
Same location – other service [a]	41 (16%)	42 (16%)
University hospital elsewhere	35 (14%)	17 (6%)
Other service elsewhere [a]	33 (13%)	44 (17%)
Retired, abroad or insufficient information	7 (3%)	5 (2%)

[a]) (incl primarily another hospital, but also general practice, private practice, company doctor, pharmaceutical industry, consultancy)

significant at p=0.17) (Table 2).

Location. The majority of the members of both cohorts still worked in the same general location but there was a significant difference in those who had moved elsewhere (Table 3). In the 1991 cohort, out of 68 MDs who had moved to other locations, 35 were in other university hospitals and 33 in other forms practice (mainly hospitals) while out of the 61 MDs in the 2000 group, 17 moved to university hospitals and 44 to other institutions. This difference in pattern was statistically significant (p=0.008), though the numbers are small. Recruitment to the pharmaceutical industry was about the same, at five persons in 1991 and four in 2000. Taken as a whole, 70% (180) of the 1991 cohort and 75% (198) of the 2000 cohort remained in the same general location as where they had undertaken their PhD.

Internationalisation. A survey of biomedical theses in 2008 found that 50% were examined by foreign external examiners, with the majority from the USA, UK and the other Nordic countries.[5] Here, 95 (37%) of the external examiners came from abroad in 1991 and 106 (40%) in 2000. In 1991, 11 were from the USA, 16 from UK and 52 from the contiguous Nordic countries (Norway 22, Finland 16 and Denmark 14) and the other 16 from seven countries. In 2000, there were 18 from USA, 26 UK and 42 for the contiguous Nordic countries (Norway nine, Finland 14 and Denmark 19) and the other 20 from 12 countries.

Analysis by gender. Women candidates comprised 47 (18%) of candidates in 1991 and 88 (33%) in 2000, a significant increase and consistent with secular trends. The comparatively small number of women and their almost doubling in number between 1991 and 2000 makes analysis based on gender uncertain. There was no significant difference in age distribution between men and women (data not shown). In the 1991 cohort, five of 27 chief positions were held by women, and in 2000 one of nine; the four professors were all male. Of the external examiners seven (7%) and 15 (14%) were women in 1991 and 2000, respectively. These figures are consistent with increasing female presence in higher echelons and supports the validity of the databases.[11]

There was no significant difference between 1991 and 2000 with regards to women who had or had not published in English during the last three years (35 vs. 12 compared with 62 vs. 26, p=0.69). The same was true for men (143 vs. 65 compared with 122 vs. 54, p=0.91). The pattern for three or more and 10 or more publications could be interpreted that the smaller number of women persisted more with publishing than their male counterparts but the differences did not reach significance.

Though the proportion of women candidates who had female examiners increased from 13% in 1991 to 20% in 2000, neither reached statistical significance when compared with the behaviour of men who also increasingly used female examiners (in 1991 – six out of 47 women compared with 15 of 208 for men, p=0.24; and in 2000 – 18 out of 88 compared with 21 out of 176, p=0.1). The changes probably reflect a combination between an increasing availability of women qualified to examine doctoral theses and choice of topics of study, though a preference for women to be examined by women cannot be excluded but is less likely.

DISCUSSION

The primary aim of this study was to ascertain whether MDs who undertook a PhD subsequently continued with research. The study used information readily available in the public domain. It did not rely on completion of surveys that could be subject to some selectivity and might be biased towards more successful doctorates. At the same time, the process runs the risk of missing or confusing doctors with common names who have changed fields of research or missing women who changed their surnames as a consequence of marriage. Nevertheless, the number of persons deemed active in research by publishing was found to be high at 70%, consistent with a lasting effect of the PhD-process. This compares well with the report that nearly 77% of EMBO Long-Term Fellows were actively publishing 10 years after their fellowship (88% of those who responded to a postal survey) in view of the high status of and competition for those post-doctoral fellowships and the high degree of funding provided to the fellows.[6]

The number of women and the change in their proportion makes the gender analysis uncertain but the overall pattern is consistent with an increased presence of women at the higher career levels.

Most people want to live and work in their own land. Sweden has a small population (nine million) and a big area (Europe's third largest country after France and Spain). It has limited resources for research, and biomedical research is found in only a few (less than 10) cities. Mobility can be restricted because only rarely can a job for a partner be arranged. This may explain the high proportion (70-75%) of these professionals that remained in the same general location as where they undertook their PhD. Nevertheless, the pattern between the two cohorts appears to be different in one area: of those who moved away a smaller proportion had moved to other universities in the more recent cohort. This could be owed either to lack of funding to attract researchers or to different selection processes. Another explanation could be that the distances between universities requires a move and cannot be handled by long-distance or weekend-commuting (which has become popular in Sweden during the past 20 years or so). The level of mobility in other countries is not well documented, but it is generally held that it is rare for an MD-PhD in USA and Anglo-Saxon countries to be able to remain where they did their research degree. Using a listing in time gives only a snapshot – we cannot see the whole picture – and doctors spending a year or two abroad on a fellowship may not bother to update their address, but if reduced ability to move to another academic institution were to be confirmed for the new millennium (i.e., not a chance occurrence for the year of 2000), this may represent a reduction in opportunity.

The examination of Swedish PhDs is internationalised.[5] In these cohorts about 40% of the examiners were from abroad, which compares with 50% in 2008 for a mixture of MDs and non-MDs.[5] The decrease in examiners from the Nordic countries with an increase from USA and UK may reflect changes in cost of travel during the decade. Doctors, dentists and veterinarians represent an attractive talent pool to recruit scientists from because not only is their basic training both wide and specific, in addition these graduates have a natural career path back to clinical practice after their PhD and so look after themselves.[12]

The median ages at PhD of about 37 and 41 years fits with surveys from midway between these cohorts that reported an average age of 40 years for MD-PhDs, with 35 years for those who had not yet completed their specialist training and 30 for those submitting from a pre-clinical research department.[2,3] Nevertheless, comparison between the two cohorts studied here, which are spaced by a decade, revealed an aging cadre. Though the median age of the two groups only rose by four years, nevertheless the spread increased considerably, with a skewed distribution of a long tail towards the older end in the 2000 cohort. The pattern of age distribution and timing of the PhD during their career is consistent with most candidates undertaking a PhD as a "rite-of-passage" rather than as a starting point.

In conclusion, it is encouraging that such a high proportion of Swedish MD-PhDs continue to be active in research as judged by publications in English during the last three years. At the same time, the change in the distribution of those publications, taken together with possible lack of mobility to other universities, may signal possibly shrinking career opportunities. A detailed official, ideally pan-European, survey is needed at least in 2020 and preferably sooner.

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Teaching Anatomy and Pathology using MP3 Audio Tours at the Leiden Museum for Anatomy and Pathology

Peter G.M. de Jong[1], Ph.D., Alien W. Riedstra[1], M.A., Luuk N.A. Willems[2], M.D., Ph.D., Jan H, Bolk[3], M.D., Ph.D.

[1]Center for Innovation in Medical Education
[2]Department of Pulmonology
[3]Department of Internal Medicine
Leiden University Medical Center
P.O. Box 9600
2300 RC Leiden
The Netherlands

Keywords: podcast, anatomy, pathology, E-learning

Phone: (+) 31-71-526 8362 Fax: (+)31-71-526 8260 Email: p.g.m.de_jong@lumc.nl

ABSTRACT

This paper reports the development of an audio tour through the Museum for Anatomy and Pathology at Leiden Medical School. Hands-on teaching in Anatomy and Pathology is decreasing and unfortunately faculties do not have enough time to provide small group teaching using the outstanding collection of the museum. With the audio tour students can study specific topics and materials in an individual way without the need of intense faculty support. The study shows that audio tours are an effective way to make an existing collection of specimens accessible to students.

INTRODUCTION

Anatomy and Pathology are two fields that are an essential part of education in the basic medical sciences. In former times, anatomy was taught to a great extent during the first years of Medical School. The Anatomic Theaters in the sixteenth and seventeenth century are still famous. Dissection sessions on human cadavers remained very popular in the educational program for many years. They give the student a good insight in the body structures in normal as well as pathological situations.

In recent years the Dutch medical curricula have tended to become more integrated and patient oriented.[1] In that process, the attention paid to the basic sciences of Anatomy and Pathology has decreased, resulting in less hands-on time for the students. This reduction of hands-on teaching in dissection courses has caused great concern with many faculties. [2] After all, anatomy is typically one of the things that have to be seen in reality to provide students a well developed three-dimensional insight of organs and structures inside the body.

At the Leiden University Medical Center a brand new building for (bio)medical education has been opened in 2007, which incorporated the former Museum for Anatomy and Pathology . The new museum is a bright and modern two-floor facility. More than 800 specimens of the human body are displayed in five glass cabinets. Each cabinet refers to a phase of life ranging from fetal life to the elderly. Inside the cabinet one panel shows healthy specimens and 7 panels show pathology. The museum also offers examples of diseases and abnormalities, which are rare today and can not be observed in other ways. The arrangement of the topics is based on the system of Underwood.[3] Touch screens provide further information about the specimens displayed.

In this study we have developed a method to compensate for the decreasing hands-on teaching in Anatomy and Pathology by using the outstanding collection of the museum. Unfortunately, faculty members do not have enough time to provide small group teaching in the museum. In order to make the existing collection accessible to our students in another way we have

developed audio tours. With this modern learning tool students can study specific topics and materials in an individual way without the need of intense faculty support. The technique brings Anatomy and Pathology back to life and, in this respect, we think the Museum for Anatomy can be a very valuable addition to the students' education.

Definition of an audio tour

In an audio tour, a traditional guided tour through a museum is replaced by a voice recorded tour to be listened to on a personal audio device. An audio tour is a collection of audio tracks. Each track refers to a specific specimen in the museum, relevant to the course. In the tracks, a narrator indicates and explains specific details the students have to notice. In case the text contains questions or assignments to be solved by the students, the tour is defined as an interactive tour.
Students use the audio files with their personal audio device. This can be a tape player, portable CD-player, MP3 player, mobile phone, PDA, or laptop computer. With the device they visit the museum at pre-scheduled appointments. The audio tours guide the students through the museum. Audio tours have a highly individual nature. Each user can listen to the audio tracks at his/her own pace and in any sequence desired; they can also repeat or skip specific parts of the tour.

MATERIALS AND METHODS

In this study we have developed audio tours for the first year course "Respiration" and the third year courses "Abdomen" and "Thorax". These three multidisciplinary courses are coordinated by faculty members of the department of Internal Medicine. Several anatomists and pathologists are involved in the educational activities during these courses.
First the course directors selected several appropriate specimens in the museum. A commentary was developed emphasizing the details of each specimen including educational comments. In the audio tours "Respiration" and "Thorax" several questions were added to the script to be answered by the students while observing the specimens. The answers to the questions were published on Blackboard afterwards. The text was recorded on a digital voice recording device. All audio files were converted to the MP3 format and uploaded to the learning environment module of the specific course. For a summary, see Table 1.

The audio tours were integrated into the course program. Participation of the tour was voluntarily. In the first week of the course the students were invited to download the audio files from the learning environment and to visit the museum at scheduled hours. The course directors referred to the materials from the tour in their concluding lectures at the end of their course. The audio tours "Abdomen" and "Thorax" were evaluated with a short survey for basic evaluation purposes only.

Experiences

No technical problems were encountered in the preparation and administration of the tours. Students were enthusiastic about this teaching method. In total 133 students participated in the tours. Seventy-five percent of the students attending the tour used their own digital audio device. Most of them (80%) used an MP3 player for playing the files, while a few students used a cell phone, iPod or laptop. Most students in our setup (64%) preferred the informative tour, while only 31% of our students liked the interactive tour better. Students clearly stated that they would like to have more audio tours to be offered in other courses as well.

DISCUSSION

Like many other medical schools around the world Leiden possesses a large collection of anatomical and pathological specimens gathered together in a museum and its depots. The main users have always been a small group of faculty and students of Medical Schools. Nowadays the interest from faculty to use the unique specimens in their courses is rapidly increasing. With large numbers of students in a course it is almost impossible to show them all around under guidance of a faculty member. The newly developed audio tour concept responds to the request of visiting the museum without the need of many guides and supervisors. So in a modern curriculum where time spent on Anatomy and Pathology has decreased the use of audio tours in the Museum for Anatomy can bridge the gap.

The concept of the audio tours is not innovative in itself. Major museums around the world use spoken tours along paintings and statues using tape or digital audio devices. Using the audio tours in our Museum for Anatomy and Pathology, however, was quite innovative and not performed before. It created an opportunity to actually integrate the outstanding collection into our curriculum. Until that point the specimens were present but not accessible for students. Therefore the educational value of the experience is the simple fact that using the tours they do study dissected specimens in relation to the educational topics relevant at that moment. For the students it is an exciting and impressive experience which absolutely brings Anatomy and Pathology back to life.

Today's generation of students is very familiar with modern technologies.[4] Research shows that medical students have high access to computers, broadband internet connections, mobile phones and memory stick devices and those numbers are increasing every year. [5] Therefore it is strategically interesting to use students' personal devices in education. In our study we intentionally worked with the students' own devices. We anticipated that all students would have an MP3 playing device, but we found that this is not the case. Only 75% used a device they owned, all others used a device from a colleague student or friend. These data are consistent however with other studies in this field. [5]

Table 1. Summary of the 3 audio tours

Course	# Tracks	Total time	# Specimens	Interactive
Respiration (year 1)	15	11 minutes	17	Yes
Abdomen (year 3)	14	14 minutes	14	No
Thorax (year 3)	25	21 minutes	24	Yes

From our experiences we learned that for a 60 minute museum session an audio tour with about 20 minutes of spoken text and about 10 to 15 specimens is appropriate. It has to be realized that students have to find their way around the museum and that they must find the right specimen. Some students also might like to repeat some tracks for a better understanding. For a teacher the development of 20 minutes of spoken text takes about 2 hours of preparation. This includes orientation on the specimens, script writing and recording. The audio tour can be used for several years as long as the content of the course and the collection in the museum do not change.

Audio tours are easy to create. A voice recorder, a microphone and a sound editor are needed. This equipment is not very expensive and free editing software is available. We used an Olympus WS-320M digital voice recorder and the Audacity® Software (open source software). For recording the tracks a quiet environment is recommended to avoid background noise. In our museum the air-conditioning system generated too much noise to make good recordings. We changed to a silent office room to record. To help faculty to create audio tours themselves, a Twelve Tips checklist has been developed.

Audio tours are not meant to replace other educational instruments like dissection room, anatomical lessons and practical sessions, but are to be regarded as a complementary teaching instrument. Dissection of the human body still remains one of the most powerful means of learning anatomy, but is from an educational point of view a very complex process.[6] Audio tours are less complex and offer a much more standardized educational instrument.

Educational integration and timing of the tour in the course are important. Like with all other learning tools, the goals of using audio tours have to be well defined. To enhance the learning effect of the audio tour, teachers need to refer to the materials during their lectures. But if the tour is offered too early in the course the level of understanding might be insufficient. Finally it might be considered to assess the information from the tour in the concluding examinations by adding questions about several specimens from the tour.

Audio tours like we use in our museum can also be enriched with images to be delivered on iPod equipment. The Royal Veterinary College in London, UK has experiences with that technique.[7-9] Adding images of the anatomical specimens makes it easier to find the right specimen in the museum, which is one of the issues in our museum. Also specific structures in the image can be illuminated for better understanding of the audio. However not all students will have access to iPod equipment. If high device specifications like the graphic capabilities of an iPod are required, the institution has to consider providing the equipment to the students.

FUTURE DIRECTIONS

Audio tours will be developed for more courses in Medicine and Biomedical Sciences at the Leiden University Medical Center. Several are already under construction. For specific groups like guests of the Medical Center or the general public a general tour has been developed. This opens a way to display the scientific resources of the museum to a broader audience. For these guests of the museum centrally managed audio devices with pre-loaded tours are available.

CONCLUSION

Audio tours through the Museum for Anatomy and Pathology can be used effectively in the medical curriculum. The MP3 technology is easy to use and no problems were encountered in developing or performing the tours. The audio tours are highly appreciated by the students. It offers them the unique opportunity to view scientifically and educationally invaluable specimens related to their actual basic science education. Students indicate that they would like audio tours to be offered in other courses as well. Audio tours provide the faculty an opportunity to use the interesting materials in the museum to partly compensate for the decreasing time available for Anatomy.

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Improving First-year Medical Student Performance with Individualized Learning Strategies

Susan Kies*[1], Ed.D, Adam Martinsek[2], Ph.D.

[1]University of Illinois College of Medicine at Urbana
Urbana, Il 61801
[2]University of Illinois
Department of Statistics
Urbana, Il 61801
USA

*Corresponding author

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Phone: (+) 1-217-333-5222 Fax: (+) 1-217-244-4444 Email: kies@illinois.edu

ABSTRACT

Despite the greatest efforts of our Admissions Committee, every year students are admitted to medical school who, despite their excellent applications, start medical school and perform poorly when faced with the rigors of the first year (M-1) curriculum. As the pace of medical school studies ramps up with the unfolding semester, some of these students develop serious academic deficits. At the University of Illinois at Urbana-Champaign, faculty have questioned the student understanding of their personal learning systems and have found many students have not developed learning strategies that lead to efficient and effective learning.

The goal of this study was to apply statistical analysis to M-1 student performance data for one academic year to determine the impact of the Lifelong Learning Strategies course on M-1 students who had performed poorly on the initial examination.

Students were enrolled in a 6-week course and their performance during their M-1 years was compared to those who were not enrolled in the course. Analysis of the change in performance included t-Test comparisons of group performance.

The Lifelong Learning Strategies course appears to have a positive impact on student academic performance.

INTRODUCTION

The purpose of medical education is to prepare competent and confident physicians. With rapid advances in medical research and the ever-burgeoning body of literature it generates, the requirement for effective continuing medical education is already in place before a license to practice is issued. The outsized demands of acquiring, organizing, assimilating, and integrating relevant information into applicable knowledge indicates that the success of a medical practitioner depends in no small part on his or her mastery of personal lifelong learning strategies. Medicine is a profession in which information overload must be considered an occupational hazard, and that hazard begins abruptly in the first year of medical school. Every individual's learning style is highly personal, and is shaped by a unique combination of perceptual and cognitive factors. There is no reason to believe that students can, without training, intuitively grasp and apply effective learning strategies toward that end; however, this is precisely what traditional medical education tends to demand of them. As first-year (M-1) medical students struggle to discover how to cope with unprecedented educational demands, their academic performance may suffer. Such performance problems are usually compounded by high levels of accompanying stress. Furthermore, even students with learning strategies that were effective in secondary school and undergraduate coursework often experience excessive levels of stress from the typical first-year medical curriculum[1-5]. Several studies document how that stress increases throughout the

year[1, 6-9]. When students matriculate they are in need of guidance to successfully navigate the new educational demands placed on them by the stresses of training and future career.

In order to address the issues summarized above, the College of Medicine at the University of Illinois at Urbana-Champaign (UIUC) in August 2006 offered its inaugural Lifelong Learning Strategies (LLS) class — a short course developed to help first-year medical (M-1) students quickly discover and optimize their own individual learning strategies, including lifestyle choices, to help them reduce stress and its related impact on academic performance.

MATERIALS AND METHODS

It was hypothesized that first-year medical students who participated in LLS would significantly improve in academic performance compared with students who chose not to take the class. In conjunction with the first offering of LLS, the Office of Academic Affairs designed and executed a statistical study for the purpose of testing that hypothesis. The goal of this study was to determine the impact of the LLS course on those M-1 students who had performed poorly on the initial examination of the first year.

The LLS course was developed as a treatment for a group (i.e., M-1 students) at elevated risk of poor academic performance related to coursework demands, information overload, and associated stress. LLS addresses four major themes of lifelong learning in the medical environment:

- adult learning
- time management
- organizing techniques
- personal balance.

During orientation week, August 15-18, 2006, new M-1 students matriculating to the Urbana, Illinois, campus were given a brief description of the LLS course and invited to enroll at that time. Students were informed that this was their one opportunity to enroll in LLS, and that attendance was expected for every class session regardless what other conflicts or issues might arise. The first session was held during the first week of M-1 coursework.

The course was designed to present fundamental guidance in lifelong learning strategies along with access to a considerable amount of supplementary information for self-guided skills development. The core information was presented in 9 forty-minute sessions, twice a week for six weeks, then once per week for the last three weeks, during August and September 2006. Using a framework based on the four lifelong learning themes, previously noted, College of Medicine faculty and guest experts led the classroom sessions. In addition to this baseline course content, students were given a printed booklet, the "Lifelong Learning Strategies Guidebook," to reinforce and expand upon material covered in the classroom sessions; and access to a dedicated LLS web page hosting related research papers, external links, and other self-development instruments. (It should be noted that the College of Medicine provided the entire M-1 student body access to the LLS web page, not just those participating in the course.)

The first priority of the course was to help students identify their personal learning process- whether visual, auditory, kinesthetic, or a hybrid style. The broader objective of the first three weeks was to help students learn how to successfully apply their individual learning style using proven time management and organization skills in preparation for the first examination. This examination is a two-day series of tests, administered to all M-1 students, covering the six basic science topics comprising the M-1 curriculum. Scores on the first exam count toward the student's class rank, but the main purpose is to acquaint new students with the style, depth, and breadth of test questions in the M-1 curriculum and how they relate to the learning material. The LLS lessons covered strategies on how to manage time and effort with respect to the specific subject as well as its relative weight toward class rank on the first exam. After the first exam was completed, the remaining LLS sessions focused on the role of stress management, health, and personal balance in the life of medical students and the career physician. The Lifelong Learning Strategies (LLS) course deals with key topics for first-year medical students.

The Adult Learner addresses issues regarding individual learning styles, the best practices for learning within each style as well as issues related to accommodation as it is related to learning disabilities. The learning styles component presents three commonly used learning styles and various instruments used in determining them. The course primarily explores the Visual/Auditory/Kinesthetic (VAC) System, but also introduces Kolb's Learning Inventory and Howard Gardner's Multiple Intelligences. After identifying their individual learning styles, students are then presented techniques that directly and efficiently support their particular style.

Time Management introduces a variety of time management tools and resources, and provides tutorial activities to help familiarize the students with those tools. Students also learn how to work efficiently with teaching assistants, how to interact with professors, and the types of supportive resources available within the structure of the campus. These include resources found at the Counseling Center which include psychological counseling, study skills coaching, and testing for learning disabilities.

Learning Organization assists students in the techniques of organizing high volumes of materials and assimilating them into long-term memory. Emphasis is directed at efficient reading, note-taking, classroom behavior, the study environment, and motivation.
Managing Stress and Test Anxiety addresses life balance, understanding cues in their own behavior that may indicate

they should seek assistance, introduction to meditation, and support resources.

The Role of Examinations throughout a Medical Career introduces testing issues encountered by undergraduate medical students, residents, and practicing physicians. Emphasis is placed on preparation for The United States Medical Licensing Examination (USMLE) Steps 1 and 2, as well as subject examination preparation.

The syllabus for the inaugural six-week LLS course, August – September 2006, is shown below. The course was taught over six weeks, during the first three weeks there were two meetings per week and during the second three weeks, the class met one time per week. Presentations lasted approximately forty to forty-five minutes, giving students the time to get food or go to their locker after morning classes.

There were no class assignments. Students were asked to attend class and were given a book of materials that supplemented the topics presented in class. They were also referred to the web page that contained additional links to on-line instruments and additional materials. The idea behind this step-wise presentation of material was to supply those who were particularly interested in a certain topic with resources, but not to inundate busy students with materials that had only a superficial interest level. The subjects of this study were drawn from an eligible group of 101 traditional-track, full-time M-1 students who matriculated to the Urbana campus of the University of Illinois in August 2006. Students excluded from this study were those not on a traditional track, namely repeating students, those who upon failing a course or learning component within the curriculum, must re-take the entire year's curriculum; students enrolled in the Decompressed Program, students who spread the first year courses over two Academic Years; and, students participating in the Medical Scholars Program, students who pursue both the MD and PhD degrees. As indicated previously, initial performance data were acquired at week 3 of the first semester, when the first exam was administered. The subjects of our analysis were those eligible M-1 students who performed in the bottom forty percent of the class on the first examination. These subjects were divided into two groups: those who had enrolled in the LLS course (LLS, n=74) and a control group consisting of those who did not enroll (N-LLS, n=27.) The Institutional Review Board (IRB) approved a study to analyze performance changes in both groups, as based on class rank after the first exam versus class rank at the end of the academic year.

Performance comparisons of the study and control groups were based on a "Change" metric, defined as the difference in mean performance by each group over time. The Change variable is calculated by subtracting the student's score on the first examination from his or her score on the end-of-the-year examination. Subtraction of the score on the first examination in effect establishes an equivalent performance baseline for all students and thereby focuses on the amount of change rather than absolute scores. Because students made the choice to enroll in the course, establishing this baseline also controls to some extent the self-selection bias among the subjects that is inherent in studies of this type. A sample t-Test, assuming unequal variance, was performed to compare the two groups using Microsoft Excel, with the results being confirmed using SAS.

RESULTS AND DISCUSSION

When assuming unequal variances in the distribution, there was a significant difference in the Change variable, P = 0.05 for a one-sided test. A one-sided test is appropriate because we are testing the hypothesis that taking the LLS course is beneficial. The result indicates that students enrolled in the LLS course achieved a significantly greater average increase in performance than the control group by the end of the year (Table 1). Observations regarding student performance are shown in Table 2. Of particular interest were the findings where 50% of the LLS students began the year at the bottom 40% of the class and improved their scores, with some of those students even moving into the top 20% of the class by the end of the first year. The opposite trend was noted on those who did not take the course, with 33% of those students moving in a downward (lower performance) direction.

Table 1 t-Test: Two-Sample Assuming Unequal Variances

	LLS	*N-LLS*
Mean	2.932	1.037
Variance	27.981	22.465
Observations	74	27
Hypothesized Mean Difference	0	
df	51	
t Stat	1.723	
P(T<=t) one-tail	0.0455	

Of all students who enrolled in the LLS course, only 16% were in the bottom performance quintile at the end of the fall semester. When comparing the top of the class performance (student performance in the top 20% at the end of the year), 74% of those students enrolled in the LLS during the Fall.

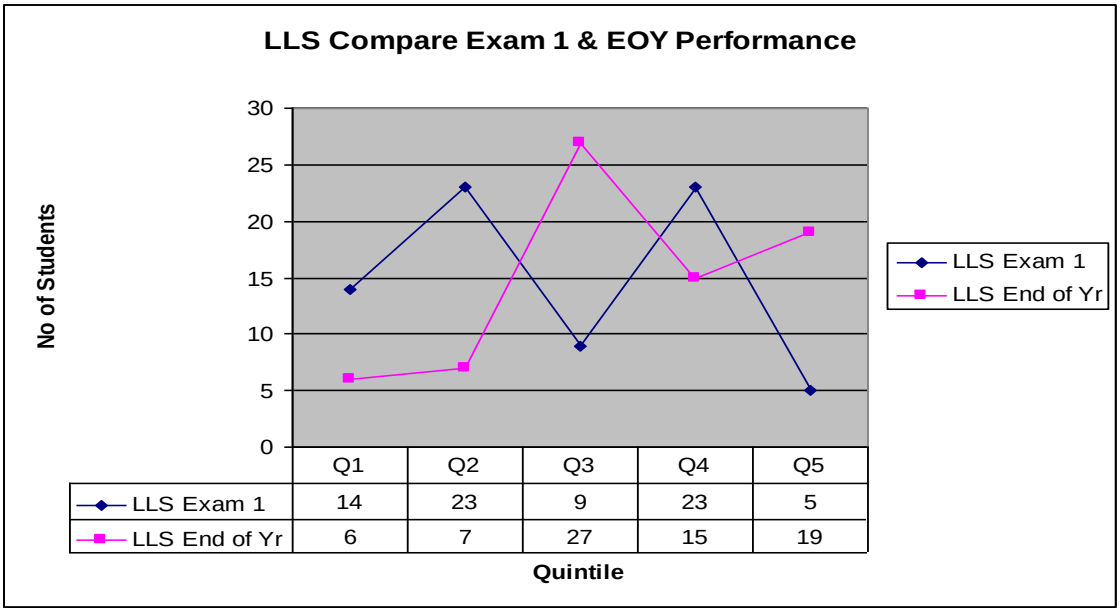
Lifelong Learning Strategies: Syllabus

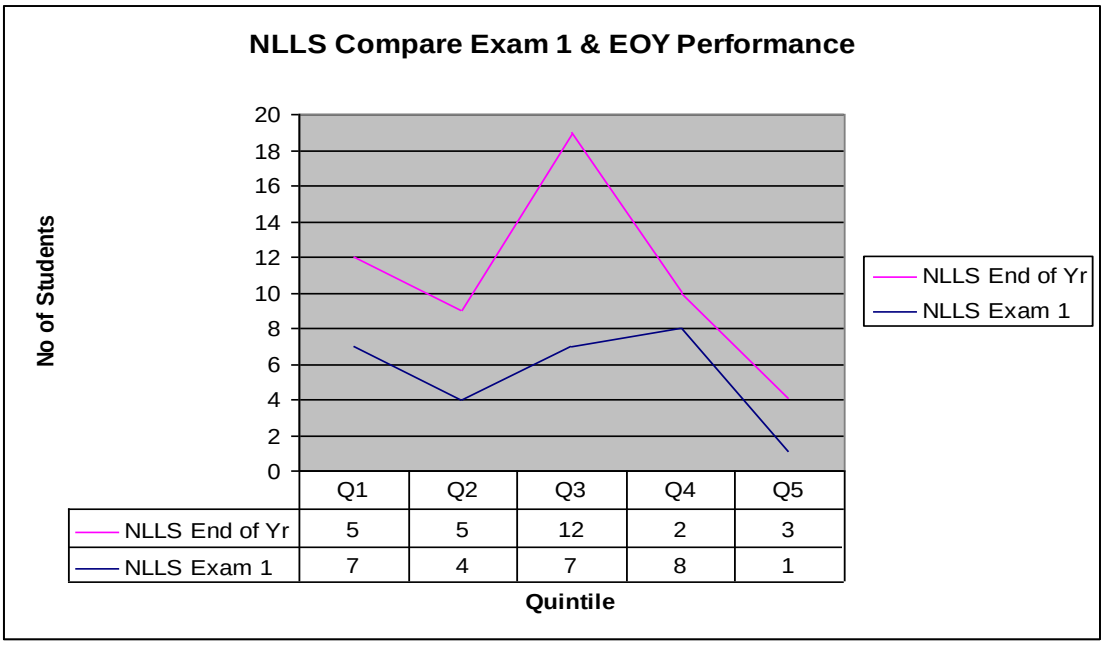
Week 1 8/23; 8/25	**The Adult Learner**
	Americans with Disabilities
	Learning Style Inventory
	Learning Pyramid
	Best Practices for Each Learning Style
	Myers Briggs Type Inventory
Week 2 8/30; 9/1	**Time Management**
	Tools and Resources
	How to Communicate with Teaching Assistants
	Working with your Professor
	Resources Available on Campus
Week 3 9/6; 9/8	**Learning Organization**
	Techniques for Organizing Hi Volume Materials
	Long Term Memory
	Reading Efficiently: Tips and Strategies
	Classroom Performance: Note Take/Concentrating
	Study Environment
	Staying Motivated
Week 4 9/13	**Managing Stress and Test Anxiety**
	Life Balance: Taking Care of Yourself
	Sleep/Nutrition/Exercise
	Meditation
Week 5 9/20	**Balance Continued: Mind Stages**
	When to Get Help
	Help Resources Available
Week 6 9/27	**Role of Examinations throughout a Medical Career: Setting Yourself up for Boards, USMLE Step 1**
	How Tests Figure into Your Work Now and Later
	The Role of the Library
	Tour of Library

The LLS course was received enthusiastically by the M-1 student body. Eighty-three students enrolled in the inaugural course, not including those from the full-time traditional track, those in the Decompressed Program, and those in the Medical Scholars Program (M.D./Ph.D.) Participation throughout the course was sustained at 95%, and those who were unable to attend sought out information in other formats. When the course was completed, all students were given the opportunity to evaluate the course with an on-line evaluation instrument. Students were encouraged to provide specific comments. This evaluation of the course was well attended, with 55% of the class responding to the instrument and including very positive and constructive critiques.

An important incidental interest to the researchers would be a study of the characteristics of students who declined to enroll in the LLS course. Students who re-entered the first year curriculum, who had previously demonstrated serious academic difficulty, such as those who participated in the Decompressed Program (n=3) in the previous academic year (2005–2006) and those students who had to repeat the M-1 year (n=2) and did not elect to enroll in the course. Perhaps the unwillingness to utilize resources offered by the College of Medicine partially contributed to the student academic difficulties. (However, had they chosen to enroll in the course, since their course of study would have been different from those who were 'first time' curricular participants, they would have still been excluded from this particular study.) Although the number of students with serious academic difficulties is limited, it would be interesting to see the impact the LLS course would have on their performance as well. In particular, following these students and their performance on board exams, number of attempts on boards, years to graduation, and performance during the clinical curriculum, would be helpful in future advising students with academic problems.

Table 2. Performance Comparisons of LLS and N-LLS on Exam 1 and Mean Score at End of Year.





The second year the LLS course was offered, several changes were made, based on recommendations from student and faculty feedback. First, course content, deemed important by the students and faculty, was presented during the Orientation week in August 2007 and was presented to all matriculating first year students. Also, the placement of the LLS course on the calendar was changed. The course was moved to a date after the first examination results were made available to students. This allowed students to first see how they performed on an examination and allowed them to make a more informed decision before committing time to this course. Another improvement in the course was offering the course for elective credit with the stipulation that in order to earn credit students must attend all classes without exception.

CONCLUSION

The results of the statistical analysis indicate that participation in the LLS course had a significant positive impact on student performance during the first year of medical school. LLS students, whose performance on the first examination was poor, significantly improved their scholastic performance by the end of the year, when compared to those who did not take the course.

Based on this research, the authors plan to study the long-term impact of the LLS course on the students and the strategies developed by these students as they continue their training and progress through residency into medical practice. Continuing effort should be made to refine the lifelong learning strategies presented in the course based on both student and faculty input.

Medical schools planning to develop a similar course would be well informed to encourage faculty participation from across several disciplines including education and psychology.

LIST OF ABBREVIATIONS

LLS: Lifelong Learning Strategies (course)
M-1: Medical Student, year one
Q-1: Quintile 1, the lowest performing group on an Examination
Q-5: Quintile 5, the highest performing group on an Examination

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Feasibility and Acceptability of a Technology-Based Geriatric Training Program for Third Year Rural Medicine Students Web vs. PDA use in Rural Medicine Clerkship

Marisol Sanchez-Lance*, D.O, Richard Sims, M.D, Kathryn L. Burgio, Ph.D., Lesa Woodby, Ph.D.

Division of Gerontology, Geriatric Medicine, and Palliative Care
Department of Internal Medicine
University of Alabama at Birmingham
201 Ch 19-933 19th Street, Room 219
Birmingham, AL 35294-2041
USA

*Corresponding author

Keywords: rural clerkship, web, PDA, geriatrics

Phone: (+) 1-205-934-9261 Fax: (+) 1-205-934-7354 Email: mlance@aging.uab.edu

ABSTRACT

Purpose: The purpose of the project was to examine the feasibility and acceptability of a technology-based geriatric training program for third-year Family Medicine (FM) students.

A one-group, pre-post intervention study was conducted between 2004 and 2005. Participants were 24 third-year medical students , assigned to rural FM practices, in which at least 30% of the patients were 65 years of age or older. Students were taught to access *Geriatrics at Your Fingertips* and other geriatric assessment tools, using internet and Personal Digital Assistant (PDA)-based formats. Case studies were reviewed to illustrate their utility. Students were emailed weekly for progress reports and electronic logs of their older patient encounters. Students completed baseline questionnaires to assess their familiarity and comfort level using internet and PDA. After the rotation, they completed questionnaires about the helpfulness and feasibility of using this educational technology.

At baseline, all students felt confident using the web and 96% felt confident using a PDA. These results remained unchanged after the rotation. After the intervention, 96% used the web to access medical information, and 100% used a PDA. Almost all of the students reported that geriatric assessment modules on the PDA enhanced their diagnostic and assessment skills for older patients; while 46% were undecided or felt that the web-based modules were not feasible in a busy rural practice.
Technology-based geriatrics education in rural FM practice is feasible and acceptable to third-year students. Geriatric assessment modules on the PDA were perceived to enhance older adult encounters at the point of care.

INTRODUCTION

An August 2000 survey of course and clerkship directors revealed that the current University of Alabama School of Medicine (UASOM) curriculum includes only about 24 hours (or < 1%) of instruction that is aging-related.[1] In addition, 30-40% of senior medical students completing the Association of American Medical Colleges 2000 Medical School Graduation Questionnaire indicated that instruction devoted to long-term care, geriatrics, and palliative care was inadequate. Few practicing physicians are prepared to manage geriatric syndromes and diseases associated with aging or to recognize the heterogeneity of function and physiology in normally aging adults. In addition, demands on medical school faculty for increased productivity and greater reliance on community-based preceptors to provide outpatient clinical learning opportunities pose formidable challenges as medical

schools strive to fulfill the requirement of the Liaison Committee on Medical Education that all medical students receive an equivalent educational experience and achieve the same core competencies. [1]

In response to this growing need, we integrated geriatric education into the Family Medicine (FM) clerkship, a required four-week experience taken during the third year of the UASOM curriculum. The purpose of the clerkship is to provide third year medical students with an understanding and awareness of the broader social context of health in the community by focusing on health-related issues of Alabama's rural population. Most of the practices in the rural communities where the medical students rotate are distant to hospitals and do not have immediate access to emergency services or other medical resources. Medical libraries and frequent interaction with specialists are typically not available in these remote areas, which place great demands on the family physician scope of knowledge. Medical students rotating through FM in rural sites therefore encounter challenging cases about whom they may wish to obtain more information than is typically available. Thus, this clerkship represented an ideal opportunity to employ distance-learning techniques, based on principles of geriatrics assessment. The education program we developed was designed to provide students with resources to assist in the diagnosis and treatment of geriatric patients.

The primary aim of this educational project was to evaluate the feasibility and acceptability of PDA and web-based technology as a diagnostic and management tool for medical students caring for older adults in rural settings. Therefore, we made geriatric educational modules available through Personal Digital Assistants (PDAs) and laptops with internet access, to provide the students with the aging-related medical references and information they currently lack in these outlying areas. With the use of technology at the point of care, we implemented a training program to improve geriatric education and ensure that all students had consistent exposure to important geriatric issues.[16]

MATERIALS AND METHODS

This project was approved by the institutional Review Board for Human Use.

Participants and Setting

Between November 2004 and August 2005, we recruited 24 third-year medical student volunteers who were assigned to preceptors with large geriatric patient populations (i.e.>30%) during their FM clerkship in rural sites. All students received lap-tops and PDAs and a seventy-five dollar monetary stipend for their participation in the study. A letter was sent to the FM preceptors in the rural sites requesting their permission to allow the use of PDAs and laptops by the medical students assigned to their practices. References for the geriatric assessment materials were made available to the preceptors upon request.

Letters were also sent to potential medical student research participants. The letters specified the monetary compensation for participation in the study and the meeting time and location during Orientation Day for the FM clerkship.

On Orientation Day, the Principal Investigator (PI) conducted a formal presentation to all students in the clerkship regarding the purpose and procedures related to the study. They were made aware that participation in the study was strictly voluntary and would not affect their grades. After this, the students were given consent forms, and if they were agreeable with the terms of the study, the PI enrolled them for the 4 weeks of clerkship. There were no exclusion criteria.

Assessments

On Orientation Day, student participants recorded their age, gender, prior medical background, and previous PDA and/or web exposure. At the end of the clerkship, the feasibility and acceptability of PDA and web-based technology was evaluated using self-administered questionnaires. Responses to the questionnaires were tabulated and summarized using descriptive statistics.

Educational Intervention

All students were provided with laptops and PDAs (2005 version, Palm Operating System OS) for the duration of the study. We evaluated the student skill level in using the internet and PDAs and as needed, provided additional training. Specifically, we taught the students to access the print version, the web version and the PDA version of *Geriatrics at Your Fingertips*[2] (GAYF) (2004-2005 version, American Geriatrics Society) thereby allowing access to information about diagnosis, evaluation, and treatment of the most common geriatric syndromes at the bedside. Assessment instruments to evaluate the patient memory, mobility, mood, pain intensity, and function were also made available at the point of care. Additionally, the students were taught to access Epocrates[3] (2004-2005 version) on their PDAs. Epocrates is a software program with over 3,000 brand and generic drugs. The students accessed drug dosing, potential drug interactions, and drug pricing using this program.

Our educational objectives encouraged the students to use the GAYF, which includes information about age-related physiologic changes, formulas, and specific assessment instruments for disorders affecting the aging population. In the event of technological failure, the medical students had GAYF in book format. We worked closely with the University's Office of Curriculum Development and Management and the Department of Information Technology, which assigns all students internet-accessible e-mail accounts in their freshman year. We

communicated closely via e-mail with the students to answer questions, monitor their progress, and guide them through potential difficulties with software and/or hardware use.

Once GAYF was loaded onto PDAs and the lap-tops, a feasibility study of our information technology was conducted: Three case studies on dementia, depression, and renal failure from the *Geriatrics Review Syllabus*[4] that utilized assessment instruments to evaluate geriatric syndromes were selected. The Syllabus is a publication of the American Geriatrics Society with 59 chapters and clinical cases, covering the prevailing management strategies for the older adult. Small group discussions were then held to discuss the case studies that utilized assessment instruments available thru GAYF.

RESULTS

Characteristics of the Student Participants

Most participants were Caucasian females between the ages of 24-40 years (Table 1). Ninety-six percent of the students owned a PDA with 54.2% of them owning a Palm Tungsten. Seventy-one percent of the students owned a lap-top, of which 25% were a Dell brand. More than half of the students did not use the web or the PDA to access geriatric assessment tools before the intervention (Table 1).

Utilization and Feasibility of Medical Technology

We used a 5-point Likert scale to compare the pre- and post- attitudinal responses of the participants before and after the FM clerkship. At baseline, all students felt confident using the web and 96% felt confident using a PDA, and this was unchanged after the rotation (Table 2). Before the intervention, 87.5% of the students strongly agreed that using the web to access medical information was feasible. However after the FM rotation, only half the students strongly agreed that using the web to access medical information was feasible and practical. Before the intervention, more of the students stated that they preferred to use the internet rather than the PDA to access information. After they returned from their clerkship rotations, they all indicated a preference for using the PDAs to access aging-related medical information, and PDA use for this purpose grew by 12.5%.

Before the intervention, almost all of the students believed it was feasible to use the web to access medical information during clerkship training and more than half of them believed the assessment modules on the web enhanced their diagnostic and assessment skills pertaining to their older adult patient (Table 2). After our intervention, about half believed it was feasible to use the web to access medical information primarily because it proved cumbersome to carry the laptops from room to room. At baseline, all students believed it was feasible to use the PDA to access medical information during clerkship training, and this was unchanged after the rotation. In contrast, the number of students who believed that the assessment modules on the PDAs enhanced their skills increased from 58% to 96% after the rotation. Therefore, the students were better able to appreciate the value of geriatric assessment modules on the PDAs rather than on the internet after their rural FM rotation.

Evaluation of Field Experience

The majority of students felt that the educational experience built their skills in using web-based (71%) and PDA-based technology (83%) (Table 3). Few felt they had enough time to access information on the web in a busy rural practice, while all but one reported sufficient time for the use of PDAs (Table 3). The majority noted that the time invested in using the web was productive in their medical training, while all of the students felt that using the PDA was productive during their clerkship. (Table 3). After the intervention, about a third of the students could more readily access information from the internet than from GAYF in the book format, while 71% felt similarly about their PDAs . Most of the students (87%) indicated that the content material in GAYF was useful at the bedside. Approximately, one-third of them used lap-tops to extract information to assist with the medical care of their older patients, and they all used PDAs. No students chose the web as the most effective tool to access GAYF.

Informal Qualitative Reports

The students reported informally that the size and immobility of current internet-based technology made it difficult to use. They recommended that the equipment be made more compact and wireless. The students noted that they did not have time to sit at a computer in a busy practice, and that it was inconvenient to carry around a lap-top all day. They felt that wireless internet access in the office and hospital could increase the feasibility of using computers in those settings. They also believed that a high-speed internet connection rather than dial-up computer access at the bedside would increase efficiency. They noted that having a PDA that could access the web through Wi-Fi would enhance their utility and that access to a variety of good, simplified PDA software would be essential early on in their training, when thinking through the patient differential diagnosis is challenging. Our discussions of the data also represented opportunities to demonstrate the wide spectrum of geriatric issues seen in FM. The chief complaints, for which students consulted GAYF, included arthritic, cardiac, pulmonary, dermatologic, endocrine, neurologic, psychiatric, and urologic disorders.

Table 1. Characteristics of the Student Participants (N=24). University of Alabama at Birmingham, year 2004-2005.

Mean age, years (range, SD)	27(24-40, 3.48)
Gender n(%)	
Male	8(33)
Female	16(67)
Race n (%)	
Caucasian	21(87.5)
African American	1(4.2)
Asian American	2(8.3)
Own a PDA (n, %)	23, (96)
PDA Model (n, %)	
Palm Tungsten	13, (54.2)
Palm Zire	3, (12.5)
Sony Clie	2, (8.3)
HP Ipaq	1, (4.2)
HP PAQ	1, (4.2)
Dell X-30	1, (4.2)
Dell X-50	1, (4.2)
Use for medical studies (%)	23, (96)
Own a lap-top (n, %)	17, (71)
Lap-top Model (n, %)	
Dell	6, (25)
Mac	4, (16.7)
Apple	2, (8.3)
Compaq	1, (4.2)
IBM	1, (4.2)
Toshiba	1, (4.2)
Gateway	1, (4.2)
Sony	1, (4.2)
Use for medical studies (n, %)	24, (100)
Use of web to access Geriatric Assessment tools (n, %)	
agree	2, (8.3)
undecided	1, (4.2)
disagree	14,(58.3)
strongly disagree	7, (29.2)
Use of PDA to access Geriatric Assessment tools (n, %)	
agree	2, (8.3)
disagree	15,(62.5)
strongly disagree	7, (29.2)

DISCUSSION

In the last two decades, a number of reports have recommended that medical schools incorporate educational technology into their teaching programs. In 1992, the Report Writing Committee of the Association of American Medical College's Assessing Change in Medical Education - The Road to Implementation Report (AAMC's ACME-TRI Report)[5] suggested that medical schools improve faculty knowledge about the use of educational technology, provide more and better organized computer software resources to facilitate student learning, and develop organizational structures that promote the use of educational technology. However according to a 1998 analyses, U.S. medical schools have made limited progress in accomplishing these goals.[6]

The increasing use of community clinics and hospitals for educating medical students has created obstacles to delivering a uniform curriculum to learners. Internet-based

Table 2. Utilization and Feasibility of Medical Technology (N=24). University of Alabama at Birmingham, year 2004-2005.

	Pre-Intervention		Post-Intervention	
	N	%	N	%
Confident using the web				
strongly agree	22	92	17	70.8
agree	2	8	7	29.2
Confident using PDA				
strongly agree	14	58.3	17	70.8
agree	9	37.5	7	29.2
undecided	1	4.2		
Using web to access medical information				
strongly agree	21	87.5	12	50
agree	3	12.5	11	45.8
disagree			1	4.2
Using PDA to access medical information				
strongly agree	16	66.7	15	62.5
agree	5	20.8	9	37.5
undecided	2	8.3		
disagree	1	4.2		
Web use feasible during clerkship				
strongly agree	16	66.7	5	20.8
agree	7	29.2	8	33.3
undecided	1	4.2	7	29.2
Strongly disagree			1	4.2
PDA use feasible during clerkship				
strongly agree	20	83.3	20	83.3
agree	4	16.7	4	16.7
Geriatric assessment modules on the web enhance diagnostic & assessment skills in Geriatrics				
strongly agree	5	20.8	4	16.7
agree	8	33.3	8	33.3
undecided	11	45.8	8	33.3
disagree			4	16.7
Geriatric assessment modules on the PDAs enhance diagnostic & assessment skills in Geriatrics				
strongly agree	5	20.8	10	41.7
agree	9	37.5	13	54.2
undecided	10	41.7	1	4.2

learning modules may represent a means to address this problem. The use of computer-assisted learning enables all students to be taught the same material in their own time and at their own pace. Computer-assisted learning programs have also been shown to be efficacious in teaching geriatrics content to undergraduate medical students.[7,8]

According to a recent survey of 834 U.S. physicians, about 26% used handhelds in 2001, and an estimated 50% would use the devices by 2005.[9] Practitioners use these devices to access drug dosing, costs, and databases with information on potential adverse drug reactions among medications, as well as health plan guidelines, protocols, and calculations that are useful at the point of care.[10,11] Recognizing that familiarity with information technology will be as important to the future physician as knowledge of the path physiology and treatment of common diseases, many medical schools in the United States, including

Table 3. Evaluation of Field Experience (N=24). University of Alabama at Birmingham, year 2004-2005.

	Strongly Agree		Agree		Disagree		Undecided		Strongly Disagree	
	N	%	N	%	N	%	N	%	N	%
Field experience built skill in using web-based technology	3	12.5	14	58.3	3	12.5	3	12.5	1	4.2
Field experience built skill in using PDA technology	8	33.3	12	50	1	4.2	3	12.5		
Had enough time to use information on the web in a busy rural practice	1	4.2	3	12.5	5	20.8	12	50	3	12.5
Had enough time to use information on the PDA in a busy rural practice	11	45.8	12	50	1	4.2				
The time invested in using the web was productive in medical training	3	12.5	10	41.7	6	25	3	12.5	1	4.2
The time invested in using the PDA was productive in medical training	14	58.3	10	41.7						
Could access of information more readily from the web than from a book	3	12.5	6	25	6	25	7	29.2	2	8.3
Could access of information more readily from the PDA than from a book	10	41.7	7	29.2	6	25	1	4.2		
The content material in GAYF was useful at the bedside	10	41.7	11	45.8	2	8.3	1	4.2		
Used of the lap-top to extract information that assists with the medical care of the older patient	2	8.3	6	25	1	4.2	13	54.2	2	8.3
Used of the PDA to extract information that assists with the medical care of the older patient	13	54.2	11	45.8						

Wake Forest University, and Stanford University are providing their undergraduate students with handheld computers.[12,13]

Medical students are using handheld computers to keep track of clinical encounters and facilitate evidence-based decision making.[14] To meet the changing information needs of their trainees, medical training programs are integrating handheld computers in their curricula. Given the growing volume of medical information and the increasing expectation for practitioners to adhere to standards of evidence-based care, physicians and trainees increasingly require ready access to medical information at the bedside. The appeal of the PDA is that it can function as a compact, portable medical information resource that can be accessed at the point of care. Moreover, it can be easily updated to incorporate emerging research and evolving clinical practice guidelines.[15]

Handheld devices are widely used in FM residency programs in the United States. Studies indicate that PDAs are being used for some purpose in two thirds of family practice residency programs, and their use is mandatory in 30% of them. Although they were designed as electronic organizers, in family practice residencies they are used as medication reference tools, electronic textbooks, and clinical computational programs.[16] PDAs are portable, relatively inexpensive, and have the ability to interface with other electronic devices, including desktop computers. The adoption of this technology may influence

how we teach or train medical students and residents to appropriately access and use available up-to-date clinical information to improve patient care. [17]

Readily available patient-specific or application-specific information at point-of-care allows for more complete and accurate information for the patient encounter. Drug dosages and clinical computational formulas that, prior to the advent of handheld computers, were accessible only by pencil-and-paper methods are immediately available on handheld computers, reducing potential for errors or outdated information. Likewise, applications for up-to-date clinical information from electronic textbooks and on-line sources encourage users to continue as lifelong learners.[18,19]

CONCLUSION

This study provides preliminary evidence suggesting that PDA utilization to enhance geriatrics education in rural Family Medicine practice sites may be most useful. Several limitations of our work deserve consideration. Our study cannot assess whether the use of technological tools enhanced student proficiency in geriatric care and points to the need for follow-up studies using a pre-post randomized control study design to assess the specific impact of technology-based intervention on clinical competence. Future work should focus on evaluating the impact of the intervention on student acquisition of geriatric knowledge. We experienced difficulties tracking time and movements of the users and relied on self-identification of resource utilization. Although our sample size of 24 students is too small to assess improvements in geriatric knowledge, we were able to demonstrate that technology-based geriatrics education in rural FM practice sites is feasible and acceptable to third-year students and that students perceived that using geriatric assessment modules on their PDAs enhanced their older adult encounters at the point-of-care. We recognize that utilizing teaching tools for medical training does not substitute hands-on teaching skills taught by preceptors in the community. Our hope is to utilize teaching resources to augment and standardize some elements of clerkship training in geriatrics while stimulating self-directed learning.

Medical education technology for students that is highly mobile, and allows much of their work to be done off-campus, is one potential future direction. Mobile learning refers to the use of mobile, hand-held electronic devices for medical education. These devices could include PDAs and cellular phones. Mobile learning is still a developing area, but it already offers many advantages. Mobility, portability, low pricing, and small size are all advantages of mobile learning in medical education. Medical students can access medical information without being tied to a specific location, and the device can easily be dropped into a pocket to free both hands. At the present time, PDAs are being phased out in favor of devices that combine cell phone and PDA functionality, as well as other functions such as video camera and web access. [16]

The iphone is the latest mobile device that has recently appeared in stores. The newest iphone has a built-in GPS chip, iPod, high-speed mobile wireless web browsing, e-mail, telephone, and PDA capabilities all in one device. However, one needs to have a contract with a specific telephone company to use this latest version of mobile learning. Technology will simplify life for health professionals as the cost to purchase and utilize mobile devices become more affordable for students and practitioners in medical education.

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