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Message from the 2006 Program Chair

John L. Szarek, Ph.D.
Chair, 2006 IAMSE Annual Meeting Program Committee

In this era of tight travel budgets, basic scientists have to consider carefully how they spend those precious dollars. I am pleased to tell you there is one meeting on medical education guaranteed to give you top value, the annual meeting of the International Association of Medical Science Educators (IAMSE). What does the IAMSE meeting offer that other meetings on medical education do not?

First, and most important, the focus: Basic Sciences. This conference is directed toward all individuals who teach within a medical environment, with a particular focus on those responsible for the basic medical sciences. These are defined as subjects arising from the traditional disciplines of Anatomy, Behavioral Sciences, Biochemistry, Microbiology & Immunology, Pathology, Pharmacology, and Physiology. At this meeting you can meet with colleagues who share your passion for your basic science discipline; learn what other basic scientists are doing in curriculum development; learn what the future holds for medicine and what we need to be thinking about so our students are ready to meet the challenges.

Second, Networking. In addition to colleagues from your discipline, you will meet those from other disciplines from around the world. Typically, medical educators from as many as 30 countries attend IAMSE meetings. Not surprisingly, we share many of the same issues with respect to educating students. Other attendees include course and clerkship directors; academic physicians; deans for medical education, academic affairs, and faculty development; CME directors; educational psychologists; and, more recently, students. There are many opportunities to meet with colleagues and the plenary presenters and session leaders. And there are two social events which provide a more informal setting for networking. The first is the opening reception where flags are displayed from each country represented by educators at the meeting. Then there is the Gala. The Galas at the last three IAMSE meetings featured a cowboy band, a Mardi Gras parade, and a mariachi band with plenty of food and beverages to go around. You will have to attend to find out what the Gala will be like for this 10th annual meeting.

Third, the Program. As in previous IAMSE Annual Association Meetings, internationally recognized speakers, interactive small group focus sessions, hands-on workshops, computer demonstrations, individual research and curricular innovations presented through posters and, commercial educational product exhibits will highlight this event. International experts will present on a wide range of topics including Professionalism; Implications of Technological Advances for Curriculum Development; Integrating Genomics into Medical Curricula; and External Forces Driving Health Science Education. Posters play a prominent role in the meeting. Through this venue, basic science educators present their efforts to enhance student learning. You are invited to submit an abstract describing an innovation you have implemented in your course or curriculum. Another highlight of the meeting is the daylong courses in faculty development presented by internationally known medical educators on the Saturday before the meeting begins. Examples of this year's courses are Becoming an Effective Course Director; Integrating Genomics into Medical Curricula; Teaching Communication Skills to Health Science Students; Supporting Students in Learning; and Research in Medical Education. Sign up early for courses since the number of participants is limited. Finally, the annual IAMSE debate sets our organization apart from others. This year, debaters will examine the role of research in achieving the mission of medical education institutions.

Fourth, the Locale. IAMSE will be celebrating its 10th annual meeting on the beautiful island of Puerto Rico hosted by the University of Puerto Rico School of Medicine. The meeting will be held 15-18 July in the Caribe Hilton in San Juan. Puerto Rico offers many attractions for site seeing or just relaxing on the beach. Check out the meeting web site at www.iamseconference.org.

The IAMSE Annual Association meeting provides basic science educators a place to meet colleagues from around the world and to receive an intense faculty development experience. There is no basic science education meeting where you will get more for your travel fund dollar than the annual meeting of IAMSE. Come with your sleeves rolled up and ready for work. See you in San Juan.

The Medical Educator's Resource Guide

John R. Cotter, Ph.D.

Ask Google (a search engine) for a definition of a search engine and you will be rewarded with a list of twenty-seven definitions. One of the shortest defines a search engine as "a computer program that retrieves documents or files or data from a database or from a computer network" such as the Internet (http://wordnet.princeton.edu).

Some search engines have the capacity to capture images from the World Wide Web. In this edition of the Guide, the performance of three of them is evaluated by searching for images of a cell structure. The other three reviews in this edition of the Guide deal with the morphology of blood cells, histology, and the morphology of nerve cells.

The performance of the three search engines was evaluated each time using the same protocol. A single keyword resulted in a large number of images. Two key words reduced the number of images to a fraction of the number that was found in the original search. In each instance, the websites for the images were identified by the search engine. The results show the search engines were efficient at locating images and defining the scope of a search.

If you are aware of a site that has the potential for being used in teaching or facilitates the learning of the basic and clinical sciences, consider submitting a review of the site to the Guide. Send all submissions to jrcotter@buffalo.edu. Please include the URL and a short critique that summarizes the essence and utility of the site.

AltaVista Images. Overture Services, Inc.
http://www.altavista.com/

AltaVista Images tracks down images incorporated into web pages on the World Wide Web. A quick test of the search engine yields over 1,000 hits when "microtubules" is used as a keyword. "Microtubules + electron microscopy" narrows the field to 22 hits some of which are different from those found in a similar search using Google Images (see below). All of the images are initially displayed on web pages as thumbnails. The thumbnails are linked to the content page for the image. The search engine can also be used to locate audio files, video files and news articles. *(Reviewed by John R. Cotter, Ph.D., University at Buffalo.)*

Atlas of Hematology. Nivaldo Medeiros.
http://www.hematologyatlas.com/

Dr. Medeiros has assembled an impressive digital library of stained blood and bone marrow smears that illustrate normal hemopoiesis and a very broad spectrum of hematological conditions and other diseases. He also presents an assemblage of diseases that display abnormal cells in the pleural and cerebrospinal fluids. The collection of images is suited for individuals with some experience in normal and abnormal morphologic hematology. A neophyte, in particular, will not always recognize why a given specimen offers diagnostic information or that the information is consistent with but not diagnostic of a given disease. Or in some cases, an entry level student may miss the cytological features displayed by an aggregate of cells that point to a given diagnosis. The supplementation of descriptive instructional comments to some or all slides would be a significant contribution to the atlas and of interest even to an experienced hematologist. The atlas does reinforce an advanced user's knowledge of a given condition and contains examples of diseases or states with which one has minimal or no experience. An advanced user also has the opportunity to compare his/her interpretations with those of the author. Cytological interpretations can be subjective and it is instructional as well as stimulating to compare one's opinions with those of a respected expert. Dr. Medeiros has put a great deal of effort into making his atlas a useful resource for those working in the field. It is a significant contribution to hematology. *(Reviewed by Chester A. Glomski M.D., University at Buffalo.)*

General Histology. A Digital Atlas. University of Southern California School of Dentistry.
http://www.usc.edu/hsc/dental/ghisto/index.html

This is a very nicely organized collection of digital images that illustrates the topics considered in normal histology. First time users should go immediately to "Site Information" for a clear explanation of how the images are organized and used. The images are accompanied by a description of an image, the method used to stain a specimen, and the magnification at which a specimen was photographed. The organization of the site is straightforward making it easy to navigate to the available topics. The descriptions are brief and students taking histology will find the site is an appropriate supplement to the examples of cells, tissues and organs that they have seen in class. *(Reviewed by John R. Cotter, Ph.D., University at Buffalo.)*

Google Image Search. Google, Inc.
http://images.google.com/imghp?%20hl=%20en&ie=UTF8&oe=UTF8&q

Google, Inc. boasts their search engine is the "most comprehensive" means of finding images "with billions of images indexed and available for viewing." Indeed, a test of the software yields over 4,000 hits and includes drawings, fluorescence photomicrographs and electron micrographs when "microtubules" is used as a keyword. "Google Image Search" finds the images by matching a keyword with the same word in the text that accompanies an image. A user can reduce the number of hits by using the advanced mode of the search engine. Adding the words "electron microscopy", for example, yields 22 images. Beware however, the choice of keywords is critical and can lead to disparate results. For example, "microtubule" results in fewer hits than "microtubules". A user can search the Web or a single website (instructions are found under "Image Search Help"). The Google company does point out in "Frequently Asked Questions" that every image on the Web is not captured in a search of the Web. The search engine displays pages of thumbnails; the image, if desired; and the web page from which the image is obtained. *(Reviewed by John R. Cotter, Ph.D., University at Buffalo.)*

Picsearch. Picsearch Company.
http://www.picsearch.com/

The Picsearch Company describes its image search technology as "cutting edge and user friendly." The engine is comparable to the other two search engines reviewed in the Guide. The images are displayed as pages of thumbnails and a thumbnail is linked to the webpage that contains the image. The number of images found with "microtubules" and "microtubules + electron micrograph" are comparable to AltaVista Images and the way the images are displayed is comparable to Google Image Search. *(Reviewed by John R. Cotter, Ph.D., University at Buffalo.)*

Synapse Web. Medical College of Georgia.
http://synapses.mcg.edu/index.asp

A number of contributors under the leadership of Dr. Kristin M. Harris are responsible for the instructional content of this site. The site is a mix of basic science lessons and research that introduces the students of neurobiology to the cytology of the nervous system. The site is organized into "Tutorials", "Procedures" and "Databases". The tutorials are short and begin with a basic introduction to a topic that quickly becomes quite detailed. "Procedures" explains how tissues are prepared for electron microscopy and the way three dimensional reconstructions are made from electron micrographs. "Databases" contain examples of reconstructed dendrites, reconstructed tissues and an Atlas of Ultrastructural Neurocytology. The atlas contains a large number of excellent electron micrographs. A section of the atlas also illustrates structures that are difficult to interpret, pathological changes and artifacts. Being an atlas, it is serves as a fine reference, and, as pointed out in the introduction to the atlas, is most useful as an aid to interpreting electron micrographs of the nervous system. *(Reviewed by John R. Cotter, Ph.D., University at Buffalo.)*

COMMENTARY

Evaluation of Medical Student Professionalism: A Practical Approach

Jay H. Menna, Ph.D., Michael Petty, Ph.D., Richard P. Wheeler, M.D. and Ong Vang, B.A.

College of Medicine
University of Arkansas for Medical Sciences (UAMS)
Little Rock, AR 72205 U.S.A.

Phone: (+)1-501-686-6680   Fax: (+)1-501-686-8160   Email: MennaJayh@uams.edu

ABSTRACT

The College of Medicine at the University of Arkansas for Medical Sciences (UAMS) has developed an easy and practical method of evaluating medical student professionalism. The evaluation instrument is a single page document listing parameters of professionalism. Next to each parameter are the options of designating a student as either "Inadequate" or "Outstanding" i.e. is the student unable to meet or has he/she exceeded the College's expectations of professional behavior. The form also provides space for comments from the evaluator. A comment is required for all "Inadequate" ratings; "Outstanding" ratings do not require comments but are strongly encouraged. The process allows for faculty, nurses, residents, clerical staff, and even other medical students to submit a form. Generally, however, faculty is the major source of these reports. The use of this form greatly facilitates the evaluation of medical student professionalism and importantly saves faculty time.

INTRODUCTION

Evaluation of medical student professionalism is as important as assessing knowledge and clinical skills. Medical educators have excellent assessment tools to measure student knowledge and clinical skills [1-4] but the assessment of professionalism remains somewhat elusive. Often medical student professionalism is evaluated using rating scales that render quantifiable information.[5-11] Such instruments afford the identification of problem students as well as those who may be border line; as does the evaluation instrument described in this report. Importantly, as well, such instruments help identify students who are exemplary in manifesting those qualities that constitute "professionalism".

Some medical schools use a global approach, called a *360°* evaluation, to evaluate medical student professionalism.[12, 13] The *360°* approach requires that a student's professional behavior be evaluated by a diversity of individuals who interact with the student. The *360•* gives a rather panoramic view of a medical student's professionalism. There are, however, some drawbacks in using a *360•* evaluation protocol. Clearly, one of the most significant concerns is the time required to carry out *360°* evaluations. Clinical faculty members are now required to see more patients than in the past as a means of maintaining the sovereignty of the medical school enterprise. Also, basic science faculty are now being required to obtain more extramural research funding to supplement their incomes and generate funds for their medical schools. Obviously, the "faculty time crunch" generates a serious problem that impedes the evaluation process. Also faculty often feels that there is no reward (compensation) for taking the time to carry out *360°* evaluations. Compounding the problem is the time required to collect the evaluations and carryout analyses.

MATERIALS AND METHODS

At the College of Medicine, UAMS the faculty has developed a list of student expectations that underpin the competency of professionalism. The competency of professionalism and six others serve as the infrastructure to measure educational outcomes, Figure 1. The student-expectations of professionalism serve as the backbone of the professionalism evaluation instrument.

Since 1980 the College of Medicine, UAMS has used a Scholastic Non-Cognitive Performance Evaluation instrument to evaluate medical student professionalism. This form was updated in 2004 to be consistent with the expectations that frame the current competency of

Figure 1. Undergraduate Medical Education Competencies, College of Medicine, UAMS

1. Medical Knowledge
2. Patient Care
3. Professionalism
4. Interpersonal and Communication Skills
5. Medical Informatics
6. Population Health and Preventive Medicine
7. Practice-Based and Systems-Based Medical Care

Professionalism:

Medical students must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. Medical Students are expected to:

A. Demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society that supersedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and on-going professional development

B. Demonstrate a commitment to ethical principles pertaining to the provision of clinical care, confidentiality of patient information, and informed consent

C. Demonstrate sensitivity and responsiveness to patients' culture, religious beliefs and practices, age, sexual orientation, gender, and disabilities

D. Dress in a manner consistent with that of a medical professional

professionalism, Figure 2 (*Scholastic Non-Cognitive Performance Evaluation: Professionalism* form). The course and the clerkship directors are trained in the use of the form and they in turn instruct their teaching faculty. Using this form the evaluator must decide if a student's professionalism is "Inadequate" or "Outstanding" relative to each professionalism-expectation. Any faculty member, resident, nurse, or other medical student can submit an evaluation on a medical student. Generally, however, most of the evaluations are submitted by faculty. A copy of the evaluation report is sent to the student, the Dean's Office and to the submitter's department or division.

When a student receives his/her first inadequate rating, the student is required to meet with the Executive Associate Dean for Academic Affairs to discuss the evaluation. At that time it is determined whether remediation is necessary. If the first negative evaluation report is of an egregious nature the student may, at the discretion of the Executive Associate Dean for Academic Affairs, be brought before his/her

medical student promotions committee for remediation and possible disciplinary action. Medical students who receive two separate reports of professional inadequacy are, as a matter of policy, required to appear before their promotions committee. Depending on the nature of the reports the student may be dismissed from medical school for scholastic non-cognitive reasons. Students who do not receive inadequate evaluation reports are considered to be in compliance with the student-expectations of professionalism. When a student receives a positive report the report is put in their permanent student-file. The substance of the report is incorporated into their medical student performance letter that is sent to all student-selected potential residency programs.

RESULTS AND DISCUSSION

Rees and Shepherd [13] found several factors which limited the benefits of using *360°* evaluations to rate professionalism, including variation in contact time and lack of discrimination by evaluators. While such factors should not obviate the use of this instrument they should be taken into consideration when interpreting results.

The basic science course directors and clerkship directors at the College of Medicine, UAMS approve of the use of the *Scholastic Non-Cognitive Performance Evaluation: Professionalism* instrument because of its ease of use and the directness of the process. The administration finds the use of this instrument to be efficient and appropriate. As the time for faculty to devote to medical education continues its steady decline efficient means of evaluating medical student professionalism are becoming essential.

The use of the evaluation instrument affords a record of medical student professionalism over time that facilitates reporting in the Dean's Letter (medical student performance evaluation document). Taken together with the evaluation of medical student professionalism in the clinical clerkship reports that are received for each student's junior and senior rotations, one is able to obtain a clear sense of a medical student's professionalism in a fashion that limits paper work and saves valuable faculty and office staff time.

While no numerical data have been developed, it is very apparent that the preponderance of the evaluations are positive and, further, that the evaluation form has been used more by basic science faculty than clinical faculty. That is not to say, however, that the form is not used during the junior and senior years of a student's education. There is no provision for the number of Scholastic Non-Cognitive Performance reports a student receives.

We evaluate student professionalism in other ways as well. During their freshman and sophomore years our student's professionalism is addressed using an objective-structured clinical examination format and well-trained standardized patients. Our students' professionalism is also evaluated in their junior and senior years as part of their subjective grade

Figure 2.   College of Medicine, Scholastic Non-Cognitive Performance Evaluation (Student Professionalism Assessment)

Student's Name: _____   **Course/Clerkship:** _____

Course/Clerkship Director: _____   **Date:** _____

DIRECTIONS: For those categories that receive an "Inadequate" rating, please provide comments.

	Check Applicable Box	
	Outstanding	Inadequate
ATTENTIVENESS – The student regularly attends, is consistently on time and is fully engaged in the course/clerkship. All absences are relevant and approved where appropriate.	☐	☐
DEMEANOR – The student has a positive attitude and is respectful towards his/her peers, faculty and others.	☐	☐
MATURITY & JUDGEMENT		
• The student functions in a mature manner (refrains from being disruptive, rude and obscene).	☐	☐
• The student avoids inappropriate responses to stress.	☐	☐
• The student shows an ability to make rational and logical decisions.	☐	☐
• The student addresses clinical problems appropriately.	☐	☐
COOPERATION & RESPECT FOR AUTHORITY		
• The student works extremely well with the health care team and freely accepts differing opinions.	☐	☐
• The student shows appropriate respect for those in authority within the University setting and in society.	☐	☐
RESPONSIBILITY – The student demonstrates a high level of accountability and trustworthiness to his/her peers, the faculty, patients, society and the profession.	☐	☐
LIFE-LONG LEARNING – The student has a strong sense of commitment to excellence and on-going professional development and actively pursues the enrichment of his/her knowledge.	☐	☐
PERSONAL APPEARANCE – The student's personal hygiene and attire reflect the high standards expected of a physician-in-training.	☐	☐
COMMUNICATION (Written, Verbal and Nonverbal)		
• The student's written communication is accurate, clear and concise.	☐	☐
• The student uses effective verbal and non-verbal listening skills to elicit appropriate information from his/her patients, peers and instructors.	☐	☐
• If the student has or encounters a physical deficit (or other problem) obstructing optimal communication, the student makes proper attempts to overcome that deficit.	☐	☐
ETHICS & SOCIAL RESPONSIBILITY		
• The student upholds the tenets of the Hippocratic Oath and is devoted to the ethical principles pertaining to the provisions of clinical care as defined by the Health Insurance Portability and Accountability Act of 1996 (HIPAA).	☐	☐
• The student is not in violation of the Controlled Substance Act of the United States and is not guilty of an alcohol related offense.	☐	☐
CULTURAL COMPETENCE – The student is respectful of others and sensitive to a patient's culture, age, sexual orientation, gender and disabilities.	☐	☐

COMMENTS: _____

Evaluator's Signature: _____   **Date:** _____

White Copy, Dean's Office; Canary Copy, Student; Pink Copy, Department

that is used along with their objective grade in calculating their final clerkship grade.

Finally, and importantly, the evaluation instrument links professionalism to scholastic-cognitive performance in a manner in which both are of equivalent importance in evaluating medical students.

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COMMENTARY

Multiple Intelligences in Undergraduate Medical Education

Rani Kanthan, M.D.[1] and Sheryl Mills, M.Ed.[2]

[1] Department of Pathology and [2]Educational Administration
Colleges of Medicine and Education
University of Saskatchewan
Room 2868 "G" Wing
Royal University Hospital
103 Hospital Drive Saskatoon, SK S7NOW8 CANADA

Phone: (+)1-306-655-2158   Fax: (+)1-306-655-2223   Email: rani.kanthan@sakatoonhealthregion.ca

ABSTRACT

Given that the physician's role today, in comprehensive health care management, is expanding to include managerial, collaborative, and teaching components in their regular practices, and given our increased knowledge about the relationship between conscious and unconscious learning and memory, it is time to question whether the "one size fits all" didactic lecture that merely transmits information as the primary instructional strategy is the best approach for preclinical medical education. Gardner's Multiple Intelligences Theory offers a framework for actively learning complex medical concepts. We can construct instructional processes for the multiplicity of learners, with identical content, by applying the various multiple intelligences.

Our interest in this area was initiated from varied student responses to alternative active learning strategies as part of the curriculum redesign for undergraduate pathology classes at the University of Saskatchewan. Over the last two years, in an attempt to understand these varied responses, information has been gathered from the students (88, 90) about their intelligences, using a readily available and accessible multiple intelligences inventory.

This Multiple Intelligences Inventory revealed that the disengagement of approximately one third of students from the process of learning may have been linked to active learning strategies incongruent with their preferred intelligences. The instructor used this information to redesign lessons incorporating different active learning strategies with the hope of engaging more students and fostering student self-awareness of their preferred intelligences.

Students differed substantially in their intelligences from year to year (highlighting the varied multiplicity of intelligences present in a student population) and because of this, no one teaching strategy or method is ideal necessitating the ongoing negotiation of instructional methods. There is a richness that occurs with incorporating varied strategies. Awareness of multiple intelligences and students' unique intelligences will enable the educator to design/redesign lessons that will improve the learning environment.

Current State
In our medical school, medical education instruction is predominantly a "one size fits all" approach. Generally an instructor enters the class or lecture theatre, moves to the front of the room, and begins the Power Point slide show. The topic for the day is "covered" and the students leave for the next class where another instructor moves to the front of the room, introduces another topic, and refers the students to the handout of the overheads to follow along with the upcoming presentation. Occasionally an instructor may ask a question or invite students to take a few minutes to discuss an idea with their colleagues. This format, with small variations, has been traditionalized over the years to the point that students and instructors have come to expect this as the norm and template for instruction. However, it is time to question whether didactic lecture, with or without its variations, is the best template for medical education today.[1-8]

Changing roles
The physician's role in the 21st century has expanded to address the public's expectations of a qualified doctor, technological advances, and competencies advocated for all physicians as is regulated, in Canada, by the Royal College of Physicians and Surgeons' CanMEDS competencies.[9]

Herein, the medical "expert" (i.e. the doctor) has to be fluent in many other skill sets and appropriate attitudes that include health advocate, manager, communicator, collaborator, professional, and scholar to have an understanding of disease prevention, health promotion, information technology and other new aspects of medical practice. The role of undergraduate medical education today has to evolve to provide the appropriate education for future physicians who are but one facet in a multi-disciplinary health management team as it is evolving in UK, Canada, USA, and Australia. In view of this, it is well-recognized in today's world that undergraduate medical education needs to be revisited and revised to include instruction to develop and incorporate these other skills and competencies as described above. [1-9]

Learning and memory
Specific parts of the brain related to making different and various memories including working memory, long term memory, procedural memory, and episodic memory may be stimulated in different ways. [10, 11] The value of the existing instructional paradigm of the lecture format is challenged given this information about how we learn and remember. This then raises the possibility of incorporating varied instructional strategies for the delivery of medical education to enhance and strengthen these memories. In 1983, Howard Gardner introduced his theory of Multiple Intelligences. [12,-14]

Dr. Gardner suggested that the traditional notion of intelligence based on intelligence quotient (I.Q.) testing was far too limited. The tenets of Gardner's theory [12-14] are that a) each intelligence can be symbolized, b) each intelligence has its own developmental history, c) each intelligence is vulnerable to impairment through insult or injury to specific parts of the brain, and d) each intelligence has its own culturally valued end state.

He has proposed, to date, nine different intelligences to account for a broader range of human intelligence potential in children and adults. These intelligences are:
1) linguistic intelligence ("word smart"),
2) logical-mathematical intelligence ("number/reasoning smart"),
3) spatial intelligence ("picture smart"),
4) bodily-kinesthetic intelligence ("body smart"),
5) musical intelligence ("music smart"),
6) interpersonal intelligence ("people smart"),
7) intrapersonal intelligence ("self smart"),
8) naturalist intelligence ("nature smart"), and
9) existential intelligence ("'big picture' smart").

Such varied intelligences are important to recognize in planning for the classroom experience. This information has been used in elementary and secondary educational settings, [15] but has not been explored at the post-secondary level, including medical education.

Unconscious learning. Students gravitate to their preferred modes of learning unconsciously when they study. [15] These preferential styles of learning may be closely linked to their personalized effective memory tools which in turn could be related to their preferential intelligences. Over time, students most likely have figured out how they learn best from their previous experiences in formalized education. They may then use this information, perhaps unconsciously, to self-guide and maximize their study time. This understanding of student learning styles may be used when developing curricula, planning specific course instruction in medical education, and providing guidance to students on how to study effectively given the voluminous medical content.

Intentional capitalization on the unconscious through instructional variety. Changes in student demographics, (e.g. ethnic background, age, and participation patterns), [16] it is important for instructors to pay attention to the different ways in which students learn. If instructors have a foreknowledge of multiple intelligences, they can provide a richer learning environment for students by using a wider variety of instructional methods (e.g. cooperative and small group learning, incorporating analogy and metaphor, concept mapping, and study guides). Thomas Armstrong indicated, "you don't have to teach or learn something in all [eight] ways, just see what the possibilities are, and then decide which particular pathways interest you the most, or seem to be the most effective teaching or learning tools. The theory of multiple intelligences expands our horizon of available teaching/learning tools beyond the conventional linguistic and logical methods used in most schools (e.g. lecture, textbooks, writing assignments, formulas, etc.)." [17] In this context, little attention has been paid to multiple intelligences in the construction, delivery, and teaching of the undergraduate medical curriculum. In the practice of medicine in North America, using this framework of Multiple Intelligences theory may provide a way to address the expanded objectives for undergraduate medical education while offering more accessibility to complex medical information to students. This in turn will promote education for understanding.

Our interest
Our interest in this area began when we incorporated active learning strategies as part of the mandated curricular change in undergraduate pathology classes at the University of Saskatchewan. The targeted group of Year 2 medical and dental students responded to these changes with varying degrees of enthusiasm that ranged from strongly positive to decidedly negative. We were curious about the possible reasons for this phenomenon. The students, who were very positive about the changes, felt they were benefiting from the strategies that were being incorporated, while others just wanted a "good old stand up traditional lecture." In this context, we wondered if their personal learning styles were having an effect on their receptivity to these changes. The instructional coach (# Mills), a PhD candidate from the College of Education, suggested using Gardner's multiple intelligences as a baseline framework for understanding the learning styles in the group.

What we did initially
Based on this hypothesis, a simple, readily available, and easily accessible Multiple Intelligences Inventory (Appendix

A) was distributed in class, explained, and completed by the students halfway into the course. This task was received with curiosity and enthusiasm by the students. We got "buy in" for the completion of the task by showing how a) this could be helpful as a first step of the awareness of their future patients' varied learning styles, b) this would lead to increased self-awareness of their own personal ways of learning, and c) the instructor could use this information to improve and personalize instruction. The entire class (90 students) completed the survey. These were then collated and analyzed. This information was reported back to the students and used by the instructor to design future lessons incorporating strategies that more closely aligned with their preferred intelligences.

What we found

The results of the Multiple Intelligences Inventory indicated that the strategies being used by the instructor were congruent with the preferred intelligences of approximately one third of the class. However, the primary ways in which students indicated on the inventory that they learned best had not been incorporated. The strategies of analogy and metaphor, concept mapping, small group discussion, creating tables and drawing that had been consciously incorporated by the instructor were slanted towards linguistic intelligence ("word smart"), logical-mathematical intelligence ("number/reasoning smart"), spatial intelligence ("picture smart"), and interpersonal intelligence ("people smart"). Other forms of multiple intelligences such as bodily-kinesthetic intelligence ("body smart"), musical intelligence ("music smart"), and intrapersonal intelligence ("self smart") were not represented in these innovative techniques yet they could be incorporated in teaching pathology. Analysis of the students' survey revealed that up to one third of the class showed a preference for the latter group of intelligences. It may be that this group of students felt disengaged from the process of learning although there was no overall difference in their academic performance. However, insight of this knowledge was useful to the instructor in attempting to redesign instruction for the next group.

What we re-did
As other forms of multiple intelligences such as musical intelligence, bodily-kinesthetic intelligence, and intrapersonal intelligence were not represented in the predominantly linguistic, logical-mathematical, spatial, and interpersonal intelligences based teaching strategies, we redesigned lesson plans with changes in instructional strategies hoping to better reflect the preferences indicated by these students. For example, to address the musical intelligences we incorporated audio files (sounds of a fetal heart beat for stem cells, football stadium clips to link to sports analogy for inflammation, and Magic School Bus video series episode dealing with sore throat and

inflammation). In addition, the instructor, once aware of the various intelligences such as bodily-kinesthetic intelligence and musical intelligence, was better able to understand and accept behaviors such as knitting in the classroom or students listening to music on headphones during the classroom presentation. When at one time the instructor may have been indifferent or offended by these behaviors, she was now able to capitalize on these preferences and use them to advantage for teaching and learning. To accommodate the intrapersonal intelligence preferences students were encouraged to (a) reflect on their participation in the class by brief questionnaires and (b) summarize each class by listing three key points.

The following year, curious about the whole area of multiple intelligences in undergraduate medical education, we distributed the inventory twice; once at the beginning of the pathology class to establish a baseline to guide planning, and then again distributed the survey at the midway point to see if the intelligence patterns changed in the class within one group and to increase the students' exposure to and awareness to multiple intelligences theory. We hope such reflective exercises may contribute to developing self-awareness and self-assessment to aid in self-directed approaches to learning.

What we then found
The responses to the Multiple Intelligences Inventory varied greatly from one year to the next. In the second group of students, having done the initial survey and then encountering the survey a second time, there seemed to be an increase in awareness and interest. Several students asked for more information on multiple intelligences while others were curious about other ways of discovering learning preferences. It appeared that this activity contributed to enhancing self-awareness and self-assessment, tools required for self-directed approaches to life-long learning.

The instructor incorporated a self-directed independent learning component in the course by assigning the reading of two journal articles related to the course content introduced in class. Knowledge of the material was tested both formatively by students handing in article summaries and summatively with questions at the midterm exam. This activity was not favorably received by approximately 30% of the students; some indicated that this was too much work outside of class and that this information should have been included by the instructor in the traditional lectures. The response of the students may indicate a need for more activities that encourage, engage, and foster the skill of self-direction for independent learning as the assigned contact time with students is shrinking in the current climate of medical education.
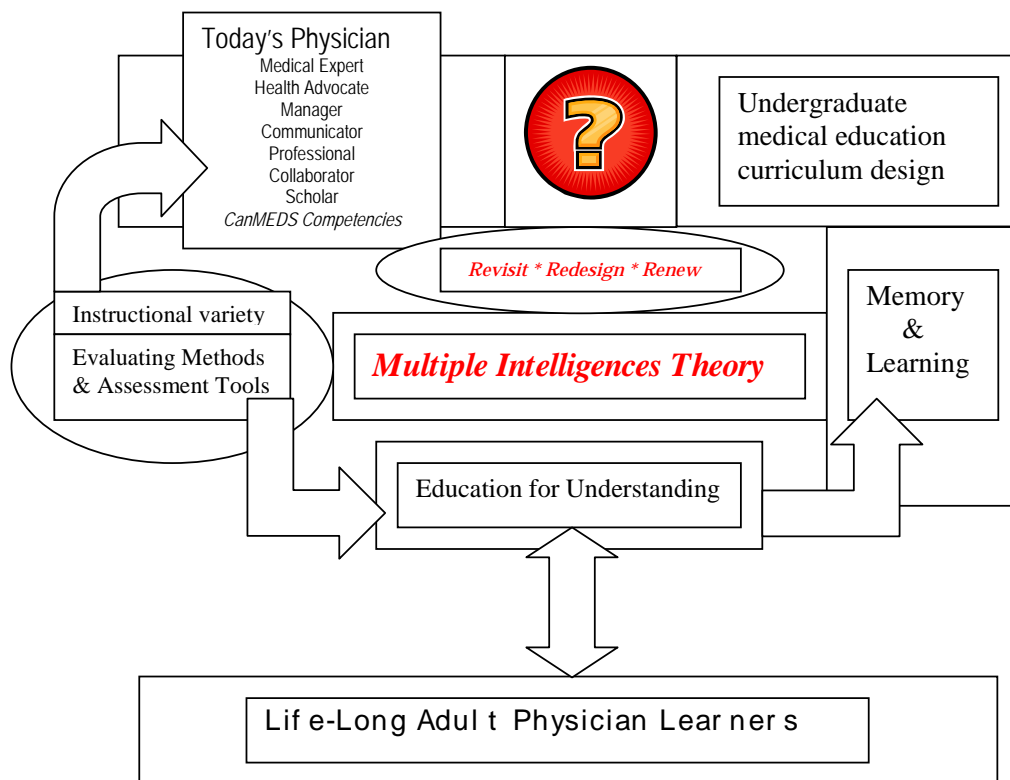
Figure 1. Schema for Medical Education Based upon Multiple Intelligences Theory

By introducing self-directed activities at the undergraduate level, it is hoped that when these students become physicians, these skills will have become internalized and implicit in their day to day practice. The transmission of medical content is only one of the multiple objectives for today's medical education program due to the democratization of information through technology and the ever-changing roles of the physician; thus the transmission of medical content solely by "the good old stand-up lecture" is no longer tenable.

Summary and Suggestions

Multiple intelligences have been incorporated in teaching methods and curriculum design in elementary and secondary education. [15] This commentary contributes another perspective for consideration. Knowledge of multiple intelligences could enhance medical education by incorporating varied instructional strategies such as cooperative and collaborative group activities, analogy and metaphor, concept mapping, small group discussion, and creating tables and drawing. This will broaden the horizons and spark discussions about the redesigning of medical education curricula. Further research may include the study of the link between the incorporation of various instructional strategies and multiple intelligences, and/or a longitudinal

study to track trends of intelligences in the medical student population. In summary (Figure 1), we suggest that:

1. Knowledge of Multiple Intelligences theory can be used in the design of undergraduate medical curricula by encouraging a variety of instructional methods "to achieve more personalized curriculum, instruction, and assessment."[18] This can help foster undergraduate medical education students' skills of self-awareness, self-assessment, and self-direction in becoming

2. effective life-long adult physician learners. Instructional variety will also aid and nurture CanMEDS competencies [9] through the processes used to teach these complex medical concepts. While the content of medical education remains the same, it is the process of instruction that is the variable.

3. Varied and appropriate assessment tools and evaluating methods will need to be designed to mirror and complement the varied instructional strategies utilized in the classroom setting to address the expanding physicians' roles.

4. Use of a wide variety of instructional strategies may promote effective dissemination of complex medical concepts with better understanding by students ("Education for understanding").[18]   Administrative

and infrastructural support is crucial to achieve this instructional change.

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APPENDIX A
(Multiple Intelligences Inventory Sample)
A Simple Multiple Intelligence Inventory (http://homepages.wmich.edu/~buckleye/miinventory.htm)

Put an "x" (x) next to those statements which basically are true about you.

LINGUISTIC INTELLIGENCE (Language, speaking, writing, etc.)

1. ___ I love books.
2. ___ I can mentally hear words even before I speak or write them.
3. ___ I often enjoy radio, CD's, and recording more than TV, movies, or plays.
4. ___ I like word games like Scrabble, Yahtzee, Anagrams, Crosswords, etc.
5. ___ I like to recite tongue twisters, silly rhymes, and puns.
6. ___ People often ask me to speak in common vernacular so the can understand me.
7. ___ English, and classes based on reading (like history) are generally easier for me than math   or science.
8. ___ I read the billboards on the highway more than I look at the scenery.
9. ___ I often talk about things I've read or heard (more than what I've seen, or done).
10. __ am proud of what I write. Sometimes I get special recognition for my writing.

SCORE: ____

Logical-Mathematical Intelligence (LM), (Math and Science)

1. ___ I can easily compute numbers in my head.
2. ___ Math and/or science are among my favorite school subjects.
3. ___ I enjoy games and brainteasers that involve math.
4. ___ I enjoy creating little "what if" experiments. (e.g. How much can I save if I skip buying desert at lunch for a week?
       What will happen to my average if I score below a 90% on this test?)
5. ___ My mind searches for and finds patterns, rules, or logical sequences in things.
6. ___ I'm interested in new developments in science.
7. ___ I believe that almost everything has a rational explanation.
8. ___ I sometimes think in abstract concepts (rather than words or images).
9. ___ I like finding logical flaws in things people say or do (this doesn't mean being negative).
10. __ I feel I know something better when it has been measured, categorized, analyzed or quantified in some way.

SCORE___

Spatial Intelligence (Art, Design, etc.)

1. ___ I often see clear visual images when I close my eyes.
2. ___ I am sensitive to color.
3. ___ I like to take pictures with a camera or camcorder.
4. ___ I like jigsaw puzzles, mazes, or other visual puzzles.
5. ___ I have vivid dreams at night.
6. ___ I can generally find my way around when I am in new places.
7. ___ I draw and doodle.
8. ___ I like geometry better than algebra.
9. ___ I can easily visualize a birds-eye view of a location.
10.___ I prefer books and reading materials that have lots of illustrations.

SCORE ___

Bodily-Kinesthetic Intelligence   (dance, gymnastics, sports, etc.)

1. ___ I participate in at least one sport or physical activity on a regular basis.
2. ___ I find it difficult to stay still for long periods of time.
3. ___ I like to use my hands creatively at activities such as sewing, or carving, carpentry or model building.
4. ___ My best ideas often come to me when I am out for a long walk, jogging, working out, or engaged in some other physical activities.
5. ___ I often like to spend my free time outdoors.
6. ___ I use hand gestures and body language when I talk to people.
7. ___ I like to hold or touch things to learn more about them.
8. ___ I like the daredevil rides (like roller coaster) at amusement parks, and other thrilling experiences (like surfing, or mountain biking).
9. ___ I am well coordinated.
10. __ To learn a new skill I need to do it, rather than just hear about it or see it done.

SCORE ___

Musical Intelligence

1. ___ I have a good singing voice.
2. ___ I can tell when a note is off-key or out of pitch.
3. ___ I listen to music a lot.
4. ___ My life would be much less happy without music.
5. ___ I often have a tune running though my mind.
6. ___ I can easily keep time with a song, tapping, playing a percussion instrument, etc.
7. ___ I know lots of melodies to songs or musical compositions.
8. ___ If I hear a song once or twice, I can usually play or sing most of the melody.
9. ___ I often make tapping sounds or sing or hum when I am studying or working.
10. __ I play a musical instrument.

SCORE: _____

Interpersonal Intelligence   (political, leadership, public relations, etc.)

1. ___ People come to me for advice, or to tell me their worries.
2. ___ I prefer group sports (like soccer or football) to solo sports (like jogging or swimming).
3. ___ I seek out friends of professional help (teachers, counselors, etc.) to help me solve my problems rather than trying to work it out by myself.
4. ___ I have at least three close friends.
5. ___ I prefer social games such as Monopoly or Magic over individual recreation like solitaire or video games (when played alone).
6. ___ I like to contribute ideas or projects in class, and I like to show others how to do things.
7. ___ I am a leader.
8. ___ I like being in a crowd.
9. ___ I like to get involved with clubs and other social gatherings.
10. __ I'd rather spend my evenings at a party or with friends than be at home by myself.

SCORE: _____

Intrapersonal Intelligence (Insightful, spiritual, sympathetic)

1. ___ I like to meditate, pray, or just think about things
2. ___ I have received counseling or gone to groups to learn more about myself.
3. ___ I am able to handle setbacks. I am resilient.
4. ___ I have a special hobby or interest that keeps me pretty much to myself.
5. ___ I have a clear idea of who I am and what my talents or weaknesses are.
6. ___ I have personal goals which I think about often.
7. ___ I am insightful and can sympathize or empathize with other people's feelings.
8. ___ I am strong willed and independent.
9. ___ I keep a diary or journal of my inner life (thoughts and feelings.)
10. __ I prefer school assignments that allow me to chose what I want to do.

SCORE: _____

Please copy all your scores below.

Linguistic _____   Logical _____   Spatial   _____
Kinesthetic _____   Musical _____
Interpersonal _____   Intrapersonal _____

COMMENTARY

New Approach to Teaching Histology

Amos G. Gona, Ph.D., Peter B. Berendsen, Ph.D. and Elizabeth A. Alger, M.D.

Department of Cell Biology & Molecular Medicine
UMDNJ-New Jersey Medical School
Newark, NJ 07101 U.S.A.

Phone: (+) 1-973-972 4416   Fax: (+) 1-973-972-7489   Email: gonaag@umdnj.edu

ABSTRACT

At UMDNJ-New Jersey Medical School, we took a new approach in teaching histology to first year medical students. In keeping with the new trend in curricular change, we focused primarily on two objectives: 1) to make histology as clinically relevant as possible and 2) to reduce the lecture time. The core strategy of our approach was to make the laboratory sessions more efficient and effective in both teaching and learning. We implemented two changes to accomplish our goals. First, we equipped histology laboratories with an 'Audiovisual Switching and Projection System'. The technology enabled us to project images from: a) glass slides, b) 2"x2" slides, c) textbook figures and photomicrographs, or d) videotape. Second, we switched from a traditional Lecture-Laboratory-Review sequence to a Laboratory-Lecture-Conference sequence. Each topic starts with a live pre-lab presentation by a topic expert who guides the students in observing the basic histological features to be studied in that laboratory session. Afterward, the students complete the laboratory exercise. Lecture time is used primarily to emphasize the structure-function relationships. The Conference uses structure-function relationships as the basis for a meaningful discussion of clinically relevant topics. With the new approach, we have reduced lecture time from 43 hrs to 34 hrs and moved away from the histological detail previously presented in lecture. We believe that this approach prepares students for subsequent medical training by enabling them to remember the useful and clinically relevant aspects of histology.

INTRODUCTION

As medical schools continue to implement new curricula, it has become imperative for faculty, particularly in the basic science disciplines, to adapt by adopting new approaches and strategies. In general, new curricula entail a) increasing emphasis on disciplines such as immunology, b) introduction of the art of medicine alongside basic science programs, c) radical changes in basic science programs to emphasize clinical relevance, and d) major reductions in the contact time available for basic science programs. In this challenging scenario, the need to devise a more innovative and efficient methodology became obvious. At our institution, we focused on the laboratory component first because it is a significant segment of the Histology course, and appeared to be the logical place to look for a variety of possibilities.

NEW APPROACH

Our first year class of about 180 students is divided into four groups and assigned to the four adjoining laboratories. We set out to run the laboratories with a centralized approach. In this effort to reorganize the physical facilities, we established a studio hooked up to the four laboratories with an 'Audiovisual Switching and Projection System' (ASPS;

Hacker Audio Video Communications, Hackensack, NJ). The ASPS technology enables us to project images from a) glass slides of actual histological sections using an Olympus BH-2 microscope equipped with a Sony 3CCD camera, b) 2"x2" slides using a NAVITAR Videomate Slide-to-Video System, c) photomicrographs and textbook figures via an Elmo EV-6000AF Visual Presenter, or d) a videotape (Fig. 1).

The centralized system provides a great deal of flexibility, with almost no time wasted in switching from one source to the other. From the studio, images are projected onto a screen in each laboratory via an LCD projector. Using these images and the two-way audio system, an instructor is able to give an oral presentation to the entire class with ease. The two-way audio system provides a mechanism for students to ask questions and to give helpful feedback to the presenter.

With the physical facilities of the laboratories radically changed, we then undertook another substantial change. We abandoned the traditional Lecture-Laboratory-Review sequence and instituted a Laboratory-Lecture-Conference approach. In this new format, each topic starts with a live pre-lab presentation by a topic expert. The students are

guided to observe the important histological features of the tissues or organs during that exercise. After about 20 minutes of the pre-lab presentation, which is part of the laboratory session, students use short written instructions and an atlas to complete the exercise. Laboratory instructors are available in each laboratory to help students needing further assistance during the remaining time of each 2-hr laboratory session.

Lecture time is used primarily to emphasize structure-function relationships, after a brief review of descriptive histology. The Conference, which replaced the old Review, is designed to use the structure-function relationship as the basis for meaningfully discussing selected topics of clinical relevance in the context of histology. The Conference was done in the lecture format and focused on clinical scenarios in the context of histology. For example, under histology of pars distalis of the pituitary, acidophil tumors are discussed by introducing amenorrhea and galactorrhea in women, along with symptoms of visual defects. This approach is much more helpful than the Review, the purpose of which was to merely recapitulate the material covered in the lecture and laboratory sessions.

DISCUSSION

Medical, and dental, schools around the country have been working hard to develop innovative approaches in histology (and other basic science disciplines) in keeping with the evolving curricula. At Loma Linda University, for example, well-prepared exhibits have been used as an adjunct to facilitate the study of glass slides with microscopes[1]. In preparing these exhibits, low- and high-power micrographs were obtained as digitized images from glass slides. Using Microsoft Word software, the images from each slide were inserted on a single document page, with labeling and annotation. The labeled features were linked to the appropriate document page on the CD atlas. In addition to printed copies of the atlas, students received a CD of the MS Word files for a token fee. With this elegant approach, students were able to readily identify the exact field of the labeled features. In addition, 'practice unknown slides', together with 10-15 micrographs and questions about labeled features, were included for student self-evaluation. The important aspect of the Loma Linda approach is that the traditional use of microscopes in the histology laboratory is preserved. In fact, McMillan[1] states "It is recognized that these media cannot replace experience with the microscope and that there is a cognitive dissonance of completely replacing microscope study". We at New Jersey Medical School are inclined to agree with this pedagogic philosophy. In fact, we believe that microscope study has the additional value of sharpening the observational skills of students, an important attribute in the practice of medicine.

Harris *et al.*[2] at the University of Iowa tested the more sophisticated and technologically advanced approach of Virtual Microscopy to replace use of microscopes and the traditional laboratory sessions. Nineteen slides from the endocrine, urinary and male reproductive units of the Histology course were selected. Their Virtual Microscope Laboratory consisted of the syllabus, gross images for microscopic correlation, and links to additional Histology web sites. Viewer plug-in navigational tools allowed the user to zoom in and out through six levels of magnification, and to click and drag the slide in an x-y axis through the entire surface of the virtual slide. As one can expect, student responses varied widely. Although they greatly appreciated the virtual microscope laboratory, they thought it was a valuable adjunct, and should not replace the traditional histology laboratory. Furthermore, without an instructor present, it was difficult for them to find many structures. Some students did feel that the Virtual Microscope Laboratory would save time. Also, students gave high ratings to the ready accessibility and efficiency of this approach.

Cotter,[3] on the other hand, reported a middle of the road approach taken at the University of Buffalo. The histology faculty of his institution took advantage of the strengths of teaching histology with both computer applications and microscope exercises. Cotter[3] emphasizes that there are no plans at the University of Buffalo to replace microscope laboratories entirely with computer applications. Instead, they seem to favor the hybrid approach, which entails computer use for cells and tissues and microscope exercises for the organ systems. This dual approach obviously addresses the differing reactions of students.

We believe that the new approach we took in the Histology course at UMDNJ-New Jersey Medical School is very different, if not unique, meriting a close look at certain beneficial features. Moving away from the deeply entrenched Lecture-Laboratory-Review format was a breakthrough in itself. Making the laboratory session the starting point of each topic was clearly beneficial. It addressed the now popular concept of self-directed learning. Students are made responsible to acquire mastery of basic histology in each topic without having to go through the monotonous and time-consuming lecture approach. It also enabled us to reduce the lecture time from 43 hrs to 34 hrs. ASPS made the laboratory exercises more efficient and more interactive. It made it possible for the topic expert to give a live presentation to students in all four laboratories, so that every student received the same benefit of guidance and useful tips. In our experience, the live presentation is certainly superior to the prerecorded presentation we used previously. It allows the presenter to scan glass slides under a microscope, pointing out the histological details. This approach greatly facilitates the students' task of completing the laboratory exercise. In addition, it permits impromptu innovation for the presenter every time. This approach is so effective that the two-way audio, which works well, does not seem to be critical. Nevertheless, we are inclined to upgrade the equipment further to encourage students to take advantage of the two-way communication system.

Reduction of lecture time was accomplished through three steps. First, teaching and learning of descriptive histology was accomplished in the histology laboratory. Second, the
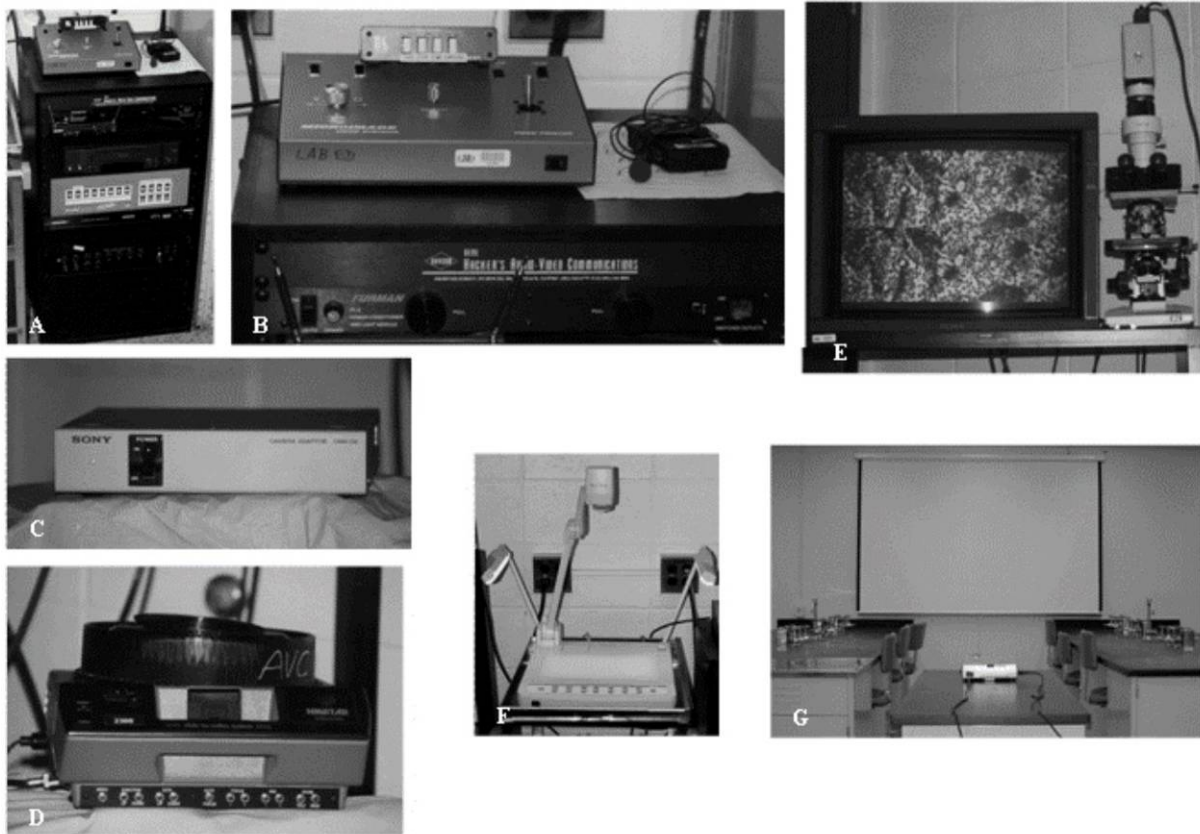
Figure 1. Audiovisual Switching and Projection System (ASPS). **A**. ASPS control module; **B**. Close-up of the control module; **C**. SONY camera adaptor CMA-D2; **D**. NAVITAR Videomate Slide-to-Video System; **E**. OLYMPUS BH-2 microscope and SONY 3CCD camera with a video monitor; **F**. ELMO EV-6000AF Visual Presenter; **G**. EPSON LCD projector in one of the four Histology laboratories.

lecture time was used primarily for focusing on the structure-function relationships. Third, the minutiae of histological detail were largely eliminated. Replacing the Review by the Conference was another major feature of great significance. In keeping with the modern trend in curricular change in the basic sciences, clinical relevance of each topic in the Histology course was thus made a major theme. For this to become successful, however, topic experts have had to retrain themselves to acquire familiarity and competence in selected areas of pathophysiology. The time and effort involved were essential to be able to present topics of clinical relevance in an appropriate and accurate manner.

When we introduced our new approach in teaching the Histology course four years ago, we did not consider the possibility of incorporating the Virtual Microscopy Laboratory. However, this possibility is currently being studied, partly because of the convenience this technology provides to students, and partly because of the cost that would be entailed in replacing the aging microscopes for our class of about 180 students. As we cautiously evaluate

various possibilities, we are inclined to embrace the hybrid approach described by Cotter,[3] at least as a first step. However, we are cognizant of the fact that technology behind Virtual Microscopy Laboratory continues to be steadily and rapidly refined, and has the potential to become widely accepted and implemented.

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The First Experience of a Global Clinical Examination at the National University of Cuyo Medical School

Ana María Reta de De Rosas, M.Ed., Celia Bordín, M.D., Ph.D., Norma Carrasco, M.D., Francisco Eduardo Gago, M.D., Ph.D., Carlos Alberto López Vernengo, M.D., Bernardo Odoriz, M.D., Eduardo Reta, M.D., Ana Lía Vargas, M.D. and María José López, M. Ed.

Faculty of Medicine, National University of Cuyo
Río Plomo 871, 5501-Godoy Cruz, Mendoza (5500) ARGENTINA

Phone: (+) 054-0261-439-0834   Fax: (+) 054-0261-449-4047   Email: amreta@fcm.uncu.edu.ar

ABSTRACT

Started in 1997, the new medical program of the National University of Cuyo, requires that students pass a Global Clinical Exam before graduation, in order to determine if they are able to approach and solve health problems in each of the major medical specialties. This report describes the first experience with this type of exam held at the Medical School by the Global Clinical Exam Committee.

The exam consists of two parts: a written test, including multiple choice questions (MCQ) and case-based open-ended questions, and an oral exam to assess clinical skills using simulated patients. Students must pass both parts of the exam. This examination was first administered in the year 2003 to 59 students, all of who passed the written test, while only two failed the oral exam.

In the written exam, the minimum passing grade was 60 %, using a traditional approach for setting this standard. The scores on the written exam ranged from 68 to 87, with a mean value of 79.1 %. There was significant variation among means when the scores at each specialty were considered separately. The procedure for setting the standard used for the OSCE was the Modified Angoff method. Students were clustered in two groups for the oral exam that was held on two consecutive days. The average score was 54 % for the first group and 61 % for the second. The overall scores ranged from 44 % to 69 %. The correlation was high when considering the score for each station.

This experience demonstrated that this medical school is able to implement a global clinical exam, despite the complexity implied. Most of the students showed that they had achieved the knowledge, skills and attitudes required for graduation. The statistical analysis of the results oriented the Committee regarding how to increase validity and reliability of the assessment tools.

INTRODUCTION

In 1997, the National University of Cuyo Medical School introduced a new curriculum, based on problem based learning (PBL) and courses with high content integration. Since then, upon finishing the three year basic cycle, the students have been required to pass a global knowledge test to enter clerkships and the obligatory internship. After a two-year clerkship and one year of internship they must also pass a Global Clinical Exam, as a "sine qua non" condition to graduate and obtain their diplomas as medical doctors.

The global exams at the end of each cycle of the program are new in Argentina and are intended to guarantee the quality of the graduate. They are offered twice a year and those who fail can take them again on the next scheduled date. These exams are drafted and administered by two "ad hoc" committees -the Global Basic Sciences Exam Committee and the Global Clinical Exam Committee- working throughout the academic year through weekly meetings at the Office of Medical Education. After four years of experience with the Global Basic Sciences Exam, the Global Clinical Exam was administered for the first time in March, 2003.

The overall goal for the Global Clinical Exam is to determine if students are able to approach and solve health problems related to Internal Medicine, Surgery, Pediatrics, Gyneco-Obstetrics and Psychiatry, before graduation.
The specific objectives for this exam are:
- To assess –through written clinical problems- the students' declarative and procedural knowledge

primarily related to clinical reasoning (diagnosis, differential diagnosis, request and interpretation of appropriate clinical tests, and therapeutics).

- To assess –through structured clinical situations with simulated patients- the students clinical skills such as interviewing, physical examination, clinical reasoning throughout the interview, and communication skills.

The Faculty faced the challenge of preparing and administering this exam which includes the standard and cut-off point setting to make pass/fail decisions.

MATERIAL AND METHODS

Fifty nine students were evaluated for the first time in March 2003. Thirteen of them had started their studies in the old curriculum and switched to the new one. The remaining forty six had completed all courses in the new curriculum.

To accomplish the specific objectives planned, the Global Clinical Exam consisted of two parts:

- A Written Knowledge Exam, which assessed mainly the student's fund of knowledge and their ability to retrive and apply that knowledge to clinical cases.
- An Objective Structured Clinical Exam (OSCE), which assessed skills and attitudes that can not be evaluated in a written test (interviewing, physical examination, communication skills, clinical reasoning and patient management).

The students had to pass both exams in order to graduate from medical school.

The **written knowledge exam** included 100 questions of different types: Seventy-two of them were MCQ -following Grondlund's [1] instructions- with four choices related to a short case scenaria that included requesting and interpretating appropriate clinical tests, diagnosis and therapeutic management. The remaining 28 questions were open-ended, in order to allow students to elaborate on the answers concerning eight different clinical cases (These 28 questions belonged to Internal Medicine, Pediatrics and Psychiatry).

This written exam was composed as follows: 40 questions for Internal Medicine; 15 for Surgery; 20 for Pediatrics; 20 for Gyneco-Obstetrics and 5 for Psychiatry. Students scored one point for every right answer; the passing score was 60. Before the exam administration, the Written Exam Review Committee informed the Global Clinical Exam Committee about the quality of each question: They -as clerkship professors, who knew the students and the concepts involved- considered the questions concerning Internal Medicine too difficult for undergraduates provoking, among the members of the Global Clinical Exam Committee, some concern about the expected results. The exam was administered to all students simultaneously.

Mean, standard deviation and Cronbach α (reliability) of the results were calculated before informing students of their scores.

The **Objective Structured Clinical Exam (OSCE)** consisted of a number of stations where different clinical situations took place. Each station had a scenario prepared for each case, with a standardized patient to be interviewed or examined according to the case objectives as described and suggested by Harden & Gleeson,[2] Harden,[3] Ladyshewsky[4] and Troncon et al.[5]

The main objectives to be assessed were: interviewing skills (two stations); physical exam (two stations); ability to request the appropriate laboratory tests (one station); capability for diagnosis (one station) and decision making concerning patient management (one station). Communication skills were assessed in all seven stations. Each case included a check list describing the expected behaviors. There were two observers at each station/room to watch the student's performance and mark the check list as the student progressed through the exam. In addition, the observers had to give an overall score to the student's performance. The last two minutes in each station were left for the student to answer a couple of written questions, related to tests, diagnosis or treatment concerning the case. Equivalent cases were made for each day to avoid the flow of information among students from the first to the second day of exam (They were equivalent in terms of the skill assessed and the level of difficulty, though the amount of the check list items and those required to pass were not the same, depending on the case pathology).

The standard for the OSCE was set following what Cusimano[6] called "combination method" (within "continuum models"). More precisely, the standards for all skills, except communication, were set using the Modified Angoff approach recommended by Friedman Ben-David,[7] which is a mix of the Angoff and Borderline procedures that Kaufman et al.[8] found reasonably fair, valid, accurate and defendable. The OSCE Review Committe had determined the minimum essential standards required to successfully pass each station. The pass/fail points for each day were the sum of the minimum essential scores for each station (stated by the Committe), plus the communication skills score set as compensatory standard (Friedman Ben-David, 2000), plus the score obtained for the two final questions at the end of every station. The cutoff score for the pass/fail decision was 33 out of 69, for the first day of the exam, and 32 out of 64, for the second day.

Mean, standard deviation and Cronbach α (reliability) of the results were calculated before students received their scores.

RESULTS

As shown in Table 1, 100 % of the students passed the written test. The mean was quite acceptable (79.1 %) and there was a relatively narrow range of scores. However, the

Number of items on exam	100
Number of students who passed	59
Mean	79.1
Maximum score obtained	87
Minimum score obtained	68
Range	19
Standard deviation.	4.1
Amount of questions with variance = 0	9
Cronbach α (reliability)	0.44

reliability of the test was low (Cronbach α = 0.44) and there were nine questions with a variance = 0 (answered correctly by all students).

Means and standard deviations vary among specialties. They are shown in Table 2, along with the differences between the kinds of questions belonging to Internal Medicine and Pediatrics, which were not significant.

Results of the Objective Structured Clinical Exam are shown in Table 3. Two students did not pass this exam and, therefore, did not pass the Global Clinical Exam as a whole. Means for both days were low. There was a narrow distribution of scores, since the range from maximum to minimum each day were 20.65 % and 18.92 %.

Table 4 shows that there is no correlation between the oral and the written exam, as was assumed. It also shows that the results obtained in the series A cases (first day) and the series B cases (second day) are acceptable. The correlation between the morning and afternoon scores for each series was very near one. The correlation between the scores obtained by the students on the check lists in each case, and the ones given by the observers as the "overall score" was

also determined; there was positive correlation in all cases.

DISCUSSION

For the written exam the score Mean was 79.1 indicating that the average was higher than expected by both the Review Committee and the Global Clinical Exam Committee. If the means for each specialty are considered (Table 2), the second lowest was the one for the Internal Medicine questions, but still high enough despite their evaluation as "too difficult" by the Review Committee. This could lead to the conclusion that both the Global Clinical Exam Committee and the Review Committee undervalued the students' knowledge and their capability to apply it, especially in Surgery. Future qualitative research on the reasons for low achievement in Psychiatry should be carried out, although the small number of questions –compared to the other disciplines- might be the reason for a lower score, considering that each question missed resulted in a greater capacity for a lower score.

The fact that there were no significant differences between the multiple choice scores and open answer question scores was surprising, since the Committee had considered that the MCQ were easier to answer, being the right answer within the options. This fact will probably lead the Committee to take a practical decision and make all the questions multiple choice, since they are easier to correct.

The range –19- between maximum and minimum scores (Table 1) shows homogeneous achievements among students, which suggests a positive evaluation of the new curriculum. However, it is important to remember that the group of students assessed by this exam is not the entire group that entered the medical program in 1997 (120), but rather the first 46 to complete the program.

Some data obtained call attention to some issues related to the exam's design: a) Nine questions had a variance = 0, since they were answered correctly by all the students. Should this kind of questions be avoided in the future, or should be maintained in the exam, since probably they

Table 2. Results of the Written Knowledge Exam for each speciality, within the Global Clinical Exam at the National University of Cuyo. March 14, 2003.

Specialty	Number of questions			Mean	Standard Deviation	Differences among kind of questions
	Open-ended	MCQ	Total			
Internal Medicine	11	29	40	69	4.5	Not significant
Surgery	0	15	15	96	2	--
Pediatrics	12	8	20	85	3.5	Not significant
Gyneco-Obstetrics	0	20	20	87	3.4	--
Psychiatry	5	0	5	55	3.8	--

Table 3. Results, in quantity and percentage, of the Objective Structured Clinical Exam, within the Global Clinical Exam at the National University of Cuyo. March 15 and 16, 2003.

	Saturday, March 15		Sunday, March 16	
	Quantity	Percentage	Quantity	Percentage
Students evaluated	30	50.85	29	49.15
Students who passed	28	93.33	29	100
Maximum possible score	69	100	64	100
Passing score	33	48	32	50
Mean	37.45	54	38.93	61
Standard deviation	3.49	--	3.26	--
Maximum score obtained	44.46	64	44.25	69
Minimal score obtained	30.21	44	32.14	50
Range	14.25	20.65	12.11	18.92

address the most important, emphasized or best taught concepts? This is a question the Global Clinical Exam Committee has not answered yet. b) A Cronbach . (reliability coefficient) of 0.44 is too low to speak of a reliable instrument. On this topic, the Global Clinical Exam Committee consulted an expert in educational assessment. His opinion was that, due to the fact that this is a global exam on knowledge that is required for graduation, the data obtained should be thought of as a "criterion-referenced assessment" rather than as a "normative-referenced assessment", for which statistical analysis such as Cronbach . is intended. His conclusion was that, in this case, it is

Table 4. Correlation obtained between different parts of the Clinical Global Exam at the National University of Cuyo. March, 2003.

Analyzed data	r
Scores obtained in the Written Exam and the OSCE	0.02
Oral exam:	
• Total scores in series A and B	0.70
• Total scores in series A, morning and afternoon shift	0.91
• Total scores in series B, morning and afternoon shift	0.96
Scores obtained on the check lists and in the global qualification granted by the observers:	
- Case 1	0.83
- Case 2	0.82
- Case 3	0.86
- Case 4	0.79
- Case 5	0.63
- Case 6	0.63
- Case 7	0.42

desirable that all the students that have accomplished an adequate learning process, achieve the goals and pass the exam that assesses them. However, the Office of Medical Education is still undecided about this issue.

Regarding the OSCE's results (Table 3), the means for both days were low –54 % and 61 %, respectively- and much lower than the written exam mean. These results serve as feedback on the curriculum, suggesting the need for more frequent exposure to patient care and better feedback on students' performance. This global exam has already demonstrated to the Faculty that the medical students' clinical skills must be developed during the program, under the strict supervision and formative assessment of physician educators.

As happened in the written examination, the range from maximum to minimum for each day of the oral exam –20.65 and 18.92 %, respectively- showed a narrow distribution of scores, which indicates a similar achievement by all students. This would also be a positive indicator to evaluate the new curriculum, since the clinical performance of the worst students was not far away from the best.

Though knowledge is very important to the physician when he approaches a patient's problem, knowledge itself does not assure development of adequate clinical skills. Much work remains in order to improve the effectiveness of the program for providing quality medical education and to ensure acceptable students performance on clinical skills upon graduation. Moreover, this Medical School will have to define which professional competences –beyond knowledge and clinical skills- are goals to reach during the program and to be assessed in the Global Clinical Exam.

The correlation between cases in series A and B (Table 4) indicates the equivalent cases were well elaborated in order to mantain the variable "clinical situation" constant. The correlation between the morning and afternoon scores was

close to 1, which indicates that the long period of time and the weariness of observers and standardized patients did not significantly change the assessing situation.

CONCLUSIONS

This experience allows the Faculty to state that, though it is a very complex process, they are able to elaborate and implement a final Global Clinical Examination. In this first experience, the great majority of the students demonstrated the appropiate knowledge, skills and attitudes required for graduation.

From now on it will be necessary to maintain the same level of difficulty in the areas of knowledge, within the written exam. It will also be necessary to increase the number of cases used in the OSCE, to better represent the variety of situations, knowledge and skills that the students must demonstrate for graduation. Also, the stations that assess diagnosis and treatment must be analyzed. Those skills might be better assessed by written questions, at the end of the stations evaluating anamnesis, physical exam and interpretation of laboratory tests. Additionaly it will be necessary to improve the process for setting standards by increasing the number of judges in the OSCE Review Committee.

It would be useful to have an explicit description of the competences required at the end of the medical program to refer to when designing the evaluation system of the entire program, not just the Global Clinical Exam.

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The Attitudes of Medical Students Towards Learning Urology in Two Different Medical Schools of Southern Europe

Dionisios Mitropoulos, M.D., Ph.D., F.E.B.U.,[1] Daniele Minardi, M.D.,[2] Maria Tsivra, M.D.,[1] Sophia Manoussou, M.D.[1] and Giovanni Muzzonigro, M.D.[2]

[1] 1st Department of Urology
University of Athens Medical School
75, Mikras Asias Street
115 27 Athens, Greece Athens, Greece
[2] Institute of Urology
Polytechnic University of the Marche Region Medical School
Ancona, ITALY

Phone: (+) 30-210-7701-141   Fax: (+) 30-210-7701-141   Email: dmp@otenet.gr

ABSTRACT

Learning environments, given the limited time and available resources, may play a crucial role in teaching undergraduate clinical urology. Purposes of the present study were: 1) to determine in which environment students best acquire knowledge and skills on certain topics, 2) to investigate whether they consider exposure in urology as sufficient for future patient management, and 3) to assess whether the above are influenced by different institutional environments and possible specialty choices. Students were asked anonymously to fill in a survey in order to check out the environment in which they believed their acquisition of knowledge and skills (15 items) was best, and whether they felt confident in managing certain urological problems (11 items). Data were analyzed using the chi-square test in relation to gender, future specialization plans, and school of origin. All educational environments except from the operating room provided at least moderate benefit. Differences exist between institutions in learning environments preferences. For certain subjects more than 5% of the students stated they did not acquire the corresponding knowledge or skills. For the majority of the problems addressed, more than 50% of respondents felt confident in managing them. Gender, possible career choice and educational environment preference had marginal or negligible effect on self-confidence development. Based on the results of this study seeing patients and student-oriented conferences represent the most suitable setting for acquiring basic clinical urology knowledge and skills. Moreover, given the plans for an integrated European medical curriculum and despite the differences in health care systems throughout Europe, a standardized core undergraduate curriculum in urology is of outmost importance.

INTRODUCTION

A medical specialty is defined as a medical science field in which other physicians lack the required knowledge and training.[1] Medical specialization is necessary because it is impossible to gain the required knowledge during undergraduate medical training, and to best handle organ system-specific medical problems. Despite major international differences in undergraduate medical training, a common thread is to frame medical knowledge through a range of required core courses.[2]

Although urology is a highly specialized field, urological patients present with a wide range of symptoms. Handling these patients requires a minimum urological knowledge and skills given the commonality of urological diseases. Therefore, urology training in medical schools should equip all future physicians with at least a base level of knowledge and skills to recognize and address urological cases.[3] As far as undergraduate urology training, European medical schools have fallen behind those in the United States. The American Urological Association has defined appropriate urological medical coursework.[4-6] However, in the United States and the United Kingdom, a continuous decline in the percentage of medical schools that offer undergraduate studies in urology has been reported,[5,7-10] a fact that should also be responsible for the great difference in the way general practitioners handle urological problems in

Table 1. Student rotation in Urology

	Athens	Ancona
Average number of students • per year • per group	240 40	130 20
Duration (days)	10	30
Time exposure (hrs) to different educational environments		
• Outpatient clinics	4 (6.6%)	20 (11.4%)
• Ward	16 (26.6%)	60 (34.3%)
• Operating room	2 (3.3%)	15 (8.6%)
• Emergency room	8 (13.3%)	20 (11.4%)
• Staff meetings	10 (16.6%)	20 (11.4%)
• Student-oriented conferences	20 (33.3%)	10 (5.7%)

comparison to that recommended by urological guidelines.[11-13]

The aim of the study was to determine the educational environment in which medical students presume that they acquired all the necessary knowledge and expertise in defined problems. Moreover, to report students' self evaluation in knowledge sufficiency in handling problems, and to research the level at which the above mentioned studied factors differ based on gender, future medical specialty and university attendance in two different European medical schools.

MATERIALS & METHODS

Questionnaires (see appendix) were distributed to 58 Italian and to 118 Greek medical students of Ancona University and Athens University respectively. Similar questionnaires were used in past studies in the United States.[14] The questionnaires were filled in anonymously by all students attending the winter semester, the last day of their rotation in urology during the second year of clinical training. Besides noting their gender, future specialization plans, and training evaluation, students were asked to provide an answer to the

following questions: a) "in which educational environment did you acquire knowledge on the following topics" (see appendix), b) "within your training time in which educational environment did you learn how to perform the following tests" (see appendix), and c) "following my training in urology I feel capable of handling the following problems" (see appendix). Correlations of answers to students' characteristics were identified using the chi square test.

Despite the differences in the number of students and the time of urology training, the types of educational activities utilized by the two schools (i.e. ward, outpatients, emergency room, operating room, staff meetings, informal resident teaching, formal teaching by staff members, and student-oriented conferences) were the same (Table 1). In the first two questions, ten topics of most importance for urological cognition and five important skills for urological diagnosis and management were included, while eleven most common problems of the everyday practice were assessed.

RESULTS

The percentage of male and female students varies significantly between the two countries (x^2=5.87 p=0.015). In particular, the percentage of male students was higher in Athens (55.9%) compared to Ancona (35.1%). General evaluation of urology training differed significantly between groups (Table 2). On the whole as well as separately by school of origin, training evaluation was independent to gender (x^2=5.62 p=0.131 for all students, x^2=1.35 p=0.508 for Ancona and x^2=5.9 p=0.116 for Athens students). A small percent of students had chosen urology as future possible specialization. In general however, no highly significant difference was noted between the future specialization plans of Athens and Ancona students, with the exception of surgery specialization choice and the percentage of the undecided (Table 3). On the whole, training evaluation did not interfere with future specialization plans (x^2=8.03 p=0.782).

The answers given to the question: "in which educational environment did you acquire knowledge on the following topics", are analytically presented in Table 4. Educational environment preferences differed significantly with topic; in every topic there were also significant differences among

Table 2. Evaluation of training in Urology

	Bad	**Average**	**Good**	**Very good**	**Total**
Ancona	0 (0%)	13 (22.8%)	42 (73.7%)	2 (3.5%)	n=57
Athens	4 (3.4%)	27 (23.1%)	69 (58.1%)	18 (15.4%)	n=118
	z=1.41 p=0.079	z=0.04 p=0.484	z=1.99 p=0.022	z=2.3 p=0.01	x^2=8.12 p=0.043

Table 3. Future specialization plans

	Urology	Other (surgical)	Other (medical)	Laboratory	I don't know yet	Total
Ancona	3 (5.2%)	7 (12.3%)	24 (42.1%)	2 (3.5%)	21 (36.8%)	n=57
Athens	4 (3.4%)	35 (29.3%)	49 (41.4%)	7 (6%)	23 (19.8%)	n=118
	z=0.569 p=0.284	Z=2.475 p=0.006	z=0.091 p=0.463	z=0.703 p=0.241	z=2.415 p=0.007	x^2=9.81 p=0.043

students stratified by school of origin. Students' first choice infections", "hematuria" and "lithiasis"; lectures from staff members for "prostate cancer", "erectile dysfunction", "urinary incontinence", "diseases of the scrotum", and "testicular torsion"; examination of patients at the ward for "benign prostatic hyperplasia"; and, individual study for "sexually transmitted diseases". In certain subjects such as sexually transmitted diseases, erectile dysfunction, urinary incontinence, and diseases of the scrotum, more than 5% of students of both schools stated that they did not acquire any knowledge.

On the question "within your training time in which educational environment did you learn how to perform the following tests", the answers are depicted in Table 5. Again, educational environment preferences differed significantly with topic, and in every topic there were also significant differences among students stratified by school of origin. Examining patients at the ward was students' first choice for abdominal examination, while the outpatient department was preferred as the best environment to acquire knowledge on how to insert a Foley catheter and how to examine the abdomen and perform a digital rectal examination. More than 20% of students stated that they did not acquire any knowledge on digital rectal examination and examination of the scrotum, while 18.9% and 9.7% of them did not acquire any skills on how to insert a Foley catheter and examine the abdomen, respectively.

The answers to the question "following my training in urology I feel capable of handling the following problems" were the following (Table 6):

1) "... to interpret urinalysis": Ancona students felt more self-secure. On the whole this sense was not related to future specialization plans (x^2=8.96, p=0.061). The sense of self-confidence was however related to gender of the respondents as a whole (women felt more confident, x^2=3.99, p=0.045), a fact that was not present when data were analyzed separately by school of attendance.

2) "...to interpret a KUB X-ray": In general, Athens students felt more self-secure. On the whole, self-confidence was not related to future plans of specialization (x^2=7.55, p=0.109) and it was present on both Ancona (x^2=4.59, p=0.331), and Athens students (x^2=2.12, p=0.712). Self-confidence was not

was student-oriented conferences for "urinary tract related to gender (x^2=2.47, p=0.115), although it was present in Athens (x^2=2.56, p=0.109), but not in Ancona students (Ancona male students felt more confident, x^2=5.41, p=0.019).

3) "...to interpret an intravenous pyelography": Athens students felt more secure. On the whole, this sense was related to future specialization plans (self-secured was higher among students planning on urology or any other surgical specialty, x^2=9.72, p=0.045) although this was not valid when data were analyzed separately by school of attendance. Self-confidence was not related to gender (x^2=2.35, p=0.124). "...to interpret renal scintigraphy": Ancona students felt more secure, although a high percent of students of both medical schools were negative on the matter. This was not related to future plans of specialization (x^2=4.47, p=0.346), stated by both Ancona (x^2=4.26, p=0.37) and Athens students (x^2=4.69, p=0.32). Self-confidence was not related to gender (x^2=0.99, p=0.319), a fact that was not present on Ancona (men felt more confident, x^2=7.17, p=0.007) but it was valid for Athens students (x^2=0.04 p=0.826).

4) "...to handle a patient with urinary retention": Athens students felt more secure. This sense was related to future specialization plans (students planning on urology or any other surgical specialty felt more confident, x^2=11.17, p=0.024), a fact not valid for both Ancona (x^2=2.65, p=0.617) and Athens students (x^2=7.84, p=0.097). Self-confidence was related to gender (males felt more confident, x^2=4.03, p=0.044), a fact that was depicted neither in Ancona (x^2=0.23, p=0.63) nor in Athens students (x^2=2.18, p=0.139). The educational environment on which expertise on Foley catheter insertion was acquired influenced greatly the percentage of students who felt self-confident (x^2=28.21, p<0.001; more students preferred the outpatient department while a few of them stated that they did not acquire skills on the subject). This phenomenon was not present on Ancona students (x^2=4.93, p=0.668) but on Athens students (x^2=19.35, p=0.007; a high percent preferred the outpatient department while a small percent stated that they did not acquire skills on the subject).

Table 4. Best learning environment in which knowledge concerning the management of the corresponding urological problem was achieved (As indicated by student response to the question, "in which educational environment did you acquire knowledge on the following topics"

Learning environment

Problem	Ward	Outpatient	E.R.	O.R.	Didactic conferences	Reading	Resident teaching	Staff teaching	No Topic Exposure	No answer
UTI	5.7 (5.3-5.9)	14.3 (12.3-15.2)	6.9 (0-10.2)*	0 (0-0)	26.3 (66.6-6.8)*	20.6 (10.5-25.4)*	4.6 (0-6.8)*	13.7 (0-20.3)*	2.3 (0-3.4)	5.7 (5.2-5.9)
STD	2.3 (0-3.4)	2.9 (5.2-1.7)	1.7 (0-2.5)	0 (0-0)	15.4 (47.4-0)*	24 (7-32.2)*	2.9 (0-4.2)*	10.3 (3.5-13.5)*	29.7 (21-33.9)*	10.9 (15.8-8.5)
Hematuria	18.3 (15.8-19.5)	12 (3.5-16.1)*	13.1 (12.3-13.5)	0 (0-0)	19.4 (52.6-3.4)*	9.7 (7-11)	11.4 (3.5-15.2)*	10.3 (0-15.2)*	0 (0-0)	5.7 (5.2-5.9)
BPH	18.3 (5.3-24.6)*	11.4 (26.3-4.2)*	3.4 (1.7-4.2)*	3.4 (10.5-0)*	17.1 (43.8-4.2)*	6.9 (1.7-9.3)*	14.3 (0-21.2)*	17.7 (3.5-24.6)*	0.6 (0-0.8)	6.9 (7-6.8)
CaP	11.4 (8.8-12.7)	8.6 (10.5-7.6)	0.6 (0-0.8)	5.1 (14-0.8)*	20 (52.6-4.2)*	7.4 (1.7-10.2)*	14.3 (0-21.2)*	25.7 (3.5-36.4)	0 (0-0)	6.9 (8.8-5.9)
S.D.	2.3 (3.5-1.7)	4.6 (10.5-1.7)*	0.6 (0-0.8)	0 (0-0)	16.6 (33.3-8.5)*	10.3 (12.3-9.3)	5.1 (5.3-5.1)	36.6 (1.7-53.4)*	12.6 (17.5-10.2)	11.4 (15.8-9.3)
Incontinence	8.6 (8.8-8.5)	11.4 (26.3-4.2)*	0.6 (0-0.8)	1.1 (3.5-0)	19.4 (49.1-5.1)*	10.3 (3.5-13.5)*	9.7 (0-14.4)*	25.7 (0-38.1)*	6.3 (3.5-7.6)	6.9 (5.3-7.6)
Scrotum	5.1 (5.3-5.1)	1.1 (1.7-0.8)	4 (1.7-5.1)	0.6 (1.7-0)	21.7 (61.4-2.5)*	12 (7-14.4)	6.9 (0-10.2)*	28.6 (3.5-40.7)*	9.7 (3.5-12.7)*	10.3 (14-8.5)
Torsion	6.3 (10.5-4.2)*	4.6 (1.7-5.9)	11.4 (15.8-9.3)	1.1 (1.7-0.8)	13.1 (33.3-3.4)*	13.1 (5.3-16.9)*	12 (8.8-13.5)	26.3 (0-38.9)*	5.1 (10.5-2.5)*	6.9 (12.3-4.2)*
Lithiasis	12.6 (10.5-13.5)	6.9 (0-10.2)*	13.1 (5.3-16.9)*	1.1 (3.5-0)*	25.1 (61.4-7.6)*	10.3 (7-11.8)	10.3 (1.7-14.4)*	14.9 (3.5-20.3)*	0.6 (0-0.8)	5.1 (7-4.2)

Values correspond to percentage of students preferring a certain educational environment; numbers in parenthesis indicate the corresponding percentages of Ancona and Athens students, respectively.

(*) indicates statistically significant (p<0.05) difference between percentages corresponding to different countries

Table 5. Best learning environment in which skills concerning the management of the corresponding urological problem were acquired (As indicated by student response to the question, "within your training time in which educational environment did you learn how to perform the following tests"

Learning environment

Skills	Ward	Outpatient	E.R.	O.R.	Didactic conferences	Reading	Resident teaching	Staff teaching	No Topic Exposure	No answer
Abdominal examination	44 (47.4-42.4)	9.7 (17.5-5.9)*	8 (0-11.8)*	0 (0-0)	3.4 (10.5-0)*	2.3 (0-3.4)*	5.1 (8.7-3.4)	2.9 (3.5-2.5)	9.7 (0-14.4)*	15 (12.3-16)
DRE	16.6 (14-17.8)	24.6 (31.6-21.2)	7.4 (0-11)*	0.6 (0-0.8)	4 (12.3-0)*	2.9 (0-4.2)	4 (3.5-4.2)	4 (3.5-4.2)	21.1 (21-21.2)	15 (14-15.2)
Scrotum examination	12 (15.8-10.1)	13.1 (15.8-11.8)	9.7 (0-14.4)*	0.6 (0-0.8)	8 (22.8-0.8)*	4.6 (7-3.4)	5.1 (7-4.2)	6.9 (3.5-8.5)	24 (10.5-30.5)*	16 (17.5-15.2)
Foley catheter insertion	6.3 (10.5-4.2)	27.4 (1.7-39.8)*	17.1 (7-22)*	3.4 (8.7-0.8)*	0.6 (0-0.8)	0.6 (0-0.8)	6.3 (10.5-4.2)	2.3 (3.5-1.7)	18.9 (35.1-11)*	17.1 (21-15.2)

Values correspond to percentage of students preferring a certain educational environment; numbers in parenthesis indicate the corresponding percentages of Ancona and Athens students, respectively.

(*) indicates statistically significant ($p<0.05$) difference between percentages corresponding to different countries

5) "...to handle a patient with renal colic": No difference was noted between Ancona and Athens students. On the whole, this sense was not related to future specialization plans (x^2=1.52, p=0.822) of both Ancona (x^2=1.97, p=0.74) and Athens students (x^2=1.88, p=0.757). Gender was not related to this question (x^2=1.27, p=0.259), a fact that was valid for Athens students (x^2=0.062, p=0.802), but not for Ancona students (x^2=4.29, p=0.038).

6) "...to recognize a urethral trauma": Ancona students felt more secure. This sense was not related to future specialization plans (x^2=4.71, p=0.318) or to gender (x^2=0.424, p=0.514), as reported of both Ancona (x^2=3.53, p=0.473 and x^2=0.396, p=0.528 respectively), and Athens students (x^2=3.69, p=0.448 and x^2=0.231, p=0.63 respectively).

7) "...to treat a patient with urinary tract infection": No differences were noted between students of two schools. This sense was however related to future specialization plans (students planning on urology or any laboratory specialty felt more self-secured, x^2=10.9, p=0.027) but this was not valid for either Ancona (x^2=4.66, p=0.323) or Athens students (x^2=8.32, p=0.08). This sense was also not related to gender as far as the Ancona students are concerned (x^2=0.347, p=0.555), although Athens female students felt more secured than males (x^2=4.93, p=0.026). The educational environment on which knowledge was acquired on the subject did not influence the percentage of students who felt secure (x^2=11.86, p=0.105). This was valid for the Ancona students (x^2=3.9, p=0.272), while on the contrary there was a major differentiation on the answers given by Athens students (x^2=21.73, p=0.002; only a few of those feeling confident preferred the ward, most favored the emergency room and student-oriented conferences).

8) "...to evaluate a patient with stone disease": No major differences were noted between students of two schools. This sense was not related to future specialty plans (x^2=2.61, p=0.624) as stated by both Ancona (x^2=3.49, p=0.478) and Athens students (x^2=1.46, p=0.832). The same applied for gender (x^2=0.84, p=0.359), in both Ancona (x^2=0.67, p=0.412) and Athens students (x^2=2.37, p=0.123). The educational environment on which knowledge was acquired on the subject did not influence the percentage of students who felt secure (x^2=12.76, p=0.12) as well as by school (x^2=1.38, p=0.966 for Ancona, x^2=13.5, p=0.06 for Athens).

9) "...to evaluate a patient with hematuria": Differences were not noted between students of two schools. The sense was not related to future specialty plans (x^2=3.02, p=0.553) of both Ancona (x^2=1.92, p=0.749) and Athens students (x^2=2.67, p=0.612). The same applied for gender (x^2=0.23, p=0.625), in both Ancona (x^2=0.56, p=0.451) and Athens students (x^2=0.12, p=0.721). The educational environment on which knowledge was acquired on the subject did not

Table 6. Percentage (%) of students confident in managing urological problems

Problem	Ancona	Athens	Difference
Urinalysis interpretation	94.7	71.2	x^2=15.7, p<0.001
KUB interpretation	49.1	91.5	x^2=28.74, p<0.001
IVP interpretation	26.1	82.2	x^2=44.39, p<0.001
Renal scintigraphy interpretation	28.1	15.2	x^2=5.55, p=0.018
Management of a patient with AUR	35.1	61.8	x^2=8.17, p=0.004
Management of a patient with colic pain	57.9	68.6	x^2=1.12, p=0.288
Urethral trauma recognition	63.2	39.8	x^2=11.79, p<0.001
UTI treatment	43.8	62.7	x^2=2.54, p=0.11
Evaluation of a patient with stone disease	77.2	85.6	x^2=0.05, p=0.822
Evaluation of a patient with hematuria	80.7	83.9	x^2=0.728, p=0.393
Indication for prostate biopsy	73.7	72.9	x^2=2.65, p=0.103

influence the percentage of students who felt secure (x^2=6.94, p=0.325) as well as by school (x^2=2.31, p=0.804 for Ancona, x^2=10.62, p=0.1 for Athens).

10) "...to put the indication for prostate biopsy": No major differences were noted between students of two schools. On the whole, this sense was not related to future specialty plans (x^2=2.49, p=0.645), this being valid for both Ancona (x^2=2.45, p=0.652) and Athens (x^2=1.41, p=0.842) as well as to gender (x^2=0.18, p=0.663). The educational environment on which knowledge was acquired on the subject did not influence the percentage of students feeling secure (x^2=11.32, p=0.125).

DISCUSSION

A reasonable time frame for urology training has been reported to be at least two to three weeks during the last years of undergraduate medical education.[8,15] The time frame for urology training at Athens and Ancona Medical Schools is ten and thirty days, respectively. Time exposure between the two medical schools for the different educational environments was similar, although one major difference was significantly more time spent on student-oriented conferences in the University of Athens. In the United States only 38% of medical schools offer undergraduate training in Urology.[5] In the United Kingdom

31% of medical schools do not include Urology as part of the core curriculum.[15]

Traditionally, it is considered that students' training in urology should take place in the ward and in the operating room.[14] This study revealed that knowledge can be acquired in other ways as well, like patients' examination in the outpatient department and emergency room as well as lectures and student-oriented conferences. Approximately one-quarter of students stated that they acquired knowledge in certain subjects with complementary personal study, while a small percent found attendance in the operating room useful. Differences in educational procedures followed by the two schools may reflect upon different perceptions of students as far as the educational environment on which they acquired knowledge or skills on certain subjects is concerned. The majority of the Ancona students acquired knowledge through didactic conferences, while Athens students declared a wider variety of choices.

The suitability of traditional teaching (i.e.ward/operating room) was questioned in two recent studies. In one study students rated patients' examination in the outpatient department as the best educational environment.[14] In a second investigation students in the outpatient/clinic based setting had a greater chance to examine patients and to acquire knowledge and experience compared to the group in the ward/operating room based setting.[16] This study also showed that personal study was of major importance for some topics (20.6% for urinary tract infections, 24% for sexually transmitted diseases, 10.3% for erectile dysfunction, 12% for scrotum diseases and 13.1% for testicular torsion). Comparatively, the respected percentages of United States students[14] were quite similar: 12%, 38%, 4%, 20% and 27%. The reason why the specific educational environment was chosen was neither defined in our study, nor in the United States study.[14] The importance of individual study as a way to acquire knowledge and experience in medicine should not be underestimated. The introduction of new technology and personal computers in education has signed successful application in Urology. An "Interactive Urology" software was successfully tested in Australia,[17] while highly effective was training through the assistance of a personal computer in examining a virtual urological patient with prostate cancer, erectile dysfunction or lower urinary tract symptoms at Bristol Urological Institute.[18] A similar program focused on the evaluation and treatment of a patient with hematuria was successfully applied at University of Texas.[19]

Learning from resident teaching was declared in a variety of percentages based on the topic. Similar were also the percentages in a respected study in the United States,[14] a fact that highlights the important role of residents in undergraduate medical training. In another United States study it was revealed that 67% of medical students stated that the residents played an important role in education and that they owe them one third of the acquired knowledge.[20]

Patient examination is considered as the first step students make in clinical medicine. However, some students did not have any experience examining the abdomen (9.7%), the prostate (21.1%) and the scrotum (24%). Urology preceptors should not assume that students have examination experience, which has been reported by doctors beginning their postgraduate specialization.[21,22] Additionally, some students indicated that they did not have any experience inserting a Foley urethral catheter (18.9% in total, 35.1% of the Ancona and 11% of the Athens students).

Many students in the study stated that after their training, they felt capable of handling certain medical problems. Reduced sense of sufficiency was noted in interpreting renal scintigraphy results (71.9% of Ancona and 84.8% of Athens students). This can be explained by the lack of didactic conferences on the subject. Significant differences between Ancona and Athens students were noted in a series of matters and reflect the differences in the educational procedures of both departments. Confidence to handle certain matters was, in general, independent of gender and future specialization plans. However, one study showed that fist year surgery residents presented a higher percent in correct evaluation of urological problems compared to internal medicine residents.[23]

CONCLUSIONS

Our study revealed that knowledge and skills in urology can be achieved through a variety of educational environments. Limitation of the study was not being able to discern whether theoretical knowledge could be applied successfully in real practice. Benchmarking different educational programs among European countries will help determine common standards in medical education throughout Europe based on general principles of the European Communities Directive 93/16, and perhaps lead to common learning outcomes.[24]

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APPENDIX 1. Questionnaire of the survey

1. Gender: ☐ Male ☐ Female

2. How do you estimate the quality of your education in urology   ☐ Bad ☐ Moderate ☐ Fair ☐ Excellent

3. Which are your future plans as far as your specialization is concerned   ☐ Urology ☐ Surgery, other than Urology ☐ Laboratory
☐ Internal medicine (any specialty)   ☐ I don't know yet

4. To date, I learned to manage each of the following problems in which environment (please, for each topic check one answer that fits best)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Urinary tract infections									
Sexually transmitted diseases									
Hematuria									
Benign prostatic hyperplasia									
Prostate cancer									
Erectile dysfunction									
Urinary incontinence									
Diseases of the scrotum									
Testicular torsion									
Lithiasis									

(1): Seeing patients at the ward, (2): Seeing patients at the outpatient department, (3): Seeing patients at the emergency room, (4): Operating theater, (5): Didactic conferences, (6): By myself, (7): From a resident, (8): From a specialist, (9): I know nothing about the subject

5. To date, I learned to perform each of the following procedures in which environment (please, for each topic check one answer that fits best)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Abdominal examination									
Digital rectal examination									
Examination of the scrotum									
Foley catheter insertion									

(1): Seeing patients at the ward, (2): Seeing patients at the outpatient department, (3): Seeing patients at the emergency room, (4): Operating theater, (5): Didactic conferences, (6): By myself, (7): From a resident, (8): From a specialist, (9): I know nothing about the subject

6. After completing my rotation in urology, I feel confident to:

	YES	NO
Interpret urinalysis		
Interpret a KUB film		
Interpret IVP		
Interpret renal scintigraphy		
Manage a patient with urinary retention		
Manage a patient with colic pain		
Recognize urethral trauma		
Treat urinary tract infections		
Evaluate a patient with stone disease		
Evaluation of a patient with hematuria		
Put the indication for prostate biopsy		

Recruitment, Retention, and Training of African American and Latino Standardized Patients: A Collaborative Study

Mauritha R. Everett, M.S. Ed. R.N.,[2] Win May, M.D. Ph.D.,[1] Carolyn Tressler Nowels, M.S.P.H.[2] and Deborah S. Main, Ph.D.[2]

[1]Division of Medical Education and Department of Pediatrics
Keck School of Medicine of the University of Southern California
Los Angeles, CA 90033 U.S.A.
[2]Department of Family Medicine
University of Colorado at Denver and Health Sciences Center
P.O. Box 460004
Aurora, CO 80046-0004 U.S.A.

Phone: (+) 1-303-617-8194   Fax: (+) 1-303-617-8194   Email: mrever@msn.com

ABSTRACT

Latino and African American standardized patients bring diversity and authenticity to the instructional and assessment mission of standardized patient programs. However, minority standardized patients are often difficult to recruit and retain and may require different training strategies to maximize their performance and recall potential. The purpose of this study is to identify important factors that affect the recruitment, retention, and training of African American, and Latino Standardized Patients (SPs) in two medical schools.

Latino and African American standardized patients from the University of Colorado Health Sciences Center and University of Southern California Keck School of Medicine SP Programs participated in a telephone interview. Trained African American interviewers interviewed the African American SPs and trained Latina interviewers conducted the Latino/a interviews. They asked structured questions, using open-ended and probing techniques to elicit information from the participants. The phone calls were audio taped, transcribed and later analyzed using qualitative methods by the team. Sixty-eight potential participants were sent a letter inviting them to participate. Forty-six standardized patients responded and participated in the telephone interviews (27 African American, 19 Latino; 32 female and 14 male). The interview transcripts were analyzed using an "editing' approach, a technique derived from grounded theory which encourages interpretation of the data using a team approach. Transcripts were compared across team members to identify common elements or themes. Common themes, patterns, and representative quotations were analyzed and confirmed.

Common themes identified included reasons participants became SPs, motivation for continued involvement as SPs, preferred training methods and preferred recruitment, retention, and training strategies. This study revealed potential barriers and suggested strategies that could improve recruitment, training, and retention of minority-standardized patients in medical education.

INTRODUCTION

The use of standardized patients (SPs) in medical, dental, nursing and other health professions education is widely documented.[1-10] However, the use of Latino and African American SPs are few and far between. Based on personal communication with other SP educators, African American and Latino SPs reflect less than 30% of their total SP databases. There is a gap between recruitment and retention of Caucasian SPs compared to minority SPs. African American and Latino groups were chosen for this study because of their increased numbers in the U.S. population,[11] under-representation in current SP databases, and the ongoing challenges associated with the recruitment, retention, and training of these populations.

In an effort to identify factors that affect the recruitment, retention and training of Latino and African American standardized patients, the Center for Studies in Clinical Excellence (CSCE) at the University of Colorado and the Keck School of Medicine of the University of Southern California (USC KSOM) partnered with independent researchers to conduct telephone interviews with Latino and

African American Standardized Patients. The perspective of these Standardized Patients on recruitment, training, and retention was the focus of the interviews.

MATERIALS AND METHODS

In May 2002, 17 African American and nine Latino standardized patients who currently work or had previously worked in the standardized patient program at the University of Colorado (CU) were interviewed. The same study was repeated at the University of Southern California (USC) in October 2003, where ten African American and ten Latino standardized patients were interviewed. The telephone interviews elicited issues that affect recruitment, retention, and training from the SPs' perspective.

A list of potential SP participants was developed from current standardized patient databases. At USC, African Americans and Latino SPs form about 15% of the total SP pool; in Colorado, they form about 20%. The selection criteria were based on demographics: race/ethnicity, English speakers, males and females, aged 20 and older, and current or past employment in a standardized patient program. Phone calls were made to African American and Latino standardized patients to explain the purpose of the study. Subsequently, 68 letters were sent which included the purpose of the study, the process to become a study participant, the consent form, and the promise of a $25.00 check to all participants who completed an interview. Forty-six SPs responded and were scheduled for an interview with an African American or Latino interviewer respectively.

An interview was administered to all volunteer subjects that focused on recruitment, training and retention issues. Recruitment questions included how they had heard about the program, their previous experiences with the health care system, and their reasons for deciding to become a standardized patient. To elicit information about the training of SPs, participants were asked about their preferred learning styles, any aspects of the training that made them feel uncomfortable as well as how the training could better prepare them to be SPs. Interviewers also asked what could be done to improve retention of SPs. Trained interviewers used open-ended and probing techniques to elicit information from the participants (Table 1). The phone calls were audio taped, transcribed and later analyzed.

Interview transcripts served as the primary data source for analysis. The Microsoft Word transcript files were entered into Atlas Ti qualitative data analysis software and analyzed using an "open coding" or "editing" approach.[12] This analytic process includes use of transcripts to identify key themes in each interview and subsequently to determine whether these themes are common or unique.[13] Members of the analysis team (two qualitative researchers: a Ph.D. social psychologist and an MPH social worker) independently read through the transcripts, highlighting particular issues, examples, or quotes each considered important. The analysts were not associated with either of the SP programs, and could therefore be determined as objective and non-biased. The analysts met to discuss preliminary themes, and subsequently re-reviewed transcripts to confirm or disconfirm initial themes and codes. The team then organized these results into a summary report.

Institutional Review Board (IRB) approval was obtained for this study from both CU and USC.

RESULTS

Six common themes emerged from the interviews. They are Strategies for Recruitment, Impact of Personal Experience, Decisions to Become a Standardized Patient, Training of Standardized Patients, Retention of Standardized Patients, and Perceived Benefits of Being a Standardized Patient. The following quotations are actual SP comments related to the themes. Latino comments are identified by (L) and African American comments are identified by (AA).

Strategies for recruitment
Of the 46 African American and Latino standardized patients who participated in the study, nearly all the USC interviewees described themselves as actors, and many had heard about the SP program through their acting teachers or colleagues. At USC, 70% of the SPs were recruited through colleagues and 30% through acting teachers. This was not surprising as it was in Los Angeles. In Colorado, 70% were recruited by fellow SPs or through colleagues, 20% were recruited by targeted e-mail lists, flyers, or Spanish newspapers, and 10% through acting groups.

"I first heard about it through another Standardized Patient, who was an actor friend of mine and we belonged to the same theatre group". (AA)

"It was actually in my theater class about maybe a year ago. My theater teacher…she told us about the program and she asked us if any of us would like to do this and she put our name down."(AA)

"It was through a Head Start Newsletter."(L)

"I was actually in an elevator in the University of Colorado Health Sciences Center School of Medicine and …saw a flyer." AA)

Table 1. Interview Questions for Standardized Patients Study

Before we begin the interview itself, I wanted to ask you if you are currently a Standardized Patient? (If not, how long did you participate in the Standardized Patient Program?)

Thank you. Now I will begin the interview by asking you some general questions about how you were **recruited** as a Standardized Patient.

1. Would you tell me how you first heard about the Standardized Patient program?
   - What made you decide to apply? What influenced your decision to apply/participate in the Standardized Patient program? ($, service to community, fun, meeting new people, curiosity, etc.)
   - Were you recruited by a minority Standardized Patient or a minority Standardized Patient educator?
   - How did this recruitment influence your decision to apply or participate?
   - Usually when people make decisions they look at both the pros and cons of doing something. What would you say are some of the "cons" to being a Standardized Patient?
   - Would you describe how trust or lack of trust might have influenced your decision to apply or participate in the Standardized Patient program?
   - How have your previous experiences with the health care system influenced your decision to apply or participate in the Standardized Patient program?

2. The next set of questions asks about the Standardized Patient **training**. (Note: All Standardized Patients should be asked question #1. If the Standardized Patient has not participated in any training sessions then proceed to #3, retention questions.)
   - What is your preferred learning style? (Note: If minimal or no response, interviewer may say: "Do you learn best when you hear information, see or visualize information or when you can have hands on interactive experience?")
   - How did the training fit with the way you like to learn?
   - Describe any aspects of the training that made you feel uncomfortable.
   - Describe particular ways the Standardized Patient training could better prepare you to be a Standardized Patient.

3. The last part of this interview has to do with **retention**—what keeps Standardized Patients on and what causes them to leave. (Note: All Standardized Patients should be asked the questions below.)
   - Have you been confirmed for a case simulation or portrayal? If not, can you tell me what's kept you from participating? If so, please describe any aspects of the training or portrayal that made you feel uncomfortable.
   - Describe what you consider to be the most important factors in retaining Standardized Patients.
   - How could the communication or interactions around orientation/interviews, scheduling, training or project participation be improved? (Note: If minimal or no response, interviewer may say: "We've heard from some SPs that they didn't feel supported, had been offended, intimidated or embarrassed during the interview, training or portrayal. Can you tell me about any of these that you might have experienced during your time as a Standardized Patient?)
   - Are you still working as a standardized patient?
     If no, what made you decide to leave the program? If yes, proceed to question #4.

4. Is there anything else you'd like to tell me about your experiences in the Standardized Patient program?

Thank you so much for your help with this interview. Again, your comments will remain confidential and will not be linked with your name. The information from these interviews will be used to help make improvements in the Standardized Patient Program. I will include your name on the list of people who have been interviewed and you will receive a check from the Standardized Patient Program.

"My husband...saw an ad in La Voz." (L)

"First on the Internet. On the Health Centers where they sent out announcements for recruiting." (AA)

Impact of Personal Experience with the Health Care System
Some of the interviewees reported previous positive experiences with the health care system; others had negative experiences, or disappointments with the system, or had heard stories from family members or friends about lack of

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respect or inadequate treatment in the health care system. For many, these experiences created a personal motivation to improve the health care system by becoming a Standardized Patient.

"… past experiences with some health care providers and not feeling like an important person in their office while I'm there. I want to be involved (as an SP) *so the future medical providers get to see diverse people in the community so they will be able to work with other sorts of patients in the future." (AA)*

"our people do suffer from lack of education, resources, lack of a lot of things and I feel that maybe by doing the SP thing that maybe somewhere I can help a doctor better understand— our culture, our language, how we interact with other people." (L)

"I know there is a real mistrust of the medical community from my generation and generations before because of past experiences with...feeling used as guinea pigs for research...but once I got into the program I saw where my being in the program would make a positive out of this."(AA)

"I have had really bad experiences, things that were probably avoidable had doctors been on the job. So it has impacted my whole life thanks to the medical community, so yes, it heavily influenced my decision...I mean it's nice to complain, but it's good to have the opportunity to be part of the solution. Save the next poor sucker!" (AA)

Decision to become a Standardized Patient
A number of themes emerged: altruistic motivations - their desire to improve the way doctors interact with patients of color; interest in becoming involved in the medical school activities; the appeal of being part of an academic setting; financial rewards; acting opportunities with new roles and a chance to work on acting skills.

"One of the good things about the program is that you have a chance to maybe do something about how doctors perceive and how they treat patients. You can help make it to where it is not … doctors coming in and you being treated like a number or just another insurance claim. At this stage of the doctor's development, the potential doctor's development, you have a chance to let the student know that you are a human being and a live encounter, or whatever. So that's certainly a reason why I entered into it". (AA)

Well, I think that there are some cultural obstacles to minority people availing themselves of opportunities to improve their health and I felt by being involved I could contribute positively to more people – minorities – taking advantage of the opportunities to live healthier lives. (AA)

…what I'm hoping we are doing is, I'm hoping we are helping the future doctors to refine their interpersonal skills. What I've found is that a lot of these kids are high in terms of book knowledge, or in terms of the medical knowledge but a lot of them are sorely lacking in how they deal with people on a 1-1 basis and what good is it to be a brilliant physician if you don't know how to talk to your patient? (AA)

Well, again, it goes back to being a service. They need to get used to Black people if they are not already. So, you know, I might as well be the one to extend that opportunity. (AA)

"I think...being in touch with the medical field, it is very, very important to get feedback from a neutral person on how somebody that wants to be in the medical profession handles their bedside manner, care and how they talk to a patient. I think that feedback is good for them [medical students] *to know, to help better their education and their being a professional... just to be a help." (AA)*

"Money...I did not know anything much else about it other than they were paying actors." (L)
"I thought it would be really interesting and fun and...you get paid for it, and I personally enjoy being around medical students and the facilitators—most of them. The facilitators I thought were pretty intelligent people and I just enjoy being in that atmosphere with that kind of educated people...I appreciated being at the University of Colorado." (AA)

"Just meeting new people, curiosity, I guess." (L)

"I am an actress and it was something to do that would be fun..."(L)

Training of Standardized Patients
Participants expressed diverse opinions in their assessment of training. Most felt it was quite good, while others suggested that it could be made better. The preferred style was "hands on" learning and role-play. Common themes included the need to practice, to review videos, and to receive ongoing feedback.

"They would act it out, or what's good, what is positive feedback, what is negative feedback for the student… and then just from hearing them talk about it and telling us what they needed to do or what works or what doesn't work. I know that I'm a visual learner. If I just hear and don't see, that doesn't work very well for me." (AA)

"Hands-on works a little bit better for me. It's almost like working on stage as opposed to sitting down and reading the script. I learn better because I'm participating and able to see and understand exactly what it is I'm doing as opposed to reading something and trying to imagine it. I can actually read it and then take all that in and then do it and then be able to verbalize it. So it's all three [learning styles] *combined." (AA)*

"I think if you had actual licensed physicians teaching the cases and doing the training as opposed to another SP Trainer training you, then …so if there are certain medical questions that come up that we don't understand, he can answer them. Whereby another SP who is training you

wouldn't be able to. They would have to go, "Oh I'm not really sure, so I need to check with Dr. So and So."(AA)

"...the more portrayals that I perform, the better SP I become ... it just becomes more comfortable and gives the student at better chance of success with what they are trying to accomplish. .. I'm more in the groove instead of six months or six weeks and then having to pop back into it again." (AA)

"I think maybe a more in-depth explanation including a video tape of previous session examples of what goes on, would make somebody better prepared and more aware of what was expected of them...I think that it would be beneficial to understand what it is that the student MD's are looking for, so that learning the script you can be better able to gauge what is important. I've spent a lot of time learning specifics that are never used in the actual exams." (L)

"...finding out the education (level) *of the people's background, how far they've gone with it and how much they need to go on. When you are an older person it is harder to catch the material and sometimes you are slower." (L)*

"I think they were going to fast and I am a slow learner...give me a little more time to understand the material." (L)

Retention of Standardized Patients
Common themes related to retention were structural changes and procedural improvements. Structurally the SPs would like increased frequency of work, higher and timely payments, and more opportunities for rehearsal or practice before portraying with the students. They also wanted increased attention to refreshments, including water, especially when they were doing multiple portrayals.

Procedural improvements included increased communication and feedback from the SP program as well as a mechanism for sharing feedback with the learners. SPs wanted to know how they were doing and expressed the desire to have their portrayals observed by physicians and given an opportunity to ask questions. They also wanted an opportunity to understand their portrayal from a medical perspective. They wanted to be assigned to cases that match their individual SP strengths and wanted more "colorblind" cases. They wanted appreciation and respect from the doctors and more professional treatment by students.

"Only that it has been by and large very positive...I'd like to get paid a little quicker and I'd like to get paid a little more, but other than that, it has been a very positive experience." (L)

"The monetary factor is a big one. Not necessarily for me but I think for the majority. Financial compensation would be a priority for retaining people... at least try to keep people involved in the process. Even if there are no cases coming up, maybe sending information just to keep their interest sparked, to keep them wanting to participate." (AA)

"I prefer to be paid twice – once at the end of training, and once after I have done the gig." (L)
"Some schools pay more than others – There should be a standard set for the payment." (AA)

"I would like to see more minority cases portrayed. And possibly more contemporary concerns of minorities...sexual dysfunction, Sickle Cell Anemia, cultural obstacles such as diet and life style. Things of that nature. (AA)

"One of the problems I have and one of the complaints that I have is sometimes the cases that are only given to people of color, or cases where that particular illness or disease is more prominent – for example, hypertension. Usually, I always get hypertension cases. I understand that the percentage of hypertension runs higher in African American communities, but I'd like to be able to do some cases that are colorblind. Where race doesn't have anything to do with it." (AA)

"Gaining their (SPs) trust, building up the trust between the coordinators and the patients. Making them feel comfortable in their portrayals and that they will be protected. Also working on cases that I know are really, really relevant...relevant to the concerns of the community...(AA)

"I know of a particular case where the gal didn't want to do one particular portrayal only because she had a very strong accent and the doctor made her feel so uncomfortable she was practically in tears...they are uncomfortable with how the doctors may view them." (L)

"Know what your SPs weaknesses and strengths are and if you have an SP that has a particular strength and you have a case that correlates with that particular strength, then give that case to that SP. Try to give them cases that they will find challenging. Because a lot of times as an SP you get tired of doing the same case year after year after year, so switch it around sometimes. Offer them a different case. Offer them something that is more challenging to them. What happens after awhile if you've done the same case over and over again, I think you have a tendency to try to just walk through it." (AA)

"I might have had a lack of trust when I first started, but as I got to know the program and met the people I met, I built up more trust than I had when I started. I ended up thinking that it (my participation as an SP) did make a difference and that I wouldn't mind staying in a program like this." (AA)

A Latina standardized patient who is no longer in the SP program told an interviewer: *"A lot of the girls in the SP program were from Colombia and I have learned to hate Colombian women because of the SP program...because I was speaking what I knew about how to say a word and they would correct me and say...this is how we say it. ...That is how they speak Spanish in Colombia. I wasn't born in Colombia. I'm not Colombian. ...I speak the Spanish that I*

was taught by my mom and dad and they wanted me to speak Colombian Spanish...The girls that are in there are very, very intimidating. I mean they intimidated me to where I didn't go." (L)

Perceived Benefits of Being a Standardized Patient
Several participants spoke of the benefits they've experienced from being part of the SP Program, including what to look for when choosing a physician and becoming more flexible with acting.

"Well, my experience is basically that I've learned to know what to expect from my own physician. I happen to have a good physician now. I've been in pain over the last year and a half and I've been able to tell from working with the medical students, what to appreciate and what to look for in a physician and that helped me out on what to ask them and what to expect from them...so it made my relationship with the real doctors that I've met to work on me, more fluid and more vivid. Because we can communicate better as far as what I'm looking for as a patient and what I'm expecting from them as a service from them as my physician. That's how it's helped me out."(L)

"...as a performer – as an actor – it made me more flexible in a way that I can turn on a dime or be more improvisational, even though we are all scripted, but it has helped me as a performer as well, to be more flexible and more real in dealing with people."(AA)

DISCUSSION

Our goal was to identify factors that affect recruitment, retention, and training of African American and Latino standardized patients. The study is based on a sample of SPs from two medical schools – one public and one private, with different pay schemes for SPs.

This study has provided "IN THEIR OWN WORDS" ways to enhance AND sustain diversity within our SP Programs and in medical education. While we chose to focus on African American and Latino Standardized Patients, we realize that the data is useful in recruitment, retention, and training of other targeted groups.

King, Perkowski-Rogers and Pohl[14] stated in their paper that recruitment was conducted through their clinical faculty patient population: volunteer, retirement and community organizations, disease-focused foundations, theatre groups, and existing sources within medical centers and hospitals. Referrals from practicing SPs were reported as their best source, by experienced trainers. Our findings suggest that recruitment strategies of minority SPs would follow somewhat similar lines but would need to be based on the target population. Use of local language newspapers, flyers, and theater groups from the respective communities was found to be invaluable. Referrals from fellow SPs were also a valuable resource.

Training of SPs usually follows the method suggested by Barrows[15] with three training sessions, where in the first session, the SP is oriented to an overview of the patient that the SP will be portraying, focusing on the history. The second session is the review of the SPs simulation of the history and coaching on simulation of the physical findings. The third session is a quick review of both history and physical findings, with further fine-tuning by the expert. Last is the "dress rehearsal" with a clinician unfamiliar with the case. The SPs who participated in the study discussed the need for more time to learn the material, evening or weekend training sessions, the desire to view videotapes of previous SPs portraying the patient, the desire for "hands-on" training; and for more feedback. The authors do not feel that these issues are pertinent only for minority SPs but to all SPs as they are all adult learners. The desire for feedback, the viewing of videos, and "hands-on" learning are all related to "situated cognition" – a recent theory of learning emerging from cognitive psychology.[16] This theory states that activity in which knowledge is developed and deployed, is not separable from or ancillary to learning and cognition. Rather, it is an integral part of what is learned. Situations might be said to co-produce knowledge through activity. Learning and cognition are thus fundamentally situated. The implications of situated learning are that the instructional designer moves from the organization of content and sequence to the creation of environment that induce, then facilitate, understanding; and the teacher assumes a different role: from a knowledge transmitter to a coach or facilitator of students' understanding.[17, 18] These could prove to be useful strategies in training SPs.

Retention of SPs is an issue that has not been widely discussed in the literature. This study shows that minority SPs are more likely to remain active if there are consistent opportunities to portray cases, sensitivity and respect to cultural and class difference, and ongoing feedback. The SPs in this study wanted more opportunities to portray cases so they could count on and plan for the work. For many of them, their SP work was in addition to a regular job. They are interested in cases that would teach better interpersonal and cross-cultural communication skills to the health sciences learner, and prefer fewer cases that simply stereotype the social, cultural, or economic dimension of their race, including language. Some prefer to portray more cases that do not focus primarily on specific diseases that are prevalent in their race such as hypertension or sickle cell disease. Meanwhile others were interested in cases that teach cultural awareness and sensitivity. They want to portray cases that address real life issues happening in their family or in their community.

The SPs said they liked to receive timely feedback on their overall performance including their standardization and checklist accuracy. SPs who provide verbal feedback to learners like to receive training on how to give effective feedback as well as receive suggestions on their feedback technique and style.

Other retention strategies discovered in this study were the importance of paying standardized patient for their training and portrayal time, providing food and water especially on long days and having their parking paid. They also appreciate knowing when they will receive payment for their work and may prefer to be paid at the completion of training instead of at the end of the entire project. Several of the USC interviewees talked of working for more than one SP program in California and that their compensation varied among the schools. A competitive wage may also contribute to SP recruitment and retention.

CONCLUSIONS

There is an increased need for diverse standardized patients in medical education as curricula continues to reflect the changing demographics and increased cross-cultural exchanges taking place daily in hospitals, clinics and throughout the community. This study brings to light potential barriers to recruitment, retention, and training of African American and Latino standardized patients and offers effective strategies that could prove useful in enhancing the experience of learners in the health professions as well as influence the future of medical education.

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Choosing Pathology: A Qualitative Analysis of the Changing Factors Affecting Medical Career Choice

Simon Raphael, M.D., M.Ed., F.R.C.P(C)[1] and Lorelei Lingard, Ph.D.[2]

[1]Department of Pathology, Sunnybrook and Women's College Health Sciences Centre
[2] Department of Pediatrics, Hospital for Sick Children
Centre for Research in Education, University Health Network
University of Toronto.
2075 Bayview Avenue
Toronto, Ontario, M4N 3M5 CANADA

Phone: (+) 416-480-6100-2124   Fax: (+) 416-480-4271   Email: simon.raphael@sw.ca

ABSTRACT

Concern over the number of medical students choosing pathology and the "graying" of pathology as a profession have been expressed over many years. In Canada, changes in the structure of training, as well as a reduction in the number of foreign medical graduates able to train in pathology, have meant that the profession has had to rely much more heavily than in the past on competitive recruitment directly from undergraduate medical students. The second-year undergraduate course in pathology is often the sole exposure of medical students to this profession. The purpose of this study is to explore the impression of pathology as a career formed during the second year course and relate it to other factors leading to a career choice in pathology. We used the qualitative techniques of focus group interviews and grounded theory analysis to retrospectively explore this question. Both undergraduates who had just completed their second-year course as well as residents and practicing pathologists participated. It was found that the course was considered important for students in forming impressions of pathology, but related more often to the quality of the teaching and the personality of the teachers rather than the actual content of the course. The influence of rumor and other poorly grounded information was noted to play a role in the students' impressions and actions regarding careers. The course was less prominent than lifestyle reasons for the residents and the intellectual attractions of the career for pathologists. All three groups described the stigma of choosing pathology as a career and their reactions to it.

INTRODUCTION

Impetus for this study, a manpower shortage in pathology

Pathologists provide a valuable although usually unseen medical service. In the popular media, pathologists are usually seen as performing forensic autopsies and helping solve crimes. Contrary to these portrayals, the overwhelming majority of pathologists spend their time diagnosing diseases and providing information regarding prognosis and effects of treatment to living patients. As both laboratory scientists and physicians, pathologists are at the forefront of the molecular revolution in clinical medicine. The importation of new information and techniques in molecular biology into clinical medicine is often first encountered in the laboratory specialties, and as a consequence the complexity of pathology is rapidly increasing. In Canada there is evidence of a manpower shortage in pathology. The number of practicing pathologists has decreased by approximately ten per cent in the ten-year period from 1993 to 2002. In addition, 25 per cent of pathologists are anticipated to retire in the next ten years. The age distribution of Canadian pathologists is also worrying. Only ten per cent are between 30 to 39, while 35 per cent are between 50 and 59.[1]

How many students are choosing pathology in order to fill these positions? The most recent and accurate Canadian data are available from the agency CARMS, (the Canadian residency matching service) that is responsible for the Canadian "match" – the process by which Canadian medical students are matched to universities and specialties for postgraduate training. The CARMS web site shows that in 2004, 24 of 1,285 Canadian medical students ranked pathology or laboratory medicine as their first choice.[2] This compares with 70 for anesthesia and 66 for diagnostic radiology. These are specialties often considered comparable to pathology in that they are all hospital-based, with controllable lifestyles and little direct patient care in the usual sense. The number of applicants choosing radiology or anesthesia as their first choice equaled or exceeded the number of places of offered. In pathology, by contrast, there

were fewer applicants choosing pathology first than places offered. In the U.S, 37.9 per cent of the positions offered in 2000 were taken by American seniors. By 2004, this number had risen to 61.2 per cent of positions offered. Although this trend is encouraging, by comparison, radiology positions are almost all taken by U.S. seniors (91.2 per cent in 2000, 96 per cent in 2004).[3]

Why does pathology lag behind comparable specialties in terms of recruiting? This is the major question that motivated this research. Although the situation may be similar in other countries, this article used a Canadian study population and further comments will concern the Canadian situation. Better understanding of the situation in the Canadian context may be relevant to experiences in other countries, because of similar experiences in pathology recruitment.

Exposure to pathology in the undergraduate curriculum as an influence on career choice.
Traditionally, pathology is taught in the first and second years of the medical curriculum. Pathology is taught at the University of Toronto in a 420-hour second-year course, combining both large and small group teaching. This course, the Pathobiology of Disease (PBD), introduces students to the basic mechanisms underlying human disease, followed by a survey of systemic diseases. It was introduced in 1993. PBD also contains some information that would usually be outside of what is classically thought of as pathology, for example, genetics. After the completion of this course, most medical students have no further exposure to pathology in their careers. This is unlike all other medical specialties where exposure essentially begins in the third and fourth clinical years of medical school and extends into postgraduate training. The two research questions arising in this background are:
1. What role does the introductory pathology course play in forming students' impressions of pathology as a career, and are those impressions positive or negative?
2. What role do these impressions play among the wider range of motivations influencing those who have already chosen pathology as a career?

Review of relevant literature
The review of the literature in this area is of necessity selective, as previous studies on career choice are both numerous and diverse. ERIC, PsycInfo, and Medline databases were searched using headings such as "occupational choice" and "medical residency". In addition, a second search was performed on Medline in these areas, looking for "pathology" as a key word.

A study published in 2001 by Murdoch, et al., reviewed publications from the past two decades concerning factors affecting career choice in medicine.[4] This review yielded seven areas of content domain that were said to consistently correlate with medical students' career choices: biosocial orientation, bioscientific orientation, academic interest,

prestige, income, desire to avoid role strain, and role support.

A large direct survey study was published by Krol, et al., in 1998.[5] It surveyed almost 5,000 physicians who had trained at the Yale-New Haven Hospital from 1929 through 1994. It found that the intellectual content of the specialty, altruism, opportunity to make a difference in people's lives, and consistency with personal identity or personal skills were stable factors in career choice over seven decades. Negative factors included high demands on time and effort, stress, and malpractice costs.

Both of these studies are useful in that they give some broad ideas about career choice in medicine, and its motivational stability over time. On the other hand, both illustrate some of the difficulties in the quantitative approach. The results are somewhat predictable and the studies are so broad that it is difficult to apply their findings to how students pick a particular specialty, especially one as small as pathology.

Davis's review of the literature published in 1990 begins with a description of the weaknesses of the literature in career choice in medicine.[6] These include the very broad classification of specialties that are being compared, for example, primary versus non-primary care. Davis states it is difficult to compare studies that examine the same factors but are performed at different points in a student's professional development. It is not possible to determine in such cases whether differences between studies reflect true differences in the subject populations or are just a reflection of the changes in choice, motivation, and memory that occur over a period of years. In addition, few longitudinal studies are available. In addition this review stated that most studies take a snapshot view of motivation, or look at motivation before and after a brief educational intervention. Most studies are also conducted at a single institution, and are often retrospective. Notwithstanding these limitations, the article points out some of the more established findings in this field. Sex appears to consistently influence career choice, while standard tests of personality have not been found to be very predictive as far as career choice is concerned.[6] The final area reviewed in the Davis article is the literature on stability of choice.[6] The decision for primary care is usually made early, often before the entry to medical school or in the pre-clinical years, and is thus most susceptible to being changed during medical school. Conversely, hospital-based careers such as radiology and pathology are characteristically chosen later, and thus are not as subject to change before the end of medical school.

The qualitative literature in the area of specialty choice is not nearly as extensive. Burack, et al., described the process of specialty choice as a socially constructed process of "trying on possible selves" – that is, projecting oneself into a hypothetical career role.[7] Burack criticizes the more quantitative literature, which views specialty choice as a rational process of calculated inputs and outputs, where personal aptitudes and needs are calculated against the costs and aspects of different specialties. The discussion of the paper described three aspects of "fit" that medical students

used to help decide a specialty: self, others, and the content of the specialty. For a specialty like pathology, the technical and intellectual content of the specialty appeared most important. The authors also discuss three processes of career choice: confirmation, inclusion, and exclusion. In confirmation, pre-existing beliefs about a specialty choice are confirmed. The other processes are inclusion – that is, finding a specialty that includes all the aspects of medicine that one enjoys, versus exclusion – finding a specialty that excludes all the aspects one does not enjoy.

In the following paragraphs, selected articles from the literature of career choice are discussed which have special relevance for pathology or the influence of specific undergraduate experiences on career choice.

Teachers and role models are one of the most thoroughly examined factors in career choice among medical students. Studies usually concentrate on the characteristics of good role models and their influence on specific career choices. [8, 9] Many specialties including pathology use elective and other experiences to encourage students to enter that specialty. Studies of these curricular efforts all have the same problem – is a student's career choice the result of a specific intervention or experience, or a pre-existing preference?[10,11] Choosing a given specialty is of course also a process of rejecting all the others. This would appear to be especially important in a specialty like pathology, as some studies have indicated it appears to be a later decision for many students.[6] Thus many students who choose pathology have made their choice by rejecting the other specialties they initially had in mind. A British postal questionnaire study published in 2003 by Lambert, et al., found that about one-third of physicians reject a specialty path they had considered.[12] This was done mainly for lifestyle reasons, job prospects, or because a given specialty did not appear as interesting as it initially had. The hospital specialties such as pathology were the least often rejected. A retrospective questionnaire was administered to students just prior to graduation from medical school in a 1984 study by Katz, et al.[13] This study further describes the nature of "changing your mind" about specialty choice. Most of the change of direction took place for negative reasons, a process of "exclusion" as described above.[7] Almost two-thirds of those choosing pathology found this choice in medical school after initially being interested in something else. This compares with only nine per cent of those choosing family medicine.[13]

A recurrent theme in the literature is that the lifestyle specialties, meaning those that entail responsibilities which can be most easily meshed with a doctor's personal life, are growing in popularity. Schwartz, et al., tracked career choice among students in the top 15 per cent of the class at three medical schools over a period of six to ten years.[14] Over this period, the percentage of these students choosing lifestyle specialties increased significantly while those choosing surgical specialties remained the same. All other choices (including internal medicine, family medicine and pediatrics) decreased significantly. In a second study, published in 2003 by Dorsey, et al., there was evidence not only of an increase in students choosing a lifestyle specialty, but also that it was the lifestyle, and not other factors, that was motivating students to choose these careers.[15] There is also evidence that the shift to controlled lifestyle professions is not evenly spread among all demographic groups in medicine, and is particularly pronounced among women and older graduates. [16] There is little information regarding the importance of lifestyle factors pertaining directly to a career in pathology. One longitudinal questionnaire-based study that addressed this to a degree was published by Firth-Cozens, et al., in 1999.[17] The main problem with the study for the purposes of the current project was the low number of lab physicians involved – eight. The main reasons for choosing a lab specialty were less patient contact and perceived lower stress levels in this career. These are exclusionary reasons: students are trying to avoid aspects they do not enjoy. Considering this, it is ironic that lab physicians were found to have higher levels of stress by standard measures, both as students and as practitioners.[17] The authors proposed that pathologists' stress levels were more a personality trait that influenced their choice of profession than a result of this choice.

In a book published in 1971, Snyder used the phrase "hidden curriculum" to describe the covert context of learning at a university. This includes the values of the faculty and the expectations of the students, as well as the social context in which the curriculum occurs.[18] A small group of articles has also documented related findings in medical schools.[19,20] Hunt, et al., administered a questionnaire in 1996 to examine the effect of what he termed "badmouthing" on career choice.[19] Badmouthing was heard regarding all specialties beginning early in medical education. The most common career choice to be affected by badmouthing was surgery – pathology was not even ranked in the paper. The phenomenon of badmouthing appears to take root in an environment with little explicit discussion regarding careers, and flourishes in an atmosphere where students feel uninformed regarding choices they have to make. An article describing these difficulties experienced by medical students in choosing a career was published in 1986 by Savickas, et al.[21] In this mail survey, sent to all four years of medical students at a single university, three of the six top problems involved lack of information or knowledge regarding specialties.

We undertook this study to examine the impression that students formed regarding pathology from their PBD course and how this compares to the motivations for choosing pathology articulated by those who have already made that choice. In the interpretation of our data we compared our findings to the general literature in career choice and the small amount that exists for pathology specifically.

MATERIALS AND METHODS

Rationale for a Qualitative Approach
Davis, in his review of the literature, notes the difficulties in a statistical approach to a problem with so many variables that cannot be controlled or isolated. [6] A quote from

Crimlisk and McManus reflects some of the overall difficulties with a quantitative approach to this problem.[22] Career preference may perhaps best be construed as a mass of idiosyncratic factors, each of great importance in a small number of students, but of little importance in the aggregate, and thereby defying conventional statistical analysis which assumes homogeneity of response in populations. (p. 467)

Qualitative research, with its strengths in revealing depth or richness of data as well as probing complex and multilayered topics such as human motivation, appeared to provide a more fruitful and revealing method to explore career choice, and was chosen to address the research questions of this study.

Rationale for focus group methodology
The focus group methodology is a form of group interview that uses group interaction to amplify and diversify group opinions beyond those that would be obtained from other methods such as direct personal interviews.[23] This method explores not only the experiences and knowledge of participants, but also why and how they think the way they do.[23] These strengths make it appear a particularly appropriate method for the research questions in this study. In addition, the group dynamic can empower participants to express views they might feel intimidated to express in a traditional one-on-one interview.[23] This aspect appeared particularly important in the focus groups with medical students and residents when the interviewer was a faculty member. Finally, from a practical point of view, the interviews at the Canadian Association of Pathology meeting (see below) had to be conducted over a period of two days. Scheduling numerous individual interviews in a narrow time frame, when the participants had conflicting priorities, was not practical.

Study Populations
This study was carried out on three study populations: medical students, residents and practicing pathologists. Focus group sessions with the medical students were carried out at the University of Toronto. Subjects for the study were second-year medical students who had just completed their PBD course. Focus group sessions for residents and practicing pathologists were held at the annual meeting of the Canadian Association of Pathologists in Charlottetown, Prince Edward Island, in the summer of 2003.

Ethics approval
Ethics approval was obtained from the Research Ethics Boards of the University of Toronto and of Sunnybrook and Women's College Health Sciences Centre. Consent was obtained as part of this process from the relevant course directors, residency program directors, and departmental chairs. Consent and co-operation were also obtained from the president of the Canadian Association of Pathologists. Informed signed consents were obtained from all participants.

SUBJECTS
Number of focus groups and participants

Four focus group sessions were used to collect data for this study. The medical students were expected to have more heterogeneous opinions than the residents or pathologists, and thus a larger number of participants was considered more desirable. The number of attendees at a Canadian national meeting of pathologists is in the hundreds, rather than the thousands found at U.S. or international meetings. In addition, schedules at the meeting varied among participants, with pathologists and residents generally not as easily available as the medical students. For these reasons, two focus group sessions were carried out for the medical students while one focus group session each was planned and held for the resident and pathologist groups. There were five participants in each of the two student focus groups and in the pathologist focus group. Eight participants took part in the resident focus group, for a study total of 23 subjects.

Sampling – medical students Our sampling methods for students were chosen to try to interview both students interested or uninterested in pathology as a career. Students were not approached by email invitation until after the final PBD grades were submitted. Every student who indicated interest was given the specific time and date that the study would be carried out. Almost all those who indicated they could attend were part of a focus group. There was no selection made by the investigators among subjects who indicated interest and were able to attend.

Sampling – resident focus group
Invitations were sent to residents through the monthly newsletter of the Canadian Association of Pathologists as well as through email solicitation. Residents funded by foreign governments to train in Canada were not eligible to participate, as their selection process for entering pathology residency training is quite different from that of Canadian residents. In addition, they are outside the Canadian manpower pool in pathology. Residents who trained at foreign medical schools, but were now Canadian citizens or permanent residents, were able to participate. All residents who were interested and were able to come to the focus group at the specified times participated. Again, no selection process was used to narrow the focus group. As none of the eight residents in the focus groups were University of Toronto graduates an additional two pathology residents who had completed the PBD course were also interviewed separately, in order to obtain their perspective regarding the course as a motivator in career choice, and their views of the junior medical students' comments.

Sampling – pathologist focus group
Attendees of the Canadian Association of Pathologists were invited to attend both by email and an insert in the monthly newsletter of the Canadian Association of Pathologists. Both foreign-trained and Canadian-trained pathologists were eligible. All participants who were able to attend at the specified time during the conference were able to participate. No selection process was used.

As the pathologist focus group was the smallest, the findings from the transcripts of this group were reviewed and

discussed with two senior academic pathologists at the University of Toronto. These discussions, which lasted approximately one hour in total, were not transcribed, although notes were made.

Topics for discussion
A semi-structured interview format was used, with broad questions and ample opportunities for respondents to pursue issues that interested them. We began with the students discussing their ideas of how pathologists spent their time, as well as their perceived role in the medical system. We also discussed their image of pathologists. Students also were asked how the PBD course had influenced their perceptions. With the pathologist and resident groups, we discussed their motivations for entering pathology, personal characteristics, and experiences – including specifically their undergraduate course in pathology.

Conduct of discussion groups
The discussion groups lasted approximately 90 minutes. At the conclusion of each group, a small token gift was distributed. A post-focus group questionnaire was also sent to participants, and all participants but one stated that they felt able to express themselves freely. All comments in the groups were digitally recorded and then transcribed in full. All identifying comments, for example, names of faculty teaching the PBD course, were removed.

Data analysis
The analysis of data was conducted using a grounded theory approach.[24, 25] This method of data analysis is particularly suited to focus group work. It allows for the management of a large amount of transcript data, by breaking comments down into categories or codes for the generation of summaries of comments, comparisons between groups, and conclusions.

The medical student focus group transcripts were examined first. These were read in an iterative fashion and a coding system was developed, an approach known as open coding. The initial coding system was structured by grouping comments made. A code was established if comments were recurrent in a discussion or if they formed a focus of discussion for a significant portion of the time. For example in the medical student group a code was created regarding the image of the pathologist. Since this code contained a large number of comments they were then sub-grouped into more manageable subcategories such as prestige or personality. A similar process was followed for the pathologist and resident focus groups. However, separate coding systems were developed independently for each of these. The transcripts analyzed were re-organized by cutting and pasting all comments regarding a single code so they were all together and could be more easily compared and summarized. The coding systems and their contained comments were then reviewed, and interpretive memos were developed that reflected the evolving themes found in the discussions. Some of these memos reflected a single coding category, while some were groupings of related codes. By comparing or combining these memos, the central themes

regarding career choice in pathology emerged and related to other issues that influenced them. For example many of the comments excerpted to form the codes regarding pathologist image as noted above evolved into the memo and theme of the stigma of pathology. This entire process was performed by both authors so that codes, memos and themes developed by one author were then reviewed and commented on by the second author in a repetitive two-way process.

RESULTS

Six themes emerged from the analysis and they are described below using representative excerpts from the transcripts.

Theme One: Medical students' perceptions regarding the role of pathologists
The level of knowledge regarding the clinical and academic responsibilities of pathologists varied among the students. Some of the students knew about the basic divisions among laboratory physicians, into those who do tissue pathology (anatomic pathologists) and those whose laboratory work is involved with non-tissue diagnoses (biochemists, microbiologists, and hematologists).
However, there was confusion and concern regarding one issue that could have a major influence in career choice: the amount of patient contact involved in pathology. One student expressed this confusion in the excerpt below: "Yeah, yeah, it was really hectic and I had this vague memory that somebody spoke to us at one point, and it gave me the impression that in pathology you can have patient contact.… The other times I got the impression that you don't get a lot of direct patient contact, and that's always left a bit of a question mark with me in terms of that as a career."

In addition to the role of the pathologist, the medical students as a group had some knowledge of or experience with the intellectual attractions of the work of pathology. One student was attracted to the reasoning process involved in morphologic diagnosis: "Whereas here it's more, you know, I'm looking for certain patterns. I'm trying to figure out what's going on. That's the aspect that I see different from a lot of other areas of medicine."

Theme Two: The role of the course in pathology in career choice
This section involves the participants' most direct comments regarding the effect that the course in pathology had on their perception of pathology as a career choice.

In the medical student groups, the discussions of the course itself often focused on the organization of the course, the quality of teaching or teachers, or the distributed notes in the course. It is not fully possible for students who have not yet made their final career decision to comment on the relative importance of factors they have not yet experienced. However, given this limitation, the students did perceive the course as being important. For example, one participant described the impact of a course as follows: "And I would say that in my life, I have never even considered pathology as a career or not as a career. Like it's something I've never

considered I guess until the course because it was really inspiring in the way that I love the basic science of it and it was the basic science that sort of led me to think back of oh, this could be applied clinically."

Courses can also have the opposite effect on students. As one student declared, "I think making the course as enjoyable as possible should be the number one priority, because I know, um, I've been turned off specialties completely by some of the weeks we've recently had."

Students emphasized the importance of good teachers and role models among the pathology faculty. Relatively few of these comments concerned issues such as knowledge of the subject matter; rather, students focused on style, enthusiasm for the subject, and personal warmth of teachers in the PBD course. Students stated that the course director in particular was important in the type of impression they formed regarding pathology. One student asserted a preference for: "…people who were really animated, lively people, lots of other stuff going on, because it kind of let me know that wow, you know, if I spent all my time in the lab with these people, they'll be really friendly individuals – which I wasn't exactly expecting."

The opposite was also noted. For instance, one commented: "I think the other way that we can really get to know the pathologist(s) are through PBL sessions like you mentioned – my experience actually wasn't so positive with my PBL tutor [*laughs*] who was pathologist. He was a bit stuff(y), uh, talked over our … and that's sort of a bit of where some of my, um, hesitancy with pathology comes from, is that influence from that PBL tutor."

This student appears to be forming a "not so positive" image of pathology through a PBL (Problem Based Learning session) tutor who was "stuffy" and not interested in the same aspects of the cases as the students were.

The resident group was able to discuss the course influences on their career choice in much different terms. They were able to put the course in perspective with other influences in their completed selection of a career. For the resident group, the influence of the course was, on the whole, felt to be less than other factors. More than one resident chose pathology despite a poor experience in their course in pathology: "And so, definitely my early medical school exposure didn't have anything to do with why I made my decision; it was more going through clinical rotations, and I'm glad that I realized that there was something called pathology that I could do, and not really try and do something else that didn't fit."

Some residents contrasted an enjoyment of the course in pathology with the attractions of a career in pathology: "I find that I – we always try to sort of get a gauge of how much a class might influence a career choice, but I think it's possible to enjoy pathology sitting in a classroom and find it interesting and not necessarily like the day-to-day practice of it, and vice versa."

The two pathology residents who were University of Toronto graduates and had completed the PBD course made comments that generally confirmed the views of the resident group. Neither had found the course the primary influence in making their career decision. One did not enjoy the course and made the decision based on an assessment of the clinical specialties, and with a personal knowledge of pathology from previous life and family experiences with laboratory medicine. The other resident had developed an active interest in pathology in high school, and had made the choice for pathology prior to entering medical school. The course reinforced a decision that had already been made.

In contrast to the residents, the pathologist group made several comments regarding the importance of the course in their eventual choice of their career. A lengthy rigorous course appeared to make an impression with these individuals, and influenced them favorably in terms of career choice.

Theme Three: Lifestyle as a major factor in career choice among students, residents, and pathologists
In the medical student, resident and pathologist groups the perceived personal advantages of pathology in terms of amount of personal time, and particularly the ability to have flexible work hours, was felt to be very important in attracting individuals to pathology as a career. One medical student put it very succinctly: "I think it's not the actual pathology, but the lifestyle that pathology offers you is very attractive." For some students, these lifestyle factors were influenced by gender. For example, as one woman said: "I looked at it more as, this is going to be a much more stable career, and that if it came across that you have a lot of control over the hours that you worked and for maybe probably females in the class, time in your career is – begins to become a larger issue as you think more and more about family issues and .…"

The advantage of pathology in terms of a physician's personal life was most prominent in the resident focus group. Much discussion involved comparisons of this aspect of career choice between pathology and the clinical specialties. As one resident simply stated, "Kids do not want to go into surgery. They want to go into something that will give them a good lifestyle."

The same ideas were reflected in the pathologist group. One pathologist commented on the flexibility of working hours in pathology: "As far as lifestyle goes, it's fantastic…So it's really great. If I have to leave early or nip out for an hour or something, just the control of the hours that you have, the flexibility is very very good."

Theme Four: The influence of rumor on career choice among medical students
During the medical student focus groups, one of the unexpected findings was the influence not of knowledge about specialties, but in fact the lack of knowledge of different specialties, and the atmosphere this creates around career choice. Many of the students' comments were

prefaced with phrases referencing the source, such as: "I said that to somebody once and they said…." Such comments question the reliability of students' sources of information. In fact, students sometimes explicitly stated that their information was not reliable in their own opinion. For example, in discussing the attractions of a specialty, one student said: " Money and lifestyle probably, or just the rumors of it. [*laughs*]". The competitive situation of the CARMS match fuels the rumors and their power, as reflected in comments regarding the popularity of specialties, such as one student's argument that "maybe that's why there's a cycle. Oh, that's popular this year because everyone wants it and then the rumor is, like, oh my god, that's so hard to get into, and everyone's, like, forget about it."

Theme Five: The influence of clinical experience and role models in choosing pathology
In contrast to the influence of the course, where students, residents, and faculty diverged in their opinions of the importance of this factor, the value of clinical experiences in pathology and other specialties surfaced as important in all groups.

In the medical student group, sometimes the value of even a brief elective was contrasted with the extensive course in pathology. One student stated, "Lecture based is great, but I don't think it entices me – it doesn't have the same power as if you spent even just a couple hours with a doctor."

The resident group also expressed the importance of electives in making their career choices. For physicians at this stage, the elective experience was not evaluated alone, but in comparison to the alternatives in other specialties. As one resident stated: "…[I] did an elective, and out of all the rotations that I had done, that experience was probably the most – the people I met there had an approach to problems, the kind of pathology that you saw, the kind of problems that you solved were more in sync with how I thought I wanted my career to be."

This resident appears to have chosen careers by doing a variety of electives and finally settling on pathology without any pre-existing idea that that was what he or she wanted to do.

More often, specialties were rejected after these clinical experiences showed that the specialty had an unattractive lifestyle or was not interesting to that individual. One resident described it thus: "So I looked at the kind of people that it attracted, like who my work colleagues would be, and the kind of work personality you needed to survive that residency, and I certainly didn't have the personality to survive the surgical residency – you know, very cut-throat and very competitive. You know, if you're not at the hospital for 48 hours straight, you're a slacker. That's not going to be me [*laughs*]"

Theme Six: Overcoming the negative stereotype of the pathologist in making career choices

The stereotypes and the stigma of pathology can be seen to be established very early in medical education. One student expressed the low prestige of pathology as follows: "It's not really negative – but I did hear it from a lot of people so it kind of just keeps creeping up – is the fact that pathologists are not, I don't want to say not respected – I'm sure they're respected – but it's just in terms of careers in medicine, they're not thought as highly of as some of the others."

A second medical student noted: "…something that interests me in terms of what I'm going to go into is the actually interaction that you have with colleagues, and I got a sense that there was very little of that with pathology." This comment reflects a negative impression of pathology as a specialty isolated in the laboratory, removed from other doctors.

Another recurring story in the theme of prestige involved the opinion that a physician who chooses pathology is a "waste" of an M.D. One participant described the reaction of his colleagues to his intention to enter a pathology residency as follows: "I said that to somebody once and they said, what a waste. Like not in terms of commenting on me, but just commenting on, we're being trained to be doctors to work with people, and to become a pathologist – just forget about all that…." The opinion expressed is that since pathologists do not deal directly with patients, they are in fact wasting their medical skills.

Finally, there was the perception that pathology lacked prestige because of low compensation. A student made the following comments in this regard: "I've heard students talk about the fact that, um, for example, pathologists are mostly salary-based, which I guess could be considered a drawback, since – I don't know how you put this – earning potential is limited…"

There were many similarities between the student and resident groups concerning this theme. The predominant image of the pathologist that the residents encountered was that of an eccentric, reclusive, perhaps clever, but not very socially competent individual. For example: "I think that my experience has been sort of, our attendings are of a different – they're a bit older, so they have different – they're a different – they're the classic eccentric pathologist, whereas the residents are a lot younger, and we tend to be a bit more – socially accessible, I think that's a good word."

This resident appears to be avoiding identification with the stereotypical image of the pathologist by attributing it to older pathologists, not the younger group he belongs to.

Similar to the medical student and pathologist groups, the residents had comments made to them by other physicians that expressed the idea that a doctor not involved with patient care was a "wasted physician". For example, the following comment was made to one resident after they said they were going to become a pathologist: "Pathology? But you're so good with patients!"

Table 1. Summary of the six themes regarding factors affecting pathology as a career choice.

Theme 1 - Medical students' perceptions (accurate and inaccurate) regarding the role of pathologists in medical care
Theme 2 - The role of the course in pathology in career choice • Course was most important in medical student and pathologist group. Non-content related factors such as teaching style or personality more important than content for medical students.
Theme 3 - Lifestyle as a major factor in career choice among students, residents and pathologists. • Most prominent factor in the resident group
Theme 4 - The influence of rumor on career choice among medical students • Students expressed that many of career decisions were based on class rumors
Theme 5 - The influences of clinical experience and role models in choosing pathology • All groups agreed that these were important influences on career choice, both in discovering or confirming pathology as a career as well as excluding other specialty choices.
Theme 6 - Overcoming the negative stereotype of the pathologist in making career choices • Negative stereotype known to even junior medical students. Dealing with stereotype necessary in order to select pathology as a career choice.

The residents who had chosen pathology eventually expressed a certain pride in their individuality and the choice they had made. As one declared: "I thought that I'm not a person who gets hung up a lot on what other people think, and I think you have to have that attitude to be in pathology – in order to stay in pathology."

In the pathologist group, this negative image was also expressed, although in a slightly different way. In the particular group interviewed, only one pathologist was a graduate of a Canadian medical school. The image of the pathologist in Canada was compared to the image of the pathologist that the participants had formed while studying medicine in other countries: "But I was going to pick up on what (F1) said, and my impression was very much the same. Coming from a South African system, you know there was a professor of surgery who was right at the top of the tree and there was a professor of medicine and there was a professor of pathology and there was the three of them – certainly at our medical school – they were very highly respected and equally respected and equally regarded members of that

community, and that does trickle down to students, and that's not something that I see yet in Canada."

Other comments were strikingly similar to those made by the residents and medical students regarding the prestige of pathology, and the perceived isolation of pathologists. One pathologist's comments regarding the image and isolation of pathology: "I mean, there are a lot of pathologists who always talk about other pathologists being very meek and not being – not wanting to create, to stir the pot about different issues. That's the impression that pathologists give to other pathologists, and therefore probably give to students; to some degree it's a vicious circle, I think, that maybe pathologists or some pathologists don't have a very high self-esteem professionally as pathologists, and that trickles down to the students."

In addition, in the pathologist group, the comments also related to the low prestige of the profession, as related to the remuneration of pathologists.

In the return-of-findings discussion, the two faculty participants agreed that pathology suffered from a poor image. In the case of the PBD course at the University of Toronto, the participants felt that the image of the pathologist suffered, as most of the exposure to pathologists came during the PBL sessions. In these sessions, pathologists were tutors and facilitators, and were not seen as experts by the students. The participants' own motivations for entering pathology were in part influenced by seeing pathologists as knowledgeable experts. When asked how to improve the image of pathology, the participants said most of the factors in need of improvement were outside the control of pathologists – namely remuneration and the availability of numerous desirable positions. A summary of the six themes is contained in Table 1.

DISCUSSION

There were three ideas that appeared central, unifying or novel in the results above. These are discussed below.

Changing motivations to enter pathology among the three groups. Our results suggest that the factors motivating the selection of pathology may be evolving across the generations represented in our subject populations. In the pathologist and resident study groups, an attraction to the intellectual content and thought processes underlying pathologic diagnosis were among the most prominent motivators expressed for entering into pathology. This would correspond to factors such as the "intellectual content of the specialty" in Murdoch's review[4] or an affinity toward the "methodology and technology" of a specialty in Jarecky.[16] The prominence of this factor vis-à-vis other common factors listed in the review articles of career choice, appears to be a central characteristic of the choice of pathology as a career. [4, 12] What arises across our focus groups, however, is a sense of change in how this primary determinant of career choice is reflected or expressed

effectively to students in their pathology course. In the pathologist group, these attractions appear to have been reflected in the course, while in the resident group, the course appeared to be only a small factor or not a factor at all in choosing pathology as a career.

As expressed by the pathologists in the return-of-findings session, the changing nature of instruction in pathology may have a role to play in the declining importance of the course in pathology. The two pathologists in the return-of-findings group expressed the idea that in problem-based formats, much of the exposure of pathologists to medical students may not show pathologists as experts, but rather as tenuous in their knowledge and unsure of themselves in relation to clinical problem-based learning cases. They are "facilitators of learning", rather than "teachers of knowledge". A similar opinion was expressed in 1998, when Herdson linked the declining profile of pathologists to changes in the curriculum, including problem-based learning.[26] In a commentary published in 1998, even Bosman, a defender of the problem-based curriculum for pathology, stated (p. 347) that the change to this format will involve "[giving] up our old identity" and "giving up the urge to defend pathology as a separately recognizable discipline…." [27]

For the medical student group, the course was felt to be important in career choice, but for this group, there were not many other influences to be considered. The students' positive comments regarding the course often centered more around positive personal experiences with individual teachers or with the course director, rather than around the course content itself. If we look at some of the characteristics of good role models described in the literature on medical career choice, they include "favorable persona" and "overt satisfaction with career."[8] These terms are quite similar to the descriptions used by the students to describe pathologists who influenced them positively in the course, such as "enthusiastic" or "approachable". It would appear that the characteristics of good role models found in medicine in general are also responsible for forming positive impressions in the PBD course, but are not related to the contents of the course. Thus students, similar to the residents, did not perceive the intellectual stimulation of pathology as being expressed in the course to the extent that their impressions of the course were dominated by other factors. It is noteworthy that the perceptions of the students appear to contradict those of the return-of-findings pathologists in terms of the positive perception formed regarding some pathologists in the course. However, on looking more carefully at these points of view, the pathologist return-of-findings group discussed the ability of the course to allow pathologists to make a positive impression by appearing like experts, while the medical student group seemed to express that they formed good impressions of pathologists not because of how knowledgeable they appeared in the course, but mostly for a host of other personal factors – for instance, ability and willingness to teach.

For the resident group, the impact of the course was far less than the importance lifestyle factors played in career choice. The resident focus group was dominated by women (seven of eight participants) and this may also have influenced the motivations expressed. From the literature review, it is clear that the increasing importance of lifestyle, and its special importance for women, is a finding found generally in doctors-in-training, not just pathologist trainees.[15, 16]

In both medical student and resident groups, the powerful positive or negative influence that short experiences and electives can have in the perception of a specialty and on career choice were repeatedly mentioned. These appeared to make a deeper impression than the lengthy, but less personal course. The power of such experiences has given rise to the studies of the literature in career choice that are the most experimentally oriented. In these studies, students are exposed to aspects of a specialty outside the mandatory curriculum. The effect of these interventions is then measured and described in these studies. The positive experiences in pathology as recounted by the participants in this study was similar to what has been described in the more experimentally oriented literature.[10,11] It would be of interest to duplicate these specialty-specific "incubators" in pathology, as some of the challenges to recruitment are shared with these specialties. For example, in psychiatry, one of the motivations for creating the special exposure to this specialty was to counter an "unfriendly medical school environment" by creating a "supportive environment for students interested in psychiatry".[11] This unfriendly environment is similar to the challenges of the stigma of pathology expressed in this study.

The stigma of pathology
The second theme found in all groups was the stigma and low prestige of pathology. This was known to the medical students, even with their very limited exposure to the clinical environment. From the literature this again is not surprising, although it has not been specifically examined in pathology. The study described by Hunt regarding medical badmouthing found that this was common and influential in the pre-clinical years.[19] The residents were well also aware of the stereotype of the pathologist, and in fact had confronted the stereotype in order to make the career choice they had. This stereotype is one of the difficulties in recruitment into pathology as students try to see themselves in and try on different specialties. The qualitative literature in this area emphasized the importance of role models in helping students in this task.[7] For example, the power of electives may be due to seeing pathologists who challenge the stereotype or may exhibit parts of the stereotype, but still appear happy and enthusiastic regarding their career.

The influence of rumor in career choice in medicine
Finally, in the medical student group the influence of rumor was prominent. The system for matching to a post-graduate position determines very much the course of the rest of the individual's life. The process is competitive, complex, and time-consuming. In this environment, rumors about specialties, or stereotypes such as those expressed

concerning pathology, often take the place of information or reflection regarding specialty choice. These rumors include such aspects as the nature of the work (e.g., amount of face-to-face patient care), and the financial rewards available. The subject of these rumors may also include the availability of residency positions and the degree of competition in each specialty program. The role of rumor in how medical students get specialty information has also been noted by other authors.[19]

There are several limitations to this study. Although qualitative work produces information of depth, the lack of numerical data limits conclusions regarding generalizability. This was, however, a deliberate choice of the authors in order to discover information not available in many previous studies of career choice. In addition it is necessary to clarify that although we analyzed the opinions and drew our conclusions from three age groups, this is not a longitudinal study as we did not follow the evolution of motivations over a period of time. Instead we interviewed three groups at one point in time and then compared and contrasted the motivations expressed by the different "generations" of doctors, each with their own unique educational and medical experiences that influence their career decisions. In addition this is a retrospective study. Particularly for the resident and pathologist group the passage of time alters the interpretation of events and the perception of motivation. Lastly, although the conclusions may be valid for Canadian physicians, many of the factors in career choice are jurisdiction-specific. For example, the number of residency positions and the rules for licensure, both of which are factors influencing career choice, are mandated by provincial governments in Canada, and therefore different factors will be at play in other jurisdictions.

CONCLUSIONS

The research question that motivated this study was to investigate the role of the introductory course in pathology among the many factors influencing career choice. In conclusion the course plays a role subservient to many other factors. The positive impressions formed from the course seem due more to skilled teaching and other less tangible personal factors perceived in teachers and tutors, than to course content. More important than the course for many students was the role of electives or other short, but personally intense, in-hospital experiences. For the most recent generations of doctors the attractions of the lifestyle available in pathology are very prominent. In addition, the perception of the desirability of pathology is formed from many other factors outside the course. These include often negative stereotypes about the specialty obtained from classmates or other non-expert sources. The lack of explicit, reliable information perceived by students may influence career choice and points to a future direction of effort: finding ways to provide medical students with more experiences and information during their medical education regarding the process of specialty choice and the nature of different specialties. This type of information may help combat the influences of rumor and stigma that surround

certain specialties, and empower students as they make this very important life decision.

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Assessing Students During the Problem-Based Learning (PBL) process

Phyllis Blumberg, Ph.D.

University of the Sciences in Philadelphia
600 S. 43rd St. Philadelphia, PA 19104 U.S.A.

Phone: (+) 1-215-895-1167   Fax: (+) 1-215-895-1112   Email: p.blumbe@usip.edu

ABSTRACT

This manuscript describes assessment processes that can be used during the normal conduct of Problem-based learning. The recent focus on assessment causes educators to consider different types of assessment methods designed for the purposes of improving students' performance. Scoring rubrics and Likert scale assessment forms can be used in both formative and summative assessments. Formative assessment can be an on-going and integral part of the learning and improvement cycle. Summative assessment can be based upon patterns of performance toward the end of the course. Students' written reports on their research on learning issues and integrative in-class discussions that follow after their research offer especially rich opportunities to assess students on many types of learning. Repeated observations of individuals working together throughout the in-class steps of the PBL process provide further opportunities for assessment. Appropriate assessors include faculty members, student peers and the students can assess themselves.

INTRODUCTION

Problem Based Learning (PBL) has been used in medical education for over forty years. With the recent focus on assessment, educators have become more attuned to how to assess students in PBL. Assessment should be designed for the purposes of improving students' and instructors' performance leading to further student improvement.[1] Feedback is an essential component of assessment. (Assessment can be contrasted with evaluation which is often done for the purposes of making pass- fail type judgments about students).[1] This paper will discuss different ways students can be assessed on their learning while engaged in the PBL process.

Current trends in assessment emphasize using different types of assessments including embedded and authentic assessments.[1] Embedded assessment means that assessment of student progress and performance are integrated into the regular teaching/learning activities, whereas non-embedded assessments occur outside of the usual learning process.[2] Use of embedded assessments of actual performance takes little additional class time and inherently has content validity.[2] Embedded assessments assess student progress and performance during the regular PBL session. An embedded assessment tool documents what took place during the learning process for the purposes of assessment. These tools often reflect what the assessors observed while the students were engaged in their learning or performing a task. Non-embedded assessments often take the form of tests. Authentic assessments mimic what is actually done in practice by asking students to engage in real tasks.[1] For student these tasks may be simplified, but the assessment should involve real performance. In authentic assessments, students are asked to apply what they learned to real situations, which for medical students would involve doing something that is similar to what physicians actually do. Contrasting these types of assessments (embedded versus non-embedded with authentic versus non-authentic), one could form a 2x 2 matrix to see that assessments can be either 1) embedded and authentic (the most desired assessments), 2) embedded and non-authentic, 3) non-embedded and authentic 4) or non-embedded and non-authentic (e.g., a multiple choice test is generally both non-embedded and non-authentic).

PBL is an instructional method involving different types of active learning opportunities. Because the students are actively engaged in learning in the classroom and demonstrate their progress as they master the content, or problem solving skills, this method provides numerous opportunities for authentic, embedded assessment that do not take away time from instruction. Since PBL employs many different types of learning, what students can be assessed on can vary. The purposes of this manuscript are to 1.) describe some specific assessment tools that can be used in PBL, moved comma and 2.) describe ways to assess students during the PBL process using embedded and authentic assessments.

Specific assessment tools: Likert scales, rubrics and critical incidents

Most assessments relating to specific steps in the PBL process, that will be discussed later in this paper, use the same types of embedded assessment tools, i.e., scoring rubrics [3] and Likert scale assessment forms, because they are very time efficient and yield equitable grading.[4] Likert scales usually have 5 points ranging from 1= not at all to 5= consistently demonstrates this trait or very much. The middle category is neutral. Examples of Likert assessment scales are question 1, 2a and 3 on Table 1. A rubric is a written summary of the criteria and standards that will be applied to assess the student's work. Rubrics transform informed professional judgment into numerical ratings. These ratings can be communicated rapidly and generally yield more consistent scoring.[3] It is usually constructed as a matrix with the criteria along the vertical axis and a brief description of the different standards of performance or levels of standards along the horizontal axis. An example of a scoring rubric is contained in Table 2. Faculty members, peers, and the learner him/herself can use rubrics and Likert scales to give students formative and summative assessments. Both Likert scales and rubrics are useful for conducting assessments based on in-class activities because they make the criteria clear and explicit in writing. [3] While this paper focuses on assessing students in PBL, it reflects current assessment trends using rubrics, Likert scales, embedded and authentic assessments. These tools and methods are used in primary, secondary and higher education with many different types of instruction.[1-3]

While scoring rubrics and Likert scale assessment forms can be used with many types of assessments, the specific assessment criteria employed are different depending upon what is being assessed. Specific scoring rubrics or assessment forms can be constructed along the lines of the examples given later to assess most desired specified learning outcomes. Narrative comments based upon repeated observations of student performance can further support these rubric or Likert scale scores.

Students and instructors can use the critical incident type of observations[5] to give specific examples of behaviors demonstrated during the PBL discussions. They can record examples of whatever is being assessed. A critical incident documents only those events that critical, influential, or decisive in the student's developing learning abilities. Usually there are only a few critical incidents noted for each student throughout a course so it is not an onerous job. While giving feedback, if someone notes an especially excellent or poor performance, the instructor should briefly record the incident so that it can be used as part of narrative comments on the student's performance written at the end of the course. This record should consist of a few sentences to jog the faculty member's memory.

Assessment considerations within the PBL process
The classical version of PBL is predicated upon the principle that discussion of a problem or case stimulates learning. All

material is discussed twice in the PBL discussions, once without prior preparation and then again after researching questions raised (called learning issues). This iterative process is shown in Figure 1. Discussion of what is known, what is unknown, and raising questions can occur simultaneously, not necessarily sequentially as shown in the figure. Because it is assumed that most readers are somewhat familiar with this PBL process I will comment only on specific ways of implementing the PBL process that can foster assessment of student learning. Many different types of assessments can occur through observations of the various steps of the PBL process. During each step or all of the steps together within the PBL process instructors and students can assess more than one type of learning simultaneously.

Many possible assessments are embedded within the regular PBL activities as these assessment flow from repeated observations of the students' regular performance in the groups. It is valid to use faculty members, peers and oneself as assessors. Peers and instructors complete assessment forms asking for evidence or absence of evidence of specific outcomes in their fellow students. The key is to sample enough observations without overwhelming everyone with the assessment process. Students and faculty members can rotate in and out of the observer-assessment role.

Assessments during specific steps within the PBL process
Generation of learning issues. Throughout the course of the discussion, the students naturally raise questions that they would like clarified. Toward the end of the session, the groups refer to their written list of questions to generate and refine learning issues, or topics that the students need to research on their own outside of class for further understanding. The students refine the questions, group and classify then to make the job of searching for answers more manageable. The questions can either require additional information on the specific problem or take the form of more general knowledge questions, which are preferred for promoting student learning. Questions on the specific problem can be transformed into general knowledge questions. A researchable question based upon a specific question relating to the patient would be, "what type of laboratory data would be indicated for patients like this and why?" This type of question can also require students to consider how strong the evidence is to support these laboratory tests in terms of efficacy and cost effectiveness.

The Association of College and Research Libraries defined five information literacy standards for higher education including: the determination of information needs, the acquisition of information effectively and efficiently, critical assessment of information and its sources, the incorporation of selected information into one's knowledge base, and the use of information legally and ethically.[6] The step of generation of learning issues is ideal for evaluating student's ability to define an information need.

Figure 1. Problem-based learning is an iterative process
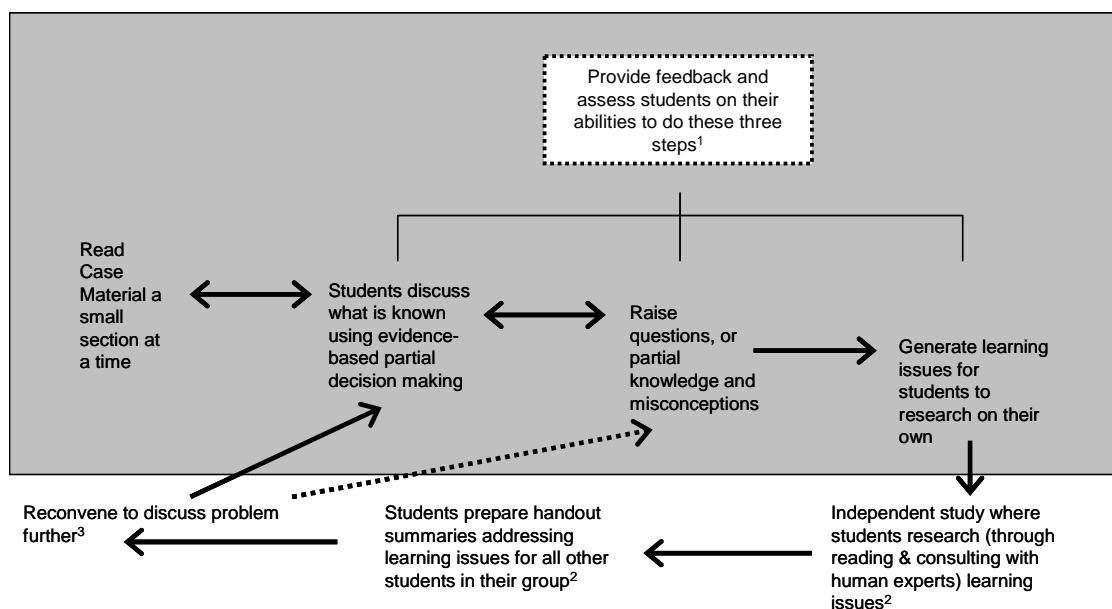
The shaded box indicates the steps that occur in small group discussions in class. All sessions of case discussions should include all of these steps.
1.   While the feedback phase usually occurs at the end of the session, it covers all of the steps in the process.
2.   The two steps below the shaded box on the right occur independently outside of class.
3.   The students reconvene in class for the second iteration of the case. This is not actually a step of the process, but a time marker.

Evidence-based decision-making has developed criteria to define a searchable question.[7] These criteria should guide the generation of learning issues. First the problem needs to be clearly identified. This problem should be structured as a specific question. The words of the question should be chosen to facilitate the search for information. A suggested format for defining a searchable question in medicine is called the PICO question. PICO is an acronym for P = problem or population to study, I = intervention, C = comparison, and O = outcome.[8]   An example of a good PICO question would be: For persons with dementia, will the use of environmental modifications decrease disruptive behaviors? The students' ability to define an information need can be directly assessed by asking the students individually to write their questions for further study, including asking them to formulate them as PICO questions, and collecting these questions. A scoring rubric would be helpful to efficiently assess these PICO questions and also a way to offer constructive feedback. Each of the letters in the PICO acronym can become a separate criterion for the rubric.   Then the faculty members develop 3-4 levels or standards of each criterion giving explicit differences between each level.   The levels would reflect the ease of obtaining useful and appropriate information.

Independent study, development of briefs. In between PBL group sessions the students research their own learning issues or questions (see the bottom, not shaded parts of Figure 1). Students then prepare a short (at most one to two pages including graphs or figures, and can be written in bullet points or outline) summary of the information they acquired to answer the learning issue question, and list their information sources, called briefs.[9] This written summary is not required in most PBL groups, but my experience indicates that it greatly increases the level of discussion when the groups reconvene.   Without the summaries prepared by the students, they come to class with large piles of photocopied or printed material that they refer to repeatedly in class and spend a great deal of time searching for information. Forcing people to abstract the essential ideas helps them to synthesize their knowledge, fosters reflection on their learning, and serves as a check as to whether or not they indeed did address the learning issues raised. Ideally these summaries should be sent electronically to the other students in their group and the instructor in charge of the course in advance of the next class session, and the students should have read the summaries generated by their peers prior to coming to class. When students compile all of the summaries of the learning issues, they develop a resource for further use that contains much information and appropriate resources.

Table 1. Peer and Instructor Assessment of Briefs

Circle the appropriate number for the questions asking for a quantity, use the space provided and the reverse side for open-ended items

	(5) completely / consistently	(4) mostly	(3) neutral	(2) slightly	(1) not at all	Unable to judge
1a. How appropriate was the search strategy used to obtain information to address the learning issue?						
1b. Comment on how to improve the search strategy						
2a.Considering how current, reliable and valid the resources were, how appropriate are the resources used?						
2b. Comments relating to the resources used						
2c. What additional resources, if any, would be appropriate to find information on this topic?						
3. How well did the brief address the learning issue from the case?						
4. List the strengths of the brief in terms of the specific learning outcome to be assessed (i.e., critical thinking)						
5. List the weaknesses of the brief on these specific outcomes						
6. Provide suggestions for improvement of the brief.						

Attached to each brief should be a brief tracking sheet, as shown in Appendix A, which can be used for documentation and for self-assessment on the acquisition of information effectively and efficiently. It is a good idea for the faculty members to develop a standard form and distribute an electronic copy of the form that the students can download and always attach to their briefs. The student preparing the brief should rate how useful their search strategy was for addressing the learning issue. For example they might write that this was too inclusive of a search strategy and they got several thousand possible citations to consult. This self-assessment can encourage students to seek help to define more effective searches. Librarians are very useful for helping students to formulate search strategies and identifying appropriate places to find information. A universal objective of PBL education is that the students become aware of the most appropriate resources to find the answers to different types of questions in addition to learning the content itself. Becoming aware of appropriate resources should help students to learn other material in the future. The use of tracking sheets helps students to identify appropriate resources for different types of questions.

Assessments from briefs. Instructors and peers can assess the briefs quickly using a standard, generic form such as found in Table 1. The review of the briefs should be done quickly to determine if they are satisfactory overall. Obtaining some feedback on each brief provides opportunities for immediate and continued improvement on the skills assessed. Students do not have to complete a form for every other student in his/her group every time, but each student should receive some feedback for most of the briefs submitted. Faculty members need to monitor the briefs more closely in the beginning of a PBL program or in a new class. As students progress, this type of formative assessment can be done less frequently. Faculty members and peers can use the same assessment forms, used to provide feedback earlier, for summative assessment on specific learning outcomes by reviewing the last few briefs and their tracking sheets the students develop for a course.

Table 2. Concept Map Assessment Rubric[11]

Criteria	Poor/unacceptable	Fair/Needs improvement	Good/acceptable	Excellent
Organization	No hierarchies of concepts are evident. The map is very difficult to navigate, hard to read, and sloppily presented.	Some concept hierarchies are present, but others are missing or disorganized. Map is difficult to navigate, or read, overall presentation is not polished.	Most essential concept hierarchies are present, and most are logically ordered. The map requires some work to navigate and read, but is presented in an acceptable manner.	All essential concept hierarchies are evident and logically ordered. The map is very easy to navigate, highly readable, and presented in a highly professional manner
Linkages	Many obvious linkages are not made, there are missing link descriptors or multiple invalid descriptors, and cross-links are not evident. There is little variety in the types of link descriptors.	Some obvious linkages are not made, and there are few cross-linkages. Link descriptors are present but lack variety or are non-specific. Some link descriptors are invalid.	All of the essential linkages are evident. Several valid cross-linkages are made. Link descriptors demonstrate variety and understanding of relationships between concepts.	There are multiple cross-linkages evident that demonstrate a deep understanding of the inter-relationships among concepts. Link descriptors are varied, specific, and clearly describe the nature of the relationships.
Integration	There is no evidence of the integration of past learning on the map.	There is some past learning evident on the map, but it is very basic knowledge and not integrated well with other concepts on the map.	There is evidence of more than one area of past learning on the map, and these concepts are cross-linked with other concepts.	Shows evidence of multiple areas of past learning, these concepts are very specific, highly relevant to the topic, and show multiple valid cross-links to other concepts.
Discovery	There is little or no evidence of the generation of new knowledge on the map.	The map demonstrates some areas of new knowledge, but the concepts are very basic, not clearly explained, and not linked appropriately to other concepts.	Shows evidence of substantial new knowledge, and the links and cross-links demonstrate acceptable understanding of the concepts and their relevance to the topic.	Shows several varied areas of new knowledge, and the links and cross-links demonstrate a deep understanding of the new material and its relevance to the topic.

A review of the briefs summarizing the student research on learning issues and their tracking sheets are excellent ways to assess students on several information literacy standards[6] including acquisition of information effectively and efficiently, critical evaluation of information and its sources, and the use of information legally and ethically. When faculty members or librarians provide formative feedback on the type of searches the students performed, the students can be encouraged to use more than lay search engines on the Internet.

Some topics will lend themselves better to assess of other specific learning outcomes than others. For example, a question that requires a review of different types of literature can be assessed for integrating different ideas or perspectives; whereas the identification of incidence or prevalence rates of a disease might only assess information literacy skills. Since information obtained from print or electronic sources is not directly related to the patient, students can usually be assessed on their ability to apply theoretical knowledge to the specific patient in the problem. Instructors should use their judgment in deciding if a topic can be assessed on specific types of learning outcomes in advance of reading the brief. They or the students might keep a record of what specific learning outcomes individual students have been assessed on and encourage students to take on different kinds of learning issue research throughout the course. Faculty members can also monitor that individual students are not always selecting the more factual issues to research (which are easy to research in textbooks)

and encouraging them to also select more integrative learning issues that require more extensive researching or reading different perspectives.

In my opinion, the briefs and the patterns observed from overall group discussions are the most important assessment tools in PBL. Because briefs are written, they can become a portfolio of the students' work throughout a semester. Further, it is easy to demonstrate to the students their progress over time. If faculty members rotate among groups without spending much time with each group, assessing the briefs can be an excellent way to determine what the individual students are learning and how well each group is adhering to the intended objectives. Briefs are also one of the few individual components of what is normally a group or collaborative experience.

Second discussion of the case. During the second iteration on the material, students reconvene to discuss material after researching their learning issues. During this discussion they should critically assess what they have learned and integrate multi-disciplinary content knowledge while addressing its application to the problem. On the second pass through the material, they follow a similar process of discussing the case only this time they are armed with much more information (see the shaded box in Figure 1). The explanation of new knowledge gained from learning issue research should emerge naturally from the case discussion. If more questions arise, and that often happens, they become learning issues for further study. Thus, the process is iterative. Students prefer to simply report on what they researched in little sequential monologues without an integrated dialogue on the problem; this practice should be avoided to allow for a more meaningful discussion. One mechanism that fosters a rich, multi-disciplinary discussion is to ask the students collectively to construct a concept map[10] summarizing what they know about the problem or case during the second pass with this material. Concept maps graphically illustrate the integration of all they know about a problem, showing relationships and hierarchies. [10] The construction of a concept map during the second iteration of the problem discussion integrating all of the group's collective knowledge, skills in inquiry, analysis and integration can be assessed by the instructors and the students using a rubric such as found in Table 2.[11] Instructors can use concept maps to assess the organization of knowledge into hierarchies, the associations and integrations among separate details. Generally the group would receive a group grade for their concept map. Even if instructors are not present for the discussion, they can assess concepts maps if they are handed in. Students can use computer programs such as "Inspiration" [12] to produce them easily and neatly. "Inspiration" is a computer software package that allows students to construct graphic organizers. Students can use the software to develop ideas and organize their thinking. It can be used to brainstorm, plan, organize, outline, diagram and write. The software uses standard conventions or symbols to show relationships, hierarchies, and consequences and, therefore, is very useful for constructing concept maps. Concept maps made on

"Inspiration"[12] are easier to follow than those made by hand or not using the standard notation of the software. Therefore, they are easier to assess. If they are constructed on a white board that has a computer camera attached to it often known as Smart Boards or Smart Sympodium, they can be electronically saved to a computer file.

Feedback phase. Feedback should occur at the end of each session, and groups need to reserve time for this formative assessment to occur before the group recesses for the day. Instructors often need to model how to give constructive feedback in a supportive way. Students might be asked to comment orally or use a written form to provide this feedback. A suggested format might be to give several statements or questions reflecting performance and ask the students to use a Likert scale to rate their assessments and write comments supporting the numbers they assigned.

Feedback on the discussion of the first iteration of the problem may concentrate on the quality of their discussions, their use of evidence-based decision-making, their ability to formulate learning issues, and the group functioning. Appropriate questions for formative feedback based upon the second iteration of the problem might be: 1) How much did you learn from this PBL discussion?; 2) How well did the PBL case discussion address the learning issues from the case?; 3) How well will you be able to apply what you learned from the case discussion to patient care?; and 4) an open ended statement such as please provide suggestions to improve the PBL discussions. The first three questions can use Likert scales and ask for comments. Such feedback assesses students' ability to become self-directed learners. Different people can be the assessors but peers and self assessments are essential to obtaining a fuller picture.

DISCUSSION

On a daily or weekly basis, the observations of student performance in the PBL activities or reviews of briefs should offer formative feedback to help students to improve. These types of assessments offer insights into how well the students are learning and are consistent with current accreditation standards such as those in the LCME[13] standards. These same assessment forms taken together can be used to look at repeated observations or reviews to determine trends and patterns. Such trends and patterns can become the basis for making summative evaluations. A summary of the narrative comments made throughout the semester should be included in the summative evaluations also. ED-32 of LCME [13] states that, "Narrative descriptions of student performance and of non-cognitive achievement should be included as part of evaluations in all required courses and clerkships where teacher-student interaction permits this form of assessment".

Faculty members who are accustomed to giving objective tests may be concerned with the reliability and validity of the kinds of measures discussed in this manuscript. The assessment literature indicates that using scoring rubrics or Likert scales yield reliable and valid measurements if the

criteria are appropriate and the description of the standard levels of performance are sufficiently grounded in real samples of different performance quality.[1-3] Repeated observations of students can indicate patterns of performance and therefore, are more reliable assessments. Rubrics and Likert scales can also be used to chart student progress over time.[4] Observations from a single class are usually not indicative of true abilities. Rubrics and Likert scales provide equitable measures because the same criteria are used for all students. This perception of equitable grading is especially important to minority students.[4] To further improve the reliability of these assessments, trained assessors who observe a sample of PBL sessions can do these observations. Training assessors, including peer assessors, involves practicing with specific feedback what to observe and how to consistently complete the rubrics or checklists. Since many of the assessments are both embedded and authentic tools, training students to be reliable assessors also serves to improve their learning and performance. The training process itself is instructive for the students as it can show them an excellent level of performance. During the training, students come to understand what is expected of them before they are assessed. Triangulation of data from different sources and collected over time results in valid measures of the student's learning. In assessment, triangulation, "refers to the attempt to get a fix on a phenomenon or (an interpretation) by approaching it via several independent routes. In short, you avoid dependence on the validity of any one source by the process of triangulation."[14] Triangulation supports a finding by showing that independent measures agree.[5,14] Triangulation can occur from different data sources, different times, different methods and different types of data.[5] In addition many of the assessments discussed here are authentic measures and as authentic assessments they mimic professional practice, therefore, they should have good predictive validity to future clinical work. These embedded and authentic measurements also have high face validity because they are based upon actual performance.

CONCLUSIONS

This manuscript describes the assessment processes for medical students that can be used during the normal conduct of PBL. Thus, assessment can be part of the learning process and not seen as taking away time from instruction. Formative assessment can be an on-going and integral part of the learning and improvement cycle. Summative assessment can be based upon patterns of performance toward the end of the course. Because students demonstrate the continual mastery of their learning in small groups in PBL, many opportunities for embedded, authentic assessment of student learning readily exist. Specifically, this manuscript describes the use of scoring rubrics, Likert scale assessment forms, and reflective comments in both formative and summative assessments. Appropriate assessors include faculty members, student peers and the student can assess themselves. The summaries of independent research that the students do to address their learning issues, called briefs,[9] are very useful for assessing

students on their a) developing information literacy skills, b) synthesis of their knowledge, c) application of knowledge to clinical problems, and d) their written communication skills. The briefs can become a portfolio of the students' work that can be very useful for documenting learning outcomes for LCME[13] or other accreditation agencies. When students develop concept maps[10] on the second iteration of the problem, they collaboratively integrate all that they know about a problem These concept maps can be used to assess a) how accurately they have mastered the knowledge, b) how appropriate is their synthesis of their older and newly acquired knowledge, and c) the organization and integration of their knowledge showing linkages among concepts, causes, effects and implications. Repeated observations of individuals working together throughout the in-class steps of the PBL process provide opportunities for assessment of a) knowledge; b) the integration of various theories, explanations, and multi-disciplinary perspectives; c) the individual's ability to work on teams or groups; and d) professional behaviors. Thus, PBL offers many rich and varied authentic and embedded assessment opportunities.

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Appendix A
Tracking Sheet for PBL briefs and documentation of resources consulted

Please attach this cover sheet to every brief you develop
Learning Issue Topic:
_____
Name of person who developed this brief_____

If you used a data base, describe your search strategies including key words and what search engine you consulted.

How successful was this search strategy to identify the right amount of information (1= not at all, 2= slightly, 3= neutral, 4=mostly, 5= completely) 1 2 3 4 5 and describe why.

How successful was this search in terms of addressing the learning issue? (1= not at all, 2= slightly, 3= neutral, 4=mostly, 5= completely) 1 2 3 4 5 and describe why.

List all resources you consulted including human, print and electronic. For print and electronic resources use a standard reference citation format. For people list their name, job title and their preferred means of being contacted (e.g, email address).
For each resource rate how useful this resource was for addressing the learning issue using the scale: 1= not at all helpful for this learning issue, 2 = somewhat helpful, 3= helpful for this learning issue, 4= very helpful for this learning issue.
1st CITATION RESOURCE CONSULTED

Usefulness of 1st resource consulted for this learning issue 1 2 3 4 5
2nd CITATION RESOURCE CONSULTED

Usefulness of 2nd resource consulted for this learning issue 1 2 3 4 5
3rd CITATION RESOURCE CONSULTED

Usefulness of 3rd resource consulted for this learning issue 1 2 3 4 5
4th CITATION RESOURCE CONSULTED

Usefulness of 4th resource consulted for this learning issue 1 2 3 4 5
Continue on another sheet if necessary.