BOSTON UNIVERSITY

BUMC

11th McCahan Education Day

Showcasing Educational Innovation and Scholarship
On the Boston University Medical Campus

Wednesday, May 25, 2016

School of Medicine

Division of Graduate Medical Sciences

School of Dental Medicine

School of Public Health

John F. McCahan, M.D.

Dr. John F. McCahan served as the Associate Dean for Academic Affairs at Boston University School of Medicine from 1976 until 2006. From November 2003 through May 2005 he also led the School of Medicine as the Acting Dean.

Dr. McCahan received his B.A. and M.D. degrees from the University of Pennsylvania. He subsequently trained in internal medicine at the Upstate Medical Center, Pennsylvania Hospital and Guy's Hospital, London. Following two years of service in the United States Public Health Service at the National Communicable Disease Center in Atlanta, he joined the staff at Lincoln Hospital in the Bronx and the faculty at Albert Einstein College of Medicine. He was appointed Director of the Department of Medicine at Lincoln Hospital in 1972. During this period Dr. McCahan was centrally involved in student and post-graduate training programs and became particularly invested in the care of the poor and the provision of health care services to underserved populations.

Following his recruitment to Boston University in 1975 as Associate Professor of Medicine, Dr. McCahan continued clinical practice with underserved populations through the Home Medical Service (now the Geriatrics Home Service). He regularly preceptored fourth-year students on home visits to frail elders. He developed a teaching program in family medicine and became a Professor of Family Medicine following the establishment of that department in 1997.

After his appointment as Associate Dean for Academic Affairs in 1976, Dr. McCahan oversaw numerous revisions and reforms of the M.D. curriculum. He guided a major change in curriculum governance and chaired the Medical Education Committee, created in this reorganization. Throughout his career he had a particular interest in the patient-doctor interaction and the teaching methodologies that resulted in effective clinical skills. He has actively taught, studied, and administered a variety of educational formats from large group lectures to one-on-one teaching, feedback, and evaluation. In recognition of his excellence as an educator, Dr. McCahan received the Frederick Jackson Teaching Award and faculty membership in AOA.

In addition to serving as chairman of numerous administrative and educational committees, Dr. McCahan was the principal investigator of several grants and contracts, including a PHS-BHP Grant to Establish a Department of Family Medicine; a PHS-BHP Predoctoral Training Grant in Family Medicine; and a Community Partnerships with Health Professions Education Initiative, W.K. Kellogg Foundation. He served as BUSM liaison and author of the Boston section of a plan for a statewide Area Health Education Center program. Throughout the years he earned the admiration of his colleagues for his ability to articulate and implement a clear vision of modern medical education.

Boston University Medical Campus

72 East Concord Street, L-103   Karen Antman, M.D.
Boston, Massachusetts, 02118-2526   Provost, Medical Campus
T 617 638 5300 F 617 638 5258   Dean, School of Medicine
busmdean@bu.edu   Professor of Medicine

BOSTON
UNIVERSITY

April 20, 2016

Dear Colleagues,

Welcome to the 11th Annual John McCahan Medical Campus Education Day. Dr. McCahan served as a distinguished Associate Dean for Academic Affairs at Boston University School of Medicine for 30 years.

We are pleased to offer BUMC educators a day of stimulating speakers and workshops for inspiration and sharing innovative ideas. Posters and oral presentations will cover a variety of topics to aid our educators in improving and reevaluating how we teach students, including evaluation, testing and assessment techniques, educational models and methods. This day provides an opportunity to consider your teaching skills and connect and dialogue with your colleagues.

Our keynote speaker this year, Dr. Colin Montpetit, is an Assistant Professor of Biology at the University of Ottawa and co-founder of the Ontario Consortium of Undergraduate Biology Educators. He played a key role in creating the Centre of Advancement in Pedagogy in the Sciences at the University of Ottawa, and promotes peer-mentoring, professional development, and the scholarship of teaching and learning as critical tools in advancing undergraduate biology education.

Sincerely,

Karen H. Antman, M.D.
Dean, Boston University School of Medicine
Provost, Boston University Medical Campus

ACKNOWLEDGMENTS

John McCahan Medical Campus Education Day is an initiative of the Medical Education Committee (MEC), supported by Provost and Dean Karen H. Antman, M.D. The MEC acknowledges with appreciation the work of the following faculty and staff who have contributed to the planning of this event:

The John McCahan Medical Campus Education Day Planning Committee:

Department of Medical Science & Education	Theresa Davies (Co-Leader of McCahan Day) Maura Kelley (Co-Leader of McCahan Day) Paige Curran (Office of Student Affairs) Gail March (Office of Medical Education) Hee-Young Park (Professor and Chair) Gloria Vachino (Biomedical Laboratory & Clinical Sciences)
BUMC IT, Educational Media	Jana Mulkern Kenith Wilson
BUMC Communications Office	Dan Madigan
BU Henry M. Goldman School of Dental Medicine	Mark Ferriero (General Dentistry) Andrea Maalouf (General Dentistry)
BU School of Public Health	Sophie Godley (Community Health Sciences) Rob Schadt (Teaching, Learning and Technology) Taryn Vian (Global Health)
Educators	Ariel Hirsch (Radiology) Stephanie Oberhaus (Microbiology) Kitt Shaffer (Radiology) Jeffrey Schneider (Emergency Medicine) Aaron Young (Physiology) Ann Zumwalt (Anatomy & Neurobiology) Monica Parker-James (Office of Academic Affairs)
Alumni Medical Library	Alissa Link Laura Sobel
Office of Medical Education	Jodie Trainor Patti Gibbs Elizabeth Rivera Ginny Potter Patricia Ward

Eleventh Annual
John McCahan Medical Campus Education Day

May 25, 2016
Hiebert Lounge

2016 THEME
Interactive Learning

SCHEDULE OF EVENTS

8:00-8:30 a.m.	**Registration / Breakfast**
8:30-8:40 a.m.	**Welcome Address** Karen Antman, M.D. *Provost, Boston University Medical Campus*
8:45-9:45 a.m.	**Keynote Lecture – Dr. Colin Montpetit** **Assistant Professor, Biology, University of Ottawa** Transforming the Large Enrollment Lecture Classroom into an Active Learning Zone
10:00-11:30 a.m.	**Workshop Sessions** *See workshop listing p. 14-20 for descriptions and locations*
11:30 a.m.	**Lunch/Networking/Vendors**
12:00-12:40 p.m.	**Deans Panel: Innovation in Teaching**

Megan Healey, MPH, PhD, Clinical Assistant Professor of Epidemiology, SPH
   Topic: Successes (and challenges) of integrating team-based learning in large classroom settings. Also will briefly mention our active learning strategies in the new MPH core courses
Allison R. Larson, MD, Assistant Professor of Dermatology, BUSM
   Topic: Experience with flipped classrooms and lessons learned
Celeste Kong, DMD, CAGS, Professor & Chair of General Dentistry, GSDM
   Topic: GSDM's digital dentistry innovation
Chelsea Epler Barbercheck, PhD, Program Director, BU's BEST program
   Topic: How BU's BEST (Broadening Experiences in Scientific Training) program is using workforce data to guide career development and how that translates into interactive learning workshops

12:45-1:15 p.m.	**Recognition Awards** *GMS Faculty Recognition Award* *BUGSDM Faculty Recognition Award for Educational Innovation* *BUSPH Educational Innovation Award* *BUSM Office of Academic Affairs Voluntary Faculty Award of Excellence* *BUSM Office of Academic Affairs Excellence in Service Award* *(See page 13 for descriptions)*

SCHEDULE OF EVENTS *(continued)*

1:15-1:45 p.m.   **Abstract Awards and Oral Presentations**

         Best Faculty Abstract
           Ahead Of The Curve: Restoring Implants Using Cerec At The Pre-Doctoral Level
           Hesham Nouh, BDs, DSc, MSD, Department of General Dentistry, BU Henry M. Goldman School of Dental Medicine
           See abstract listings page 48

         Best Faculty/Staff Abstract
           Pilot Test Of The General Observation And Reflection Platform (GORP) For Measuring The Level Of Activity In Classrooms At The Boston University School of Public Health
           Travis DiJoseph, M.Ed., Department of Global Health, BU School of Public Health
           See abstract listings page 30

         Best Student Abstract
           Lessons From The Spectrum Of Physician Advocacy-1 Free-Time Elective
           Katelyn Carey*, Karen Foo*, Genevieve Guyol*, Jawad Husain, Janine Petito, Molly Zielenbach, Johnna Murphy MPH, Megan Sandel, MD, MPH.

           * BU School of Medicine, Class of '17 authors contributed equally
           See abstract listings page 26

2:00-3:30 p.m.   **Poster Session/Networking/Vendors**

<u>Educational Vendors</u> will be showcasing their products in Hiebert Lounge after 9:00 a.m. throughout the day

Harvard Macy Institute

Professional Development Programs for Academic Health Care Leaders

Health Care Education 2.0 - Transforming your teaching for the digital age
October 16-21, 2016

Program for Post-Graduate Trainees: Future Academic Clinician-Educators
December 10-12, 2016

Program for Educators in Health Professions
January 8-18 and May 15-19, 2017

A Systems Approach to Assessment in Health Professions Education
March 5-10, 2017

Program for Leading Innovations in Health Care and Education
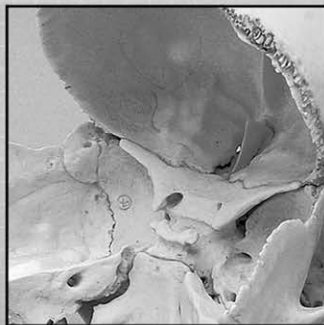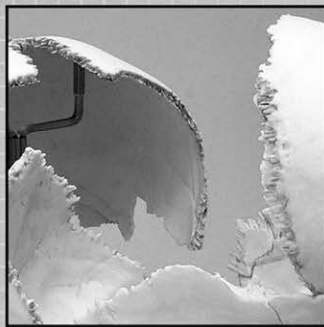June 11-16, 2017

Health Care Education 2.0 - Transforming your teaching for the digital age
October 15-20, 2017

2016-2017

Leading Change

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Applications now accepted online at www.harvardmacy.org

Interactive
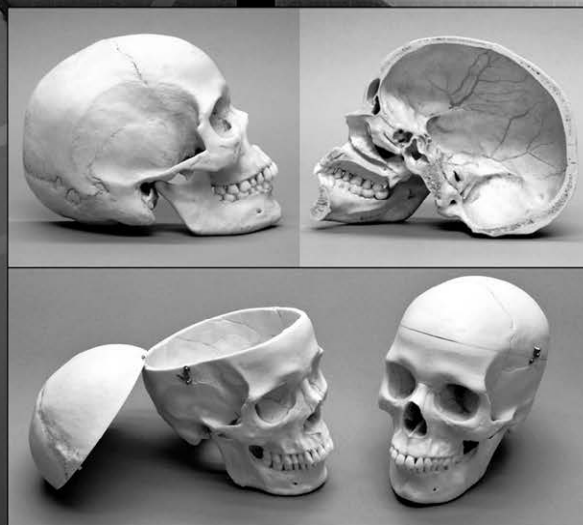# LEARNING SOLUTIONS

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Dean's Panel: Innovations in Teaching

The following faculty was selected by each school as representatives for the Dean's Panel:

School of Public Health

Megan Healey, MPH, PhD (healeym@bu.edu)
Clinical Assistant Professor of Epidemiology

Topic: Successes (and challenges) of integrating team-based learning in large classroom settings. Also will briefly mention our active learning strategies in the new MPH core courses

School of Medicine

Allison R. Larson, MD (arlarson@bu.edu)
Assistant Professor of Dermatology, Assistant Dean in the Office of Academic Affairs

Topic: Experience with flipped classrooms and lessons learned

Henry M. Goldman School of Dental Medicine

Celeste Kong, DMD, CAGS (cvkong@bu.edu)
Professor and Chair of General Dentistry

Topic: GSDM's digital dentistry innovation

Graduate Medical Sciences

Chelsea Epler Barbercheck, PhD (crepler@bu.edu)
Program Director, BU's BEST program

Topic: How BU's BEST (Broadening Experiences in Scientific Training) program is using workforce data to guide career development and how that translates into interactive learning workshops

John McCahan Medical Campus Education Day Awards

BUSM Office of Academic Affairs Voluntary Faculty Award of Excellence

This award honors our voluntary faculty members, community-based physicians who teach medical students and/or residents in one of BUSM's external teaching programs or travel to BUMC to teach on campus. These individuals are honored for their commitment to teaching, quality of teaching, impressive student evaluations and their overall commitment to the teaching mission of BUSM.

BUSM Office of Academic Affairs Excellence in Service Award

The Office of Academic Affairs' Excellence in Service Award was established in recognition of BUSM Administrators and Staff whose outstanding work within the curriculum supports the success of the school, faculty, and students. Areas of excellence can include, but are not limited to service, leadership, innovation, and/or teamwork.

GMS Faculty Recognition Award

The Division of Graduate Medical Sciences is committed to the highest quality educational experiences for our students. The GMS Faculty Recognition Award celebrates faculty who embrace our teaching mission by seeking ways to engage students in an active learning environment and by challenging students to think critically and supporting students to take ownership of their own scholarship. This award recognizes faculty that have gone above and beyond expected contributions by developing creative initiatives to our teaching mission including, but not limited to, innovative coursework, new curriculum design, and the support of an improved teaching and learning environment.

BUGSDM Award for Innovation in Education

The Award for Innovation in Education goes to the faculty member who best exemplifies the characteristics that makes our students excited about learning. This faculty member, through the use of technology or alternative modalities of teaching and assessment, has been able to inspire and motivate his/her students to achieve competency in their subject matter while enhancing student learning.

BUSPH Educational Innovation Award

BUSPH values its excellent reputation for innovative teaching and is proud to acknowledge excellence in teaching and learning through the BUSPH Educational Innovation Award. This award recognizes creative contributions to the development of tools for the innovative presentation of coursework, new curriculum design, and the creation of an improved teaching and learning environment.
The Educational Innovation Award is designed to reward faculty who are prepared to challenge the traditional ways of doing things, to try out new approaches and to seek improvements in the way teaching is delivered and learning is achieved. Its aim is to enhance the status of teaching, encourage innovation and disseminate good practice.

WORKSHOP DESCRIPTIONS AND LOCATIONS

All workshops run concurrently from 10:00-11:30 AM

WORKSHOP A - Room L - 201

ACTIVITY-BASED LEARNING:
DISRUPTIVE INNOVATION IN EDUCATION ACROSS THREE SCHOOLS

Gouri Gupte, PhD, MHA, Department of Health, Law, Policy and Management, School of Public Health; James Wolff, MD, MPH; Department of Global Health, SPH; Rachael Bonawitz, MD; Department of Global Health, SPH; Robert Lowe, MD; General Internal Medicine, School of Medicine, Sonia Ananthakrishnan, MD; General Internal Medicine, School of Medicine, Andrea Maalouf, DMD, MPH; Department of General Dentistry, Goldman School of Dental Medicine

Activity-based learning is a disruptive innovation in education that can transform teaching and learning. Instead of transmitting information to the student as is commonly done in a lecture, activity-based learning provides students a way to experience and interact with ideas and information. Because activity-based learning connects students with real world practical problems, it increases student engagement. Activity-based learning is generally convenient, easy to use, and can be constructed from traditional teaching methods, aligning and blending with pre-existing education pedagogy, competency mapping and assessment. Activity-based learning is modular and creates opportunities for meaningful collaborative work.

In this session we will achieve our workshop objectives by modeling activity-based learning and applying our experience to create a roadmap for introducing activity-based learning into our own teaching.

Target Audience: Educators using and interested in learning about activity-based learning to enhance students' professional skills and meet technical competencies.

Rationale: Traditional pedagogy, focused predominantly on educational theory and less on student engagement with the practice world, falls short in providing the active education current learners need. Disruptive education, in the form of experiential learning, creates an opportunity to motivate all students to master real-world skills and professional competencies through self-efficacy without remediation. Rigorously designed rubrics and innovative assessment methods of activity-based learning can identify quality teaching practices for educators.

Learning Objectives: By the end of the session, participants should be able to:

1. Review principles of activity-based learning and explain why it can be a disruptive innovation by participating in an activity-based learning exercise.
2. Identify the technical and professional competencies and skills that students can learn through activity-based learning.
3. Explain the benefits of activity-based learning for the various stakeholder groups: faculty, students, and the education community at large.
4. Analyze the challenges of activity-based learning and evaluate means by which to address these challenges.
5. Identify the process of establishing partnerships and mechanisms to successfully design and evaluate an activity-based learning course.

Outline:

Overview (10 minutes): Introductions, agenda and learning objectives, and session expectations. Clarify what is meant by disruptive innovation in education and why it is important and explain that we will be modeling activity based learning in the workshop. Break into workshop groups. Introductions, agenda and learning objectives, and introductory questions regarding session expectations.

Discussion-focused working groups using activity-based approach (60 minutes):

- Task 1- Activity based Learning examples (30 minutes): The facilitators will engage participants by creating working groups to identify and discuss activity based learning examples (this can include discussion of examples from workshop facilitators) (15 minutes) Lightning Round Presentations 3 minutes in plenary to present examples of activity based learning from each group. (15 minutes)
- Task 2- Benefits and Challenges (25 minutes): Working groups discuss benefits of creating an activity-focused classroom environment and then the challenges of implementing activity based learning in the classroom. Record discussion on flip charts. (10 minutes). The groups will then reconvene to present their thoughts (15 minutes).
- Task 3-Next steps (15 minutes): Using sticky notes, a silent reflection approach will be adopted to think of next steps for promoting activity-based teaching in their courses and across schools (7 minutes). This will be followed by review of thoughts and next steps (7 minutes).

Conclusion and final thoughts (10 minutes).

A resource list will also be provided to aid workshop participants for future reference and learning.

WORKSHOP B - Room R - 107

WHY ARE VIDEOS DOING ALL THE TALKING,
ENABLE YOUR STUDENTS TO TALK BACK TO MEDIA

Kenith Wilson, M.Ed., Educational Technologist, BU School of Medicine and
Vafa Akhtar-Khavari, Ed.M. Education Associate, Department of Anesthesiology, Boston Medical Center

Description

In the age of flipped classrooms, videos have become an integral part of the curriculum. But currently videos have linear motion – the only interactions students have with the videos is mechanical. The purpose of this workshop is to show how you can go a step forward and make videos interactive. This workshop will show how to take polls, embed questions, documents, PDFs and other links within a video.

1. YouTube Interactivity: Participants will learn how YouTube is more than just a video hosting platform and how by using simple inbuilt tools they can create interactive videos.
2. OfficeMix: Participants will learn to install and use this simple PowerPoint plugin to make interactive videos

Target Participants

Faculty and staff who are interested in creating interactive videos for teaching

Software Demo

Microsoft Office Mix
YouTube Embedding

Materials Provided

1. Electronic copy of the PowerPoint Presentation used at the beginning of the session
2. Paper & electronic copy of two handouts used during the demo portion of the workshop (OfficeMix & YouTube Embedding)

Rough Agenda

1. Introduction Presentation: 10 Minutes
2. OfficeMix Software Demo: 10 Min
3. OfficeMix Hands-On Session – 30 Min
4. YouTube Software Demo: 30 Min
5. YouTube Hands-on Session: 30Min
6. Conclusion Discussion: 10 Min

Learning Objectives

1. By the end of this workshop, participants will be able to:
2. Create instructional videos using MS OfficeMix
3. Embed quizzes & annotations in videos
4. Annotate YouTube videos
5. Embed multiple-choice questions/polls to the YouTube videos

WORKSHOP C - Room L - 209

WHEN BOTH LEARNERS AND EDUCATORS STRUGGLE:
DIAGNOSIS AND MANAGEMENT OF THE LEARNER IN DIFFICULTY
Evans Clinician Educator Workshop

Laura Hallett, MD; Rachel Casas, MD; David Chu, MD; Rebecca Lara, MD,
Fellows, Department of Family Medicine, BUSM

Presenters are part of the year-long "Achieving Mastery of Medical Education" course for fellows and faculty seeking additional skills in medical learning and clinical teaching. (CT 527/528)

Target Audience: All faculty, residents, and educators who work with medical students or trainees in the health professions, and who want to improve their skills in communication and working with challenging learners.

Rationale: Learners in difficulty are commonly encountered by educators in clinical and academic settings. Identifying and managing learners in difficulty, however, can be challenging even for experienced educators. This workshop explores types of learners in difficulty and presents a framework for diagnosing modifiable behaviors and facilitating feedback for change and remediation when needed. We will focus on learners struggling with behavioral issues, with a focus on burnout, insecurity, and inefficiency. This workshop will primarily address medical student learners, but the strategies discussed can be applied to learners of various levels and across all health professions.

Learning Objectives: At the conclusion of this workshop, participants will be able to:
1. Identify learners in difficulty and list categories of learner difficulties
2. Discuss types of challenging behaviors in learners in difficulty
3. Demonstrate feedback techniques using the SOAP model (Subjective, Objective, Assessment, Plan) to manage learners in difficulty with burnout, insecurity, and inefficiency

Timeline:
1. Brief introduction (5 min)
2. Identify types of learners in difficulty: brainstorming using think-pair-share (5 min) followed by group reflection (10 min) and creation of list together of different categories/ subtypes of learner difficulties.
3. Diagnosis of learners in difficulty: Group discussion to create a "differential diagnosis" for reasons for challenging behaviors (10 min)
4. Management of learn in difficulty:
   a. Discussion of feedback techniques and the SOAP model in large group setting (15 min)
   b. Skills practice (25 min).
      Participants will be divided into small groups for role-playing and to practice feedback techniques using the SOAP model, using cases of learners with burnout, insecurity, and inefficiency. Each participant will have a chance to role play as educator and learner.
5. Return to large group for conclusion and final reflection (10 min)

At the conclusion of the session, participants will be provided with a bibliography of relevant papers and articles containing further information on the diagnosis and management of learners in difficulty.

WORKSHOP D - Room L – 203

DON'T JUST GOOGLE, GUESS, OR CURBSIDE!
TEACHING WHERE AND HOW TO SEARCH FOR INFORMATION

Miriam Hoffman, MD; Department of Family Medicine, BUSM; Molly Cohen-Osher, M.D.; Department of Family Medicine, BUSM; David Flynn, MS (LIS); BUSM Alumni Medical Library, Medical Campus; Theresa A. Davies, PhD, Assistant Professor of Medical Sciences & Education, Director, Oral Health Sciences Program, GMS; John M. Wiecha, MD, MPH, Associate Professor of Medicine, Office for Academic Affairs, Department of Family Medicine, BUSM

*Participants are encouraged to BYOD (bring your own device) for the hands on portion of the workshop.

In this age of rapid information expansion, medical education can no longer be structured solely around information acquisition. We need to teach the concepts and lifelong learning skills of information management and mastery to be used at the "point-of-learning" and later applied at the point-of-care. These concepts can be difficult to teach, so we have developed the "Finding Information Framework" – a conceptual algorithm, web-based tool, and App – to structure how learners ask and categorize their questions and link directly to the most appropriate information resource to answer their question. This framework is the basis of our longitudinal Evidence-Based Medicine (EBM)/Information Mastery curriculum which is woven throughout the four-year curriculum.

During this workshop participants will get hands on practice using the web-based and App versions of the Finding Information Framework.

Target Audience:
Faculty, residents, staff, students

Learning Objectives:
Upon Completion of this workshop, participants will be able to:
1. Describe the importance of teaching information management and information mastery in health professions education
2. Use and explain the Finding Information Framework and how it is used in a longitudinal curriculum
3. Discuss approaches to implementing this framework and curriculum in your courses and rotations

Timeline and duration of activities:

0 – 5 minutes	Introductions, Learning objectives
5 – 15 minutes	Review EBM 4-year curriculum arc
15 – 30 minutes	Discuss core concepts in Information Mastery
30 – 40 minutes	Participant discussion of challenges in teaching information management, how to use information resources
40 – 55 minutes	Finding Information Framework Web version demonstration; use sample questions generated from audience discussion
55 – 65 minutes	Demonstrate App version of the Finding Information Framework
65 – 75 minutes	Cases: Finding real information for real patients
75 – 90 minutes	Discussion of how to use and implement in participants' courses/rotations

WORKSHOP E- Room L - 206

SCIENTIFIC TEACHING: MAKING TEACHING MORE SCIENTIFIC

Dr. Colin Montpetit, Ph.D., Assistant Professor, Department of Biology, University of Ottawa

Most if not all knowledge instructors acquire about teaching and learning is mostly through exchanges with colleagues. While we teach different content and different types of students in unique instructional settings and that we modify strategies in slightly (or major) different ways to meet our teaching and learning needs, the results identified by colleagues and in the literature may not occur. How then can instructors evaluate the impact of their approaches in the classroom and use this information to make informed decisions about their pedagogy? This session aims to familiarize faculty in exploring ways to evaluate pedagogical innovations used in their classes with the critical thinking, rigour, creativity, and spirit of experimentation that defines research. Participants will have the opportunity to form a community to reflect on how they can assess the impact of their pedagogical interventions through scientific means.

Target Audience: Educators of all types interested in reflecting on their pedagogy.

Rationale: Most college and university instructors lack the background to design or select teaching methods wisely. Reliance on shared stories from colleagues about how they teach and how their students learn in their classroom, and on how they were taught are factors that inform their pedagogical decisions with no attention to evidence either from the published literature or from our students about the validity of their approaches in their own classroom. Scientific teaching aims to bring a philosophy and framework to teaching that makes the process more rigorous, reflective, and evaluative. Scientific teaching is part of a growing effort to improve teaching and learning at the post-secondary level. Prior knowledge in teaching and learning theory is not essential and engagement in scientific teaching may encourage instructors to contribute to the growing field of scholarly literature in science education in higher learning.

Learning Objectives: By the end of the session, participants should be able to

- Describe the nature of scientific teaching and recognize that active learning, assessment, and diversity are core themes of scientific teaching.
- Define what an active learning exercise and develop a list of tools, strategies, and resources that can be used in the classroom.
- Develop a plan to evaluate learning regularly and making teaching decisions based on "scientific" evidence.
- Making scientific teaching an iterative process of review and revision.
- Developed a list of resources that can be used in the classroom.
- Developed an action plan for scientific teaching.

Outline:

1. Brief introductions, review learning objectives and ask for participant input/reflection about what they hope to gain from the session.
2. Discuss the challenges of implementing active learning strategies in the classroom.
3. Review basic elements of scientific teaching and brainstorm reasons for scientific teaching – how might this apply to medical training?
4. Analyze one professor's approach to teaching. Activity: Share prior knowledge, experience, and misconceptions about scientific teaching.
5. Discuss how active learning can foster a student-centered classroom.
6. Discuss strategies for designing active learning activities.
7. Think-pair-share: What evidence would convince you that students are learning in your course? What evidence would convince that your teaching strategies lead to learning?
8. Exit Assessment: What is scientific teaching? Give an example.

ABSTRACT THEMES FOR POSTER PRESENTATIONS

Education Technology

These submissions are meant to demonstrate creative use of interactive technology to augment learning. Appropriate types of submissions include course or clerkship websites, electronic clinical case simulations, online didactics, computer – based faculty development resources and electronic evaluation instruments. Submitted projects should be non-commercial although industry funding is permitted if the content and control of the project resides solely with the faculty authors.

Abstracts 1-2

Education Innovation and Research

These submissions showcase scholarship or ongoing research in education at BUMC. Projects can be presented prior to the completion of full evaluation. Examples of educational innovations include: development, implementation, or evaluation of educational tools, course curricula, simulations or innovative educational collaborations. For research, both quantitative and qualitative research may be submitted as well as research in progress.

Abstracts 3-34

Education Technology

1

THE EFFECTIVENESS OF PREPCHECK SOFTWARE AS A TEACHING AID IN PRECLINICAL FIXED PROSTHODONTICS

Louis M. Brown, DMD, CAGS; Sharron Rich, MPH and Celeste V. Kong, DMD, CAGS; Henry M. Goldman School of Dental Medicine

As digital assessment tools have become available for use in preclinical fixed prosthodontics courses, it is necessary to measure their effectiveness as teaching aids. These measures are still lacking in the literature. While some work has been done on other tools, so far there has been little reported on the prepCheck application within the Cerec system.

We have begun studying student skill development when aided by the use of the prepCheck application. We have tried to measure effectiveness is various ways; comparing a control group of students trained prior to the availability of prepCheck to students trained with it, as well as by surveying various groups of students and faculty regarding its perceived value. Through this work we hope to obtain evidence of the benefit prepCheck will provide as a teaching aid.

CREATING AN ONLINE ACTIVE-LEARNING WORKSHOP TO HELP GRADUATE STUDENTS AND POSTDOCS SET CAREER GOALS

Sarah Chobot Hokanson, PhD; Professional Development & Postdoctoral Affairs; Bennett Goldberg, PhD, Physics & STEM Education BU, Jeffrey Engler, PhD (University of Alabama Birmingham), Donald Gillian-Daniel, PhD (University of Wisconsin-Madison), Colleen McLinn, PhD (Cornell University), Craig Ogilvie, PhD (Iowa State University)

Individual Development Plans (IDPs) can inform the development of mentoring/training plans in grant proposals and help graduate students and postdocs set measurable and attainable goals that will create a trajectory for their long-term career success. Boston University created a new template for graduate students and postdocs to analyze their professional skills and career aspirations and connect those to actionable goals to be completed within the next six months. To encourage our graduate students and postdocs to apply the new template, Professional Development & Postdoctoral Affairs and STEM Education Initiatives at BU partnered with four other institutions within the Center for the Integration of Research, Teaching, and Learning (CIRTL) Network to offer an online workshop focused on helping graduate students and postdocs begin the IDP process. The workshop applied a common framework for active learning professional development workshops that combines backward design together with online, blended learning. Over 75 graduate students and postdocs across 20 institutions from Alaska to Puerto Rico participated in an online interactive learning community to use the new template towards developing a plan for talking through their goals with their advisor/mentor. This workshop was also offered locally in collaboration with BU's BEST Program to 35 graduate students and postdocs in early December. Pre- and post-assessments indicate that 76% of online and 85% of in-person participants intend to follow-up with their mentor to discuss their IDP following the workshop.

Education Innovation and Research

3

BU'S BEST GUIDE TO CAREER DEVELOPMENT

Chelsea (Epler) Barbercheck, PhD; Program Director, Division of Graduate Medical Sciences, BUSM; Deborah Fournier, PhD, M.S., Assistant Provost for Institutional Research and Evaluation, Director BU-CTSI Evaluation, BUSM; Kimberly McCall, PhD, Professor of Biology, BU; Linda Hyman, PhD, Associate Provost, Division of Graduate Medical Sciences, Professor of Microbiology, BUSM; and Barbara Schreiber, PhD, Associate Professor of Biochemistry Director of Graduate Studies, BUSM

As the biomedical workforce continues to evolve, what was once referred to as an "alternative career" is no longer an accurate way to describe the diverse paths that biomedical PhDs are taking. As such, NIH-supported BU's BEST strives to assist BU biomedical doctoral students and postdocs (trainees) in learning about career options available in the biomedical workforce. Additionally, the program hopes to identify and equip trainees with those skills necessary for successful entry into careers of their choice. BU's BEST has divided the career options a trainee might pursue into six broad "career tracks"; research-intensive (includes academic, industrial, non-profit, and governmental research), business, teaching, law, policy and communications.

Using one career track (the policy track) as an example, we demonstrate how a trainee may move through the program to find and prepare for a fulfilling career. The trainee can avail him/herself of numerous tools made available by BU's BEST including current workforce data, preparation of an individual development plan, alumni mentoring networks, career exploration seminars, skill enhancement workshops, internships, one-on-one career coaching and more. Although we only show one career track here there are similar actions to be taken for all six career tracks.

BREAKING GROUND WITH A DIGITAL BADGE PROGRAM IN MEDICAL EDUCATION A NOVEL METHOD TO TEACH MEDICAL STUDENTS POPULATION HEALTH METRICS AND ANALYSIS

Ramon Cancino MD, MSc (BUSM); Austyn Young, MD (California Health and Wellness); Helen Jin, BS (BUSM)

Background: The ACA emphasizes health care quality measurement and improvement for patient populations. Academic Medical Centers must define methods to effectively promote faculty and trainee engagement in QI initiatives within the structure of current medical education. While relevant education has focused on structured didactic learning and/or projects, few teach how administrative data can drive the QI process.

Aims:

Teach: quality metric evaluation at an urban community health center using data from an electronic health record.

Teach: how to build and analyze control charts.

Analyze: the impact of an "integrated" Behavioral Health Unit on this data.

Develop: QI initiatives based on control charts results.

Methods: Medical students reviewed aggregated, de-identified visit data. Data was stratified by provider, specialty, and month for the time-period January 2014 to September 2015. The project occurred during medical school rotations. Student #1 developed a project Spring 2015, and Student #2 continued the project in Fall 2015.

Results: Four Run Charts (created and analyzed by students)

Discussion/Implications:

Increased emphasis health care delivery quality impacts medical education's QI curricula. Current interventions are not well-integrated into curricula and literature reveals a paucity of interventions promoting analytical methods integral to high-yield QI projects.

Example Control Charts

Figure 1. An example finding from student analysis using one set of metrics. From this finding, a student may develop a QI project.

Figure 2. A second example finding from student analysis. A student may develop a second QI project from these findings.
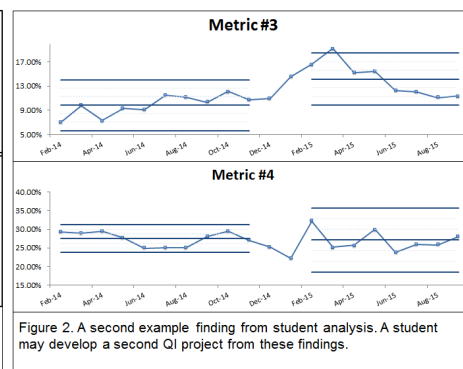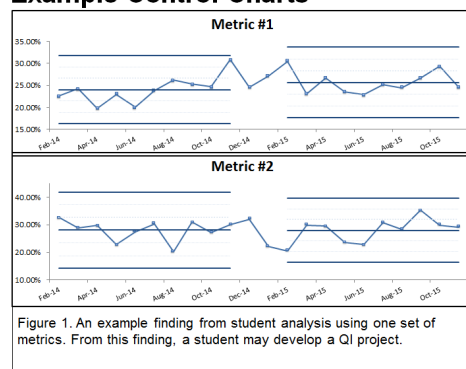
This project illustrates the feasibility of involving medical students in quality metric analysis to identify new clinically relevant targets for QI. Second, this approach can provide vital benefits to students and sponsoring medical practices alike, since analysis and intervention meet students' educational needs while improving clinic practices. Lastly, the success of this project demonstrates that there is room to build population health research and QI capacity in medical education using a systematic framework and "big data" tailored to real-world issues in clinical practice.

LESSONS FROM THE SPECTRUM OF PHYSICIAN ADVOCACY-1 FREE-TIME ELECTIVE

WINNER

Katelyn Carey,* BUSM '17, Karen Foo* BUSM '17,
Genevieve Guyol* BUSM '17, Jawad Husain, BUSM '17;
Janine Petito, BUSM '17; Molly Zielenbach, BUSM '16,
Johnna Murphy MPH, Boston Medical Center Department of Pediatrics
Megan Sandel, MD MPH, Associate Professor of Medicine, Department of Pediatrics, BUSM.
*authors contributed equally.

Introduction: Boston University School of Medicine (BUSM) provides unique opportunities to learn about nonmedical barriers to health among underserved populations. One example is the student-led, faculty-mentored Spectrum of Physician Advocacy-1 (SPA-1) elective[1]. As the importance of advocacy training in undergraduate medical education gains recognition[2,3], we sought to evaluate the effectiveness of the SPA-1 curriculum and measure students' attitudes, knowledge, and confidence around health advocacy.

Methods: Surveys assessing student demographics and advocacy attitudes, knowledge, and confidence were administered to 24 students enrolled in SPA-1, before and after completing the course, and to a control group of 32 first-year medical students not enrolled in SPA-1. Pre- and post-intervention data were analyzed using paired t-tests. Pre-intervention and control groups were compared using Fisher's exact or chi-square tests.

Results: We found statistically significant improvement in students' attitudes, knowledge, and confidence after completing SPA-1. Demographics and advocacy knowledge at baseline were not significantly different between class-takers and controls. Compared to controls, students enrolled in SPA-1 had more favorable attitudes towards advocacy (p=0.0047) but less confidence in their advocacy skills (p=0.0434) prior to completing the course.

Discussion: Our findings demonstrate that student-led, faculty-mentored curricula can be an effective model for advocacy training in undergraduate medical education. Additionally, we found that students who opted not to take the SPA-1 elective exhibited greater confidence in their advocacy skills, despite equivalent baseline knowledge compared to those enrolling in the class. This suggests that confidence is not a good predictor of advocacy knowledge. Thus, even students who feel comfortable with their skills may benefit from advocacy training. As a whole, our findings reinforce the value of integrating advocacy training into undergraduate medical education.

Next Steps
- Investigate strategies to incorporate advocacy education into core curriculum, while maintaining learner-centered model.
- Characterize and address interests of BUSM students not currently engaged in advocacy programming.

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2. Croft D, Jay SJ, Meslin EM, Gaffney MM, Odell JD. Perspective: Is It Time for Advocacy Training in Medical Education? *Acad Med*. 2012;87(9):1165–1170.
3. Bhate TD, Loh LC. Building a Generation of Physician Advocates. *Acad Med*. 2015;90(12):1.

COMMON THREADS: REFLECTIVE PRACTICE CONNECTING MEDICAL GENETICS CONCEPTS ACROSS AN INTEGRATED CURRICULUM

Shoumita Dasgupta, Ph.D. Associate Professor of Medicine

Recent curricular surveys have identified increasing numbers of medical schools moving towards integrated pedagogical models. At the same time, AAMC data indicates that the average proportion of the pre-clerkship curriculum dedicated to medical genetics is approximately 2%[1]. An integrated curriculum structure risks diluting the genetics concepts until the discipline identity is lost. To help preserve the identity of genetics within an integrated curriculum, a longitudinal reflective practice was introduced into the first year Principles Integrating Science and Medicine (PrISM) curriculum. This activity was tied to a series of patient visits held in four distinct modules of the PrISM curriculum. Following each patient session, the students were given an in-class reflective writing prompt. For the first two sessions, the anonymous writings focused on the stories' connections to their own lives and values, and subsequent sessions were paired with preceding patient visits. For example, the students' fall semester writings from meeting the parent of a child with trisomy 18 were returned to the their peers for further comment after a spring semester session featuring a self-advocate with Down Syndrome. The writing guided students to contrast the similar genetic etiology and dramatically different prognoses of these conditions. Likewise, the students' fall semester reflections about women harboring hereditary breast and ovarian cancer-predisposing mutations were returned to their peers in the spring semester, after meeting a guest with multiple family members affected by Huntington's Disease. While both are single gene disorders with genetic testing options, the ability to select risk reducing procedures in one was juxtaposed with receiving a prediction for an incurable disease in the other. By structuring these reflective writings to highlight the common threads and contrasting outcomes between conditions, the students engaged with the clinical relevance of the genetics content and grappled with the ethical ramifications of genetic testing.

[1]Plunkett-Rondeau J, Hyland K, Dasgupta S. Training future physicians in the era of genomic medicine: trends in undergraduate medical genetics education. *Genet Med*. 2015. doi:10.1038/gim.2014.208.

MASTERS PROGRAM SERVES AS EXCELLENT PIPELINE FOR ADMISSIONS TO BU DENTAL

Theresa A. Davies, Ph.D., Director, MS in Oral Health Sciences Program, Department Medical Sciences & Education, GMS, BUSM; Barbara M. Schreiber, Ph.D., Associate Professor, Department of Biochemistry, BUSM; Michele Stahlberger, B.A., GMS; Majed Abbas, B.A., GMS; Cataldo Leone, D.M.D., D.M.Sc., Associate Dean for Academic Affairs; Department of Periodontology and Molecular & Cell Biology, BUGSDM

Purpose: BU Goldman School of Dental Medicine (GSDM) in collaboration with GMS at BUSM implemented a pipeline program in 2005 to increase the number of under-represented minority (URM) as well as socioeconomically disadvantaged students to GSDM. This Oral Health Sciences (OHS) master's program aims to enhance the academic preparedness of students who had previously applied to dental school and had not been accepted. OHS students have the opportunity to demonstrate improved academic skills by enrolling in several DMD 1 and graduate level courses.

Methods: Students enrolled in OHS during the years 2006-2015 were evaluated and race and ethnicity, undergraduate GPA, and socioeconomic status data collected from admissions records. Success in the program was assessed by evaluating GPA in the program (OHS-GPA), DAT scores and successful matriculation to dental school. Criteria were evaluated to determine if any parameters could serve as a predictor of success and thus aid in admission selection. Success during the first 2 years of dental school (Y1 and Y2) was also evaluated. Mean values of each parameter were compared by ANOVA.

Finding: The OHS program has been very successful with 90% of graduates matriculating to dental school (152 of 168 students). The average OHS-GPA for graduates matriculating to dental school (3.5 ± 0.31, n=156) was significantly higher than the OHS-GPA average for those students who did not gain admission (2.96 ± 0.22, n=17), respectively ($p<.001$).

A total of 56 URM students matriculated to dental school with credentials significantly lower than traditional DMD students nationally with respect to UGPA (3.04 ± 0.27 vs 3.48 ± 0.70) and DAT scores (18.11 ± 2.06 vs 19.15 ± 0.52). The DMD Y1 and Y2 GPAs for those OHS-URM students who matriculated to BU dental were comparable to traditional 4 year DMD students (3.44 ± 0.009 vs 3.37 ± 0.149 $p=0.33$ for Y1 ($p=0.64$) and 3.40 ± 0.003 vs 3.30 vs. 0.048 for Y2 ($p=0.189$).

Conclusions: OHS serves as an excellent credential-enhancing pipeline program increasing the numbers of minority students entering not only GSDM but dental schools across the country. These URM students perform equally as well as their traditional DMD counterparts during Y1 and Y2 indicating a strong performance in the master's program is predictive of future success in dental school.

INCORPORATING CLERKSHIP LEARNING OBJECTIVES INTO THE 3RD YEAR INTERNAL MEDICINE ROTATION: DEVELOPMENT OF A GUIDE TO IMPROVE LEARNING AND FEEDBACK ON WARD TEAMS

Julien Dedier MD, MPH and Sonia Ananthakrishnan, MD, BUSM

Introduction: The Medicine 1 clerkship attempts to promulgate its educational goals to students and members of the inpatient team, but there is reason to believe inpatient team members are not sufficiently aware of them and/or do not discuss expectations on how to best achieve them with medical students. The initial team orientation (I/O) meeting is a venue where all team members should discuss roles, mutual expectations and other information relevant to operating as a team smoothly. The overall goal of this program was to develop a curricular tool to use in the I/O that (i) presents the M1 clerkship's objectives for student education to all team members, (ii) guides team members to effectively support clerkship goals, and (iii) encourages residents and attendings to clearly communicate their expectations of students. This program also aims to stimulate the I/O meeting to occur more regularly.

Methods: **Interview phase:** We conducted 2 rounds of in-depth structured interviews with M3 students, IM residents and DOM ward attendings to assess awareness of Medicine 1 clerkship educational objectives and team member roles and perceptions of the inpatient I/O as a key venue for negotiating mutual expectations. We used NVIVO qualitative analysis software to identify emerging themes and concepts and used these to construct a printed guide for the I/O meeting. **Assessment-only phase:** Next we surveyed all members of 4 medicine teams 2-4 days after they assembled and again at the end of their rotation to assess the occurrence, content and impact of I/O meetings prior to our intervention. **Intervention phase:** We have recently implemented the guides and training to use them into clerkship and residency curriculum. At present, we are surveying teams to assess our program's effect on outcomes measured in the assessment only phase.

Results: We interviewed 10 Medicine 1 clerkship students, 9 IM residents and 5 DOM attendings. Using a priori clerkship priorities and themes that arose from interviews, we developed complementary student and resident guides to the inpatient I/O. These guides focus on the 3 main Medicine 1 clerkship student goals: 1) meaningful involvement in patient care, 2) learning comes first, and 3) eliciting useful feedback. They also highlight clerkship expectations of residents and attendings, and present a format to conduct the I/O. We also developed training presentations for residents and students that highlight guide content and equip the stakeholders to use them on the wards. In the assessment-only phase, we are surveying 4 medicine teams (n=24) to ascertain current practices. Analysis of all survey results are in progress.

Conclusion: We were able to create written guides and a training program that students and resident team leaders can use routinely at the I/O to structure a discussion of M3 education that incorporates the M1 clerkship's learning objectives. The goal of the present intervention phase is to study the impact our guides and training programs have on team awareness of the Medicine 1 clerkships goals for 3rd year students, and whether this awareness leads to increased implementation of the clerkship goals into the student ward experience.

PILOT TEST OF THE GENERAL OBSERVATION AND REFLECTION PLATFORM (GORP) FOR MEASURING THE LEVEL OF ACTIVITY IN CLASSROOMS AT THE BOSTON UNIVERSITY SCHOOL OF PUBLIC HEALTH

WINNER

Travis DiJoseph, M.Ed. and Taryn Vian, Ph.D., Department of Global Health,
Boston University School of Public Health

Background and Purpose: Classroom observations are intended to encourage discussion around teaching and learning while fostering an environment where reflection and innovation are nurtured. The General Observation and Reflection Platform (GORP) is a web-based software application developed at the University of California, Davis, to identify and record the activities both instructors and students are engaged in during a class meeting. While GORP has previously been used to observe STEM classes, to our knowledge it had not been used in a School of Public Health. To test whether the tool could identify instructional styles and strategies used in public health teaching, and whether the tool would be accepted by faculty and students, we conducted a pilot of the GORP tool during the Fall 2015 semester.

Methods: We observed four graduate-level BUSPH courses—two with 60+ students, and two with 20-25 students. Trained student or staff observers attended four sessions of each course, chosen by the observer with input from instructors. GORP software was used on laptops, and observers attempted to sit in discreet locations. Observers recorded all activities engaged in by students and instructors in two minute intervals, according to preset activity categories. Following the final observations, data were downloaded and analyzed to determine the relative frequency of different types of activities (e.g. group work, listening, filling out worksheets, lecturing). Patterns of activity were compared to models from prior research to identify the instructional style and strategies most commonly utilized in each course.

Findings: Regarding acceptability, we found that the faculty and students did not mind being observed, and faculty appreciated feedback generated using the GORP data. Our findings suggest that BUSPH courses, regardless of size, incorporate more student-centered instructional styles and strategies when compared to other institutions that have conducted observations using GORP. Pre-existing codes did not allow us to capture some activities used in BUSPH classes, such as asking students to lead a class discussion or give a presentation. Reports showing individual session data seemed helpful to faculty, as the data seemed to reveal places where time could be spent more wisely.

Conclusion: It is feasible to use the GORP protocol for observing classroom activities in a School of Public Health, although new codes are needed. The tool is effective in identifying teaching style and strategies, and provides flexibility in how these data are presented. The GORP tool's cost and the effort needed to observe classes should be compared to other observation tools before adopting more broadly.

THE SNAP CHALLENGE: EDUCATING THROUGH EXPERIENCE

Jonathan Duskin, Student, BUSM, M1; Maria Loren Eberle, Student, BUSM, M1; Jacquelyn Piraquive, MS, Student, BUSM, M2; Joshua Mervis, Student, BUSM, M2; Joseph Chung, Student, BUSM, M2; David Hui, Student, BUSM, M2; Iris Trutzer, Student, BUSM; Kathy A. Ireland, MS, RD, LDN, Department of Pediatrics and Pediatric Nutrition and Fitness for Life, BUSM; Aaron J. Manders, MS, RD, LDN, BMC.

Problem: Over the last 4 years, the Student Nutrition Advocacy and Action Council (SNAAC) at the Boston University School of Medicine has conducted the SNAP (Supplemental Nutrition Assistance Program) Challenge for the BU community. The SNAP Challenge asks participants to live on a weekly SNAP budget, approximately $32, for 7 consecutive days. The goal of this program is to help students gain a better understanding of food insecurity, thereby helping them develop empathy for their patients who struggle with food insecurity and giving them more confidence speaking to patients about their resource needs. For the second consecutive year, SNAAC has completed a formal evaluation to determine if the SNAP challenge met its aforementioned goals, and to determine whether it would be beneficial to formally include it in the BUSM curriculum. This year saw a two-fold increase in participants, increasing our sample size from 12 to 36.

Objectives: To evaluate the effectiveness of the SNAP challenge as a food insecurity education tool for students and their preceptors and to assess whether the SNAP Challenge should be included in the medical school curriculum

Methods: For seven consecutive days, participants lived off the average weekly federal SNAP benefit of $32. Participants were asked to complete a 22-question post-challenge survey to assess adherence to the SNAP challenge requirements, individual experiences over the course of the week, and opinions on the SNAP challenge as an educational tool. Descriptive analysis was performed.

Results: A total of 36 students participated in the SNAP challenge: 47% reported successfully completing the challenge, 97% mentioned gaining a better understanding of food insecurity, and 92% agreed that participating in the SNAP challenge was a worthwhile experience. In addition, 97% felt more empathy for patients with food insecurity and 64% reported that they felt more comfortable talking to their patients about food insecurity after completing the SNAP challenge.

Discussion: The SNAP challenge was perceived as a worthwhile and educational experience for participants, indicating that more students should be offered this opportunity. Incorporating the SNAP challenge into the medical curriculum would help cultivate understanding and empathy for patients' food-related needs. This may help students complete the challenge and feel more comfortable talking to patients about food insecurity.

EVALUATING THE FEASIBILITY AND IMPACT OF A NEW MINDFULNESS CURRICULUM IN A LARGE PEDIATRIC RESIDENCY PROGRAM

Yarden S. Fraiman MD, Pediatics, PGY-1; Alexandra Coria MD, Department of Pediatrics, BUSM; Christine Cheston MD, Department of Pediatrics, BUSM; Emily Allen MD, Department of Pediatrics, BUSM; Catherine Michelson MD, Department of Pediatrics, BUSM; Colin Sox MD, Department of Pediatrics, BUSM

Background: Burnout affects physician well-being and patient care and safety. Mindfulness is the quality of being fully present in the moment during everyday activities. Mindfulness curricula can reduce physician burnout and improve their wellness and empathy.

Objectives: We designed, implemented, and evaluated a new mindfulness curriculum to improve resident wellness and decrease burnout.

Methods: We performed a needs assessment to assess the rate of burnout and the acceptability of a curriculum to address burnout. The curriculum objectives were that participants will: 1) understand what mindfulness is 2) report a positive attitude towards mindfulness 3) feel confident discussing mindfulness 4) demonstrate awareness of evidence for mindfulness 5) understand the link between mindfulness and burnout 6) use mindfulness techniques more often 7) report decreased rates of burnout. The curriculum was led by two residents with mindfulness practices and included five sessions each with a mindfulness exercise and discussion about the use of mindfulness at work. We implemented a longitudinal study design with pre- and post-surveys to measure change in residents' knowledge, attitudes, and behaviors. Data were analyzed using chi-square tests.

Results: A needs assessment found that 64% of residents reported experiencing burnout within the prior 12 months or since starting residency. Only 17% of residents did not believe a curriculum aimed at preventing burnout would be beneficial. 60 residents completed pre-tests, 49 completed post-tests. After the curriculum, a higher proportion of residents felt they could define mindfulness (p<0.0001). There was a trend toward significance of residents that felt that mindfulness practice could decrease burnout (p<0.13). Finally there was a significant shift in the distribution of residents who would use mindfulness as a technique to present burnout (p=0.02).

Conclusions: Burnout is common among pediatric residents, many of whom believe that curricula to prevent burnout could be beneficial. A new mindfulness curriculum implemented in a large residency program increased knowledge of mindfulness. Additionally, resident awareness of the impact of mindfulness practice on burnout and their intention to use mindfulness techniques to prevent burnout was significantly impacted by the curriculum.

A 14 YEAR ANALYSIS OF A PREDOCTORAL PRECLINICAL REMEDIATION PROGRAM AT BOSTON UNIVERSITY HENRY M. GOLDMAN SCHOOL OF DENTAL MEDICINE

Debra Hong Pan, DMD, MS; Louis Brown, DMD, CAGS; Ronni Schnell, DMD, MAGD, FICD; Celeste V. Kong, DMD, CAGS; Simran Grover, DDS, MSD, CAGS, BU Henry M. Goldman School of Dental Medicine

Abstract

Problem: Prior to 2001, Boston University Henry M. Goldman School of Dental Medicine did not have an organized remediation system in place at the Simulation Learning Center (SLC) to provide more time on task and supplementation for preclinical students who were failing in their preclinical curriculum. The Pre-Doctoral Preclinical Remediation Program was developed to provide early identification of weak students in danger of failing their preclinical courses. Second-year Doctor of Dental Medicine students (DMD2) and first-year Advanced Standing DMD students (AS1) who were performing at a Clinically Unacceptable (CU) level participated in individualized tutorial sessions with direct one-on-one faculty formative feedback followed by Remedial Summative Skills Tests.

Purpose: This 14-year study is aimed to examine 300 second-year Doctor of Dental Medicine students (DMD2) and first-year Advanced Standing Doctor of Dental Medicine (AS1) students who have participated in one academic year of early intervention in the Pre-Doctoral Preclinical Remediation Program, while also comparing their graduation rates with students who did not need remediation.

Material and Methods: Data represents 14 academic years from 2001-2002 through 2014-2015 of DMD2 and AS1 students. Class size range varies from year to year. The average class size for DMD2 and AS1 is 175. Moreover, students with visa, mandatory military duty and medical leave of absence, such as, pregnancy, maternity leave, health issues, were exempted from the data. In this one year preclinical curriculum, faculty examine DMD2 and AS1 preclinical students' competency-based education by administering Summative Skills Tests (SST) at the Simulation Learning Center (SLC). Course directors perform early identification of Clinically Unacceptable SST and are referred to the Preclinical Remediation Program for supplementation and more time on task.

Conclusion: Statistical analyses have shown comparable graduation rates of remedial and non-remedial students. This reaffirms that early identification and supplementation of students who need more time on task succeed in graduating the D.M.D. program successfully. It additionally demonstrates the importance of a preclinical remediation program benefiting students and should influence future dental school curriculum modifications. Finally, correlations between graduation rates of remedial and non-remedial students indicate that Boston University Henry M. Goldman School of Dental Medicine's (BUGSDM) remediation procedures are reliable and valid tools.

ASSESSING THE NUTRITION CURRICULUM AT BOSTON UNIVERSITY SCHOOL OF MEDICINE

Kathy A. Ireland, MS, RD, LDN; Aaron J. Manders, MS, RD, LDN, Pediatrics, BMC; Carine M. Lenders, MD, ScD, MS, Pediatrics, BUSM

Background: There has been a national charge to increase nutrition medicine education in medical school curricula. The Nutrition VIG has been facilitating the integration of nutrition into BUSM's 4-year curriculum, but quantifying what is being taught has been a challenge.

Objectives: 1) To determine how many of the nutrition knowledge objectives set forth by the Nutrition VIG at Boston University School of Medicine (BUSM) were being taught and tested on in the 4-year curriculum. 2) To determine course directors' opinions on the importance of each nutrition knowledge objective in the curriculum.

Methods: The Nutrition Vertical Integration Group (VIG) at BUSM developed a list of 80 medical student nutrition knowledge objectives to be covered in the 4-year BUSM curriculum. Seventy-seven of objectives were based off of the 146 nutrition learning knowledge objectives for medical students set forth by the National Academic Award (NAA) Program's Nutrition Curriculum Guide for Training Physicians and add 3 original objectives on food security were also added. In the 2011-2012 academic year, the Nutrition VIG conducted a survey of BUSM course directors to determine which objectives were currently being taught and on which students were being tested. The survey also assessed course directors' opinions toward integrating nutrition topics into the BUSM curriculum. The survey was administered during pre-clerkship and clerkship subcommittee meetings and also available online for those unable to complete it in person.

Results: Eighteen of 26 (69%) of course directors responded to the survey. Course directors reported teaching 63 of the 80 (78%) objectives in their courses. However, they were only testing students on 48 of 80 (60%) objectives. Fourteen of the 18 (78%) respondents answered questions about the desirability of the objectives in the curriculum. For each of the 80 objectives, at least 92% of respondents reported that the objective was either a desired or necessary part of the curriculum.

Discussion: The results of this survey show that that the majority of the objectives set forth by the Nutrition VIG are being taught at BUSM. However, this does not correlate with feedback from BUSM students who indicate that they do not feel prepared to talk with patients about nutrition. This gap raises question to the effectiveness of the nutrition knowledge objectives in the curriculum

Conclusion: Further studies are needed to determine if the presence nutrition knowledge objectives in the curriculum equips medical students with the practical nutrition skills needed to help patients. This survey will be repeated in the 2015-2016 academic year and reported on at the 2016 Experimental Biology Conference.

FLIPPING THE CLASSROOM:
HOW TO HELP STUDENTS LAND ON THEIR FEET

Kathryn S. Ivy, B.A., BUSM '18 and Allison R. Larson, M.D., Department of Dermatology, BUSM

Abstract

Within the past few years there has been an increased emphasis on active learning in medical education. This impetus has led to the development of numerous innovations in lecture delivery. Each of these methods, in its own way, has focused on bringing the 'sage from the stage' to the 'guide on the side', offering more opportunities for students to engage the material with their professors as well as their classmates. At Boston University School of Medicine, we have incorporated a version of the 'Flipped Classroom' approach into our second year curriculum. This approach requires the student to prepare for class through watching a video on the basic building blocks of a topic. When students come to class, they are then able to work through case discussions or questions with their peers and professor, who offers guidance and structure to the session. We wanted to explore the student experience after 6 months of participating in flipped classrooms.

Our data was gathered through an anonymous questionnaire on the student experience of flipped classrooms. We were able to develop categories of concerns and praises for this new pedagogy as well as practice points to improve upon for next year and for other faculty interested in applying the 'flipped classroom' approach. In short, the most significant student concern centered around the time required to prepare for these flipped sessions, particularly if the pre-class videos were longer than 30 minutes. In addition to the length and presentation style of the pre-class work, the second most important indicator of student satisfaction was the content of the session. Students remarked that more visual topics, such as dermatology, and application-based topics, such as biostatistics, lent themselves to better comprehension of the material through interactive sessions. Based on the feedback we gathered from the survey, we found that the large group interactive sessions piloted in the second year medical school curriculum ('flipped classrooms') effectively engaged the students with the material and each other. This improved their self-measured comprehension and course satisfaction.

INTEGRATING ADVOCACY TRAINING INTO THE THIRD-YEAR SURGERY CLERKSHIP

Megan Janeway, MD, Department of Surgery, PGY-1; Theresa Timmes, MD candidate, BUSM, MS3; Thiago Oliveira MPH, MD candidate, BUSM, MS4; Tyler Robinson MPH, MD candidate, BUSM, MS4; Feroze Sidhwa MD, Department of Surgery, PGY-3; Ryan Macht MD, Department of Surgery, PGY-3; Ivy Gardner, MD candidate, BUSM, MS4; Reid Haflich, MD candidate, BUSM, MS3; Jacqueline Mills, MD candidate, BUSM, MS2 ; Doug Kauffman PhD, Department of Surgery; Tracey Dechert MD FACS, Department of Surgery.

Introduction: Despite successful integration of patient advocacy training into many medical school clerkships, surgery rotations continue to lag behind in such training. Research examining the impact of formal training in assessing barriers to care is an important and timely addition to surgical education research. This study describes a) how we introduced social responsible surgery (SRS) to the third year clerkship and b) how this intervention impacted students' knowledge, attitudes, and beliefs about social determinant of health (SDOH).

Methods: We are evaluating the effect of an educational intervention by conducting a survey-based prospective case-control study. We developed a comprehensive curriculum that includes lecture materials, class activities, and readings emphasizing how patients' educational, social-economic, geographic, mental health, and/or cultural barriers impact surgical health. Several surgical clerkship blocks were assigned randomly to either the intervention or a control group. All blocks completed three questionnaires on the first day and again on the last day of their surgery rotations. Students in the intervention blocks participated in a 90-minute lecture with class activities and were assigned readings examining SDOH. Students were also asked to assess at least one patient for barriers-to-care, and to create an appropriate treatment plan using local resources.

Results: Results are presented relative to changes in students' knowledge, attitudes and self-efficacy from the start to the completion of the clerkship. First, average scores on the knowledge test increased from 53% on the pre-test to 81% on the post-test. Second, 95% of respondents rated advocacy as either "important" or "very important" to surgical training. Third, students' confidence that they can adequately address barriers to care increased from 45.23 to 75.06 from the start to the end of the clerkship.

Conclusions: Entering the surgery clerkship students have insufficient knowledge about patients' barriers to surgical care, and lack confidence that they have the skills to improve care for these vulnerable populations. Training in patient advocacy is highly valued by third-year medical students, and improves their understanding of the impact of SDOH on patient health. Students gain knowledge and confidence in their ability to identify these barriers and address them. Our results demonstrate that advocacy training during the surgery clerkship is both welcome and needed. We have shown that with a modest educational intervention, we were able to positively impact the knowledge base and attitudes of medical students about social barriers to surgical care.

A RARE CASE OF SPORADIC CREUTZFELDT-JAKOB DISEASE IN VERY OLD AGE

Michelle R. Johnson, M.D., Department of Medicine, Section of Geriatrics, BMC and BUSM; Marianne Bauer, M.D., Department of Medicine, Internal Medicine Residency, BMC; Felipe Batalini, M.D., Department of Medicine, Internal Medicine Residency, BMC; Steven Vernali, BUSM; Megan E. Young, M.D., Department of Medicine, Section of Geriatrics, BMC and BUSM; Won Lee, M.D., Department of Medicine, Section of Geriatrics, BMC and BUSM.

Introduction:

Creutzfeldt-Jakob Disease (CJD) is a rare, rapidly progressive, neurodegenerative disorder that presents with cognitive changes that can be mistaken for more common causes of dementia. The annual incidence worldwide is about 1 per million, with sporadic CJD accounting for 85% of the cases. The median duration of illness is 4-5 months and thus the urgency in making the correct diagnosis to adequately prepare patients and families. While sporadic cases primarily occur at about age 65, this case illustrates sporadic CJD diagnosed at age 85.

Case Presentation:

An 85-year-old male with a history of hypertension, chronic kidney disease, and prostate cancer presented to the hospital with rapidly progressive cognitive and functional decline over 10 weeks. He was first seen as an outpatient for anxiety, subtle memory loss, and weakness. Donepezil was begun for presumed early Alzheimer's dementia and a work-up was initiated. Despite treatment, he had progressive memory loss, paranoia, auditory hallucinations, gait instability, and functional decline resulting in complete dependence in ADLs and IADLs. Physical examination demonstrated tremor, asymmetric myoclonus, rigidity, dysmetria and akinetic mutism. Work-up including routine dementia labs, infectious studies and head CT were unremarkable. Brain MRI showed diffuse volume loss and changes consistent with chronic ischemic microvascular disease. EEG showed diffuse slowing and runs of triphasic waves. CSF had elevated levels of 14-3-3, AB (1-42) peptide, tau, and phospho-tau proteins. Based on CDC criteria, he was diagnosed with probable CJD and was discharged to home with hospice. He died at home 2 weeks later.

Discussion:

While outside the typical age of diagnosis for CJD, this patient's rapid clinical decline triggered a CJD work up. His symptoms, abnormal examination, EEG findings and CSF studies were characteristic of sporadic CJD. There are currently no treatments to slow the neuronal destruction of this prion disease. There is a need for early and accurate diagnosis as well as sophisticated advanced care planning regarding available options for burial in patients with CJD. After his death, the patient's body was cremated according to funeral home protocol rather than being embalmed as the patient had wished. While this case was a unique educational experience for the team directly involved in his care, education is needed for all residents and fellows in diagnosing and prognosticating neurodegenerative disorders in order to better prepare families for the rapid decline and anticipate challenges they will face when their loved one has a fatal and transmissible disease like a prion disease.

CANCER PRESENTATIONS IN INDIVIDUALS WHO SURVIVE TO EXTREME OLD AGE

Michelle R. Johnson, M.D., Department of Medicine, Section of Geriatrics, BMC and BUSM; Michael Voisine, D.O., Department of Medicine, Section of Geriatrics, BMC and BUSM; Stacy L. Andersen, Ph.D., Department of Medicine, Section of Geriatrics, BMC and BUSM; Lisa Nussbaum, Department of Biostatistics, BUSPH; Paola Sebastiani, Ph.D., Department of Biostatistics, BUSPH, Rebecca Silliman, M.D., Ph.D., Department of Medicine, Section of Geriatrics, BUSM and BUSPH; Thomas Perls, M.D., M.P.H., Department of Medicine, Section of Geriatrics, BMC and BUSM.

Anecdotally, we have noted nonagenarians and centenarians presenting with large tumors without metastases. Tumor registry and hospital-based medical records provided information about cancer types, age of diagnosis, stage at presentation, histology, tumor markers, and treatments of 66 persons age $\geq$95 years (43 females, 23 males; 45% white, 35% black, 11% Latino) with 76 cancers (median age at presentation, age range, mean years to death): 18 breast (90, 81-97, 11), 16 colorectal (92, 81-98, 6.2), 7 prostate (90, 80-94, 5.8), 8 head/neck (97, 82-105, 0.9), 6 bladder (89, 81-101, 6.5), 3 bone marrow (86, 84-95, 7.3), 3 skin (93, 78-93, 2.7), 3 brain (95, 92-98, 0.7), 3 stomach (96, 83-99, 0.3), 2 ovarian (91, 87-95, 0.2), 2 lung (92, 89-95, 1.4), 1 endometrial (85, n/a, 9.6), 1 endocervical (82, n/a, 12.3), 1 penile (92, n/a, 5.6) and 1 vulvar (93, n/a, 5.6). Patients were relatively healthy at presentation (Charlson index mean 2.7) despite 50% (n=33) with a history of tobacco use. Only 10% of cases were diagnosed by screening. The incidence of metastases at diagnosis was low, ranging from 0% for prostate cancer, 6% (n=1) for colorectal cancer, and 17% (n=3) for breast cancers. Many primary tumors were large, including colon tumors up to 9.5cm. The single case of stage 4 metastatic colon cancer with lung metastasis and positive pleural effusions lived for 4 years beyond diagnosis despite no treatment. The majority of breast (78%) and colon (80%) cases were managed with surgical intervention despite being diagnosed late in life, owing to this cohort's good functional status. These findings warrant further study of the characteristics of cancers in persons who survive to extreme ages vs. those who do not, and potential biologic mechanisms that underlie them.

CONTINUED EFFECTIVENESS OF A BUSM STUDENT-LED SERVICE-LEARNING INITIATIVE, PUMPSTART, FOR CPR EDUCATION FOR INNER-CITY HIGH SCHOOL STUDENTS: A REVIEW OF 2015-2016 DATA

Ian Kates, BUSM '19, Anubhav Nangia, BUSM '19, Muhammad Fazal, BUSM '19, Harsh Patel, BUSM '19, Nikita Saxena, BUSM '18, Pooja Shah, BUSM '18, Anita Knopov, BUSM '18, Clare Eichinger, BUSM '18, Victoria Fox, BUSM '18, Kevin Wilson, BUSM '18, Ricky Kue, MD, MPH, Department of Emergency Medicine, BUSM.

Objective: To describe the continued effectiveness of a medical student-led, CPR training program for local inner-city high school students. Our goal is to provide BUSM students the opportunity to teach layperson CPR, mentor younger students, and raise awareness of the importance of CPR.

Background: After seeing lack of exposure to healthcare fields and basic medical knowledge among inner-city high schoolers, we sought to close this gap through a cardiopulmonary resuscitation (CPR) initiative: PumpStart, utilizing the American Heart Association's "Family & Friends CPR Anytime" curriculum. PumpStart's goal was to empower students with CPR skills they may not otherwise receive, expose students to the healthcare field by connecting them with BUSM medical students as mentors and role models, and provide medical students skills in effective leadership and mentoring. After a successful pilot in Spring 2015 at City on a Hill School-Circuit Street in Roxbury, MA, the program was expanded to City on the Hill School-Dudley Square and Fenway High School for the 2015-2016 academic year.

Methods: Weekly one-hour sessions were taught utilizing video instruction and supplemental hands-on practice led by BUSM volunteers. Anonymous pre- and post-session IRB-approved questionnaires for quality improvement were administered to gauge students' comfort performing CPR, feelings surrounding the importance of CPR and knowledge of CPR facts.

Results: 150 high schoolers have completed PumpStart to date for the 2015-2016 academic year, with 79% (117/148) reporting no prior CPR training. After the session, 78% (115/147) of students reported that they felt comfortable/very comfortable performing CPR compared to 23% (34/150) prior to the class. 88% of the students scored above 71% (5/7) on the seven-question objective post-assessment.

These results are comparable to that of the pilot despite the larger sample size. For the pilot, after the session, 79% (44/56) of students reported that they felt comfortable/very comfortable performing CPR compared to 39% (22/56) prior to the class. 91% of the students scored above 71% (5/7) on the seven-question objective post-assessment.

Discussion: This service-learning pilot project was a positive learning experience for volunteers and high school students alike. By the end of each session, all students said they would be willing to share their newly acquired knowledge with friends/family. Our observations suggest that PumpStart has continued success in teaching basic CPR skills and importance. PumpStart shows great potential for continued growth. We are hoping to expand to more Boston-area schools this summer and start sister programs with other medical schools. In addition, we are piloting a short AED tutorial in our sessions.

ORAL HEALTH FOR OLDER ADULTS:
AN INTERPROFESSIONAL WORKSHOP

Laura Kaufman, DMD; General Dentistry, GSDM; Annetty Soto, DMD; GSDM; Prajakta Joshi, BDS; SPH Leslie Gascon, GSDM; MBA; Ryan Chippendale, MD, BUSM

Objective: The goal of this research project was to evaluate the effectiveness of a hands-on skills based interprofessional oral health workshop for medical students in comparison to an oral health lecture-only class.

Study population: Sixty nine fourth year medical students rotating through their Geriatrics clerkship at the Boston University School of Medicine (BUSM) were randomly assigned to two groups. Groups receiving only an oral health lecture were assigned to Group 1 and groups receiving both a shorter oral health lecture followed by an interprofessional oral health skills workshop were assigned to Group 2.

Study design: A cross sectional study was carried out to evaluate medical students' knowledge, attitudes and skills regarding oral health assessments in older adult patients and interprofessional collaboration before, immediately after, and one month post either lecture and/or workshop.

Data analysis: Out of the 69 study participants admitted to the study, 39 completed all three surveys. Data analysis was done on those who completed all three surveys. The association between Group 1 and Group 2 was analyzed with respect to knowledge, attitudes, and oral health assessment skills.

Results: Both groups showed an increase in oral health skills and knowledge after the oral health lecture and workshops. Group 2 showed slightly greater odds of independently performing the skills over time. Both groups agreed that it is important to consult with dental providers as needed, with no change in attitude over time.

Conclusions: While the oral health lecture alone leads to an increase in knowledge and skills, the interprofessional workshop format led to slightly greater odds of independently performing an oral health assessment over time.

Future Directions: Medical students' written feedback included the suggestion to incorporate oral health knowledge and assessment skills training into the second year of medical school curriculum. This workshop in the fourth year Geriatrics rotation could then serve as a skills refresher prior to graduation.

MEDICAL STUDENT PERSPECTIVES ON GENDER AND SEXUAL MINORITY HEALTH AND PATIENT CARE

Jennifer J. Liang MS,[1] Ivy H. Gardner BS,[1] Jacob Walker BS,[1] and Joshua Safer MD[2]
Department of Medicine, Boston University School of Medicine

Background: Lesbian, gay, bisexual, transgender, queer, and intersex (LGBTQI) people continue to face many well-documented disparities in care. One source of these disparities is a lack of adequate education for medical providers about LGBTQI patients. Currently, LGBTQI curriculum across health professional schools remains varied and often inadequate.

Methods: In this study we used a Likert-scale survey to examine the knowledge and attitudes of medical students regarding LGBTQI health issues before and after experiencing a year of the medical curriculum at Boston University. Each year of students experienced different LGBTQI education interventions, ranging from use of online modules to lectures.

Results: Overall, 31% of enrolled students (218/713) answered the pre-intervention survey and 17% of students (123/713) answered the post-intervention survey. Almost all students (94%) interacted with an LGBTQI patient by the time they graduated from medical school. Likert responses regarding self-perceived knowledge of LGBTQI issues increased significantly during the preclinical years but self-reported comfort did not vary.

Conclusions: Responses suggest that inclusion of relevant medical discourse on LGBTQI health in a standard lecture format can improve student knowledge, but may be insufficient to improve student comfort with seeing LGBTQI patients.

MANAGING PEDIATRIC NUTRITION IN THE AMBULATORY CARE SETTING: THE DEVELOPMENT OF A NUTRITION ENTRUSTABLE PROFESSIONAL ACTIVITY (EPA) IN RESIDENCY EDUCATION

Aaron J. Manders, MS, RD, LDN, Pediatrics; BUSM; Kathy Ireland, MS, RD, LDN, Pediatrics, BUSM; Daniel J. Schumacher, MD, MEd, Pediatrics, Cincinnati Children's Hospital Medical Center; Sharon B. Collier, MEd, RD, LDN, Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital; Catherine L. Distler, MD, Pediatrics, BUSM; Carine M. Lenders, MD, MS, ScD, Pediatrics, BUSM

Objective: Describe the creation of an EPA created to improve pediatric residents' ability to appropriately manage the nutrition-related conditions of their patients, and its importance.

Introduction: The Accreditation Council for Graduate Medical Education pediatric program requirements do not include a focus on nutrition education. Unsurprisingly, most graduates feel unprepared to address nutrition-related conditions that are common in pediatric practice, such as failure to thrive, food allergies, nutrient deficiencies, obesity, and diabetes. Medical students become medical doctors (MD) after four years of education, yet they require three additional years of practical training to obtain a medical license. In order to improve patient care and health outcomes, medical residents should be trained to manage the nutrition-related conditions they will encounter in their practices, and be able to work with multidisciplinary teams that include specialist allied health professionals such as registered dietitians. The American Association of Medical Colleges (AAMC) recommends a new practical tool to define professional activities for residents that is called an EPA. Implementing an EPA for pediatric nutrition could provide focus in this area and help bridge the gap to ensure residency training outcomes prepare graduates to care for these patients.

Methods: After establishing the need for improved nutrition training for residents and identifying an EPA as the most appropriate method to address that need, a meeting amongst a multidisciplinary team of health care professionals was held. The group identified the four major components that needed to be addressed to create a pediatric nutrition EPA: (1) Target population (e.g. general pediatrics residents and/or pediatric specialist residents), (2) Target location of care for EPA (e.g. hospital inpatient, (3) EPA structure and presentation, and (4) Methods and logistics (e.g. Defining the strategy for creation of content, and defining the team). Ultimately, a team consisting of two pediatrician physician educators, three dietitians, and a physician nutrition specialist was created to develop the EPA. The initial work was completed through several face-to-face and telephonic meetings, with later work being done individually and reviewed by the group until completion of the EPA.

Results and Discussion: Numerous challenges were encountered during development. These include appreciating and properly balancing the content requirements with the limitations of the EPA structure, and the realities of implementing an EPA in practice such as instructor training or background. The end result of this process was the development of the first nutrition EPA for pediatrics, titled, "manage pediatric nutrition in the ambulatory setting." The creation of the EPA was the first step in establishing nutrition as an entrustable professional activity for residents. In order to establish our EPA and ensure its sustainability, supporting curriculum development is ongoing.

A COLLABORATIVE PROGRAM TOWARDS DEVELOPING FAMILY MEDICINE AS A SPECIALTY IN MYANMAR

Jeff Markuns, MD, EdM; BUSM; Christoph Gelsdorf, MD, UCSF Santa Rosa Family Medicine Residency; Kyaw Thu, MD, Myanmar Academy of Family Physicians; Tin Aye, MD, Myanmar Academy of Family Physicians

In 2013, the Boston University Global Health Collaborative (BU GHC) began working with general practitioners (GPs) in Myanmar to help develop postgraduate training in Family Medicine (FM). Primary care in Myanmar is currently delivered by a mix of government health workers, specialist physicians, traditional healers, pharmacists, and private sector general practioners. GPs may have some limited postgraduate government work experience, but lack any formal postgraduate training and further professional development is extremely limited. The General Practice Society has taken ownership of the primary care capacity gap by forming a new civil society organization, the Myanmar Academy of Family Physicians (MAFP), to establish new postgraduate training opportunities and system supports for primary care physicians, with an end goal to establish FM as a distinct specialty. In the pilot phase of this project, the BU GHC assisted with strategic planning and led a Training of Faculty (ToF) course for 21 leaders of the MAFP.

This program focused on teaching and curriculum development skills to help support participants in developing new curricula and implementing academic skills. Didactics were organized and delivered by BU GHC faculty or consultants both in person and remotely through PowerPoints with recorded audio, followed by local discussion sections led by MAFP faculty or staff and supported by BU GHC faculty or consultants.

Participants prepared curricular modules as a core longitudinal project, including competency-based goals and objectives. In addition, participants prepared a lecture or small group presentation and supporting teaching materials. Both curricula and didactics were presented to the group for peer feedback. Future plans include additional ToF courses to focus on evaluation and further teaching material development, creation of new outpatient teaching clinics, and strategic planning for integration with local university and government plans as the new political landscape unfolds.

EFFECTIVENESS OF PRE-LEARNING ONLINE MODULES IN A FIRST YEAR MEDICAL SCHOOL CURRICULUM

Gareth Marshall, Class of 2018, BUSM MD Program; Danielle Matonis, Class of 2018, BUSM MD Program; Jessica Carr, Class of 2016, BUSM GMS Program; Gwynneth Offner, PhD, Department of Biochemistry, BUSM; Karen Symes, PhD, Department of Biochemistry, BUSM

Objective: To explore student experience of online educational modules for pre-learning as part of a first year medical school curriculum in biochemistry.

Background: A pedagogical approach that shifts from traditional lectures to pre-learning outside the classroom is increasingly being adopted in medical education. Exploration of student experience using online modules as pre-learning can evaluate and enhance improvement of such modules.

Methods: A mixed methods anonymous survey was administered to the class of 2019 BUSM students who had used online learning modules as part of their first year curriculum. The survey included both Likert scale questions and free responses. Free responses were analyzed using an immersion-crystallization approach in iterative meetings.

Results: The majority of students responded that online learning modules served as an effective teaching tool and enhanced their educational experience. The students also noted that modules could be better integrated with the rest of the course and that there was variability in lecturer expectations for students in regards to preparation using the modules.

Conclusion: Online modules can serve as an effective source of pre-learning for medical school students, but should be functionally and conceptually integrated with the overall course.

TEACHING POPULATION HEALTH TO PRIMARY CARE RESIDENTS: MINI-SYMPOSIUM ON OBESITY AS A POPULATION HEALTH ISSUE

Jessica Murphy, MD, Department of Medicine, SPH, BUSM; Jennifer Siegel, MD, Department of Medicine, BUSM; Ambili Ramachandran, MD, MSc, Department of Medicine, Boston University/Boston Medical Center

Background: Residency programs must integrate novel curricula focused on prevention and population health. We developed a mini-symposium on population health issues for primary care residents focused on obesity. Our objectives were to introduce the concept of population health, articulate individual and societal factors that contribute to obesity, and invite learners to consider interventions at multiple levels.

Methods: During the symposium, we introduced fundamentals of population health and the Health Impact Pyramid. Speakers offered perspectives from individual clinical work with patients to social and policy interventions. Faculty facilitated a case-based debate, analyzing interventions to address the obesity epidemic. Residents were challenged to use a population health lens to evaluate the evidence for clinical and societal approaches to limiting obesity. Teaching sessions used principles of adult learning theory, encouraging self-directed learning and delivering relevant content. Residents completed pre- and post-surveys.

Results: Seventeen residents attended the symposium. When asked to rank the top 5 contributors to the obesity epidemic on the pre-survey, 71% of ranked responses were for environmental rather than individual-level factors. Despite a high baseline understanding, post-surveys showed that 92% of residents somewhat/strongly agreed that the symposium gave them a better understanding of the environmental, policy, and economic factors that contribute to an individual's health. Three-fourths of residents somewhat/strongly agreed that they were more likely to talk to their patients about obesity, and 67% somewhat/strongly agreed that the symposium changed their attitudes regarding obesity.

Conclusions: Mini-symposia create an efficient, multidisciplinary approach to a clinical issue with population and public health dimensions. Future work will develop similar sessions addressing issues such as behavioral/mental health disorders and tools to assess knowledge, skills, and attitudes in population health.

THE FAMILY MEDICINE CENTER, HUE UNIVERSITY OF MEDICINE AND PHARMACY

Gabrielle Newton, BS, Kristin Shaw, MPH, Laura Goldman, MD,
Nguyen Minh Tam, MD, Jeffrey Markuns, MD
Boston University Global Health Collaborative and Hue University of Medicine and Pharmacy

Goals and Work in Vietnam:
The BU Global Health Collaborative (GHC) aims to improve access to primary care worldwide through a competent primary care provider for everyone. BU GHC has been working to improve primary care in Vietnam, primarily through Family Medicine (FM) development, for 20 years.

FM in Vietnam:
FM was declared a specialty by the Ministry of Health in 2000. The BU GHC has worked with faculty in Vietnam – including Hanoi, Hue, and Ho Chi Minh City - to establish the specialty including national curricula, postgraduate training programs, faculty development, training facilities and advocacy for government policies to support primary care.

Hue Family Medicine Center (FMC):
Collaboration between the Hue University of Medicine and Pharmacy (UMP) and BU GHC has been key in the country's growing recognition of FM as a vital part of primary care. For 10 years, Hue UMP and BU GHC have been working together towards the creation of a flagship outpatient primary care training center in Vietnam, now opened in 2015.

Modeled on similar training facilities here at BU and our affiliated community health centers, the Hue FMC offers a state-of-the-art model for the rest of Vietnam and the region, providing a new experience in both clinical service delivery and education. Two of the seven floors of the Center are dedicated to FM consultation and education. In addition to a variety of primary care services, the Center includes video capacity for OSCEs, classroom space, and outpatient precepting space – facilitating a model of teaching virtually unseen throughout the rest of Vietnam.

Going Forward:
The Center continues to refine its business model, clinical offerings, insurance integration, and inclusion of trainees. The BU GHC will offer ongoing faculty development, including provision of BU School of Medicine faculty volunteers to rotate as visiting consultants and preceptors.

Funding:
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INCORPORATING PRACTICE IMPROVEMENT AND PANEL MANAGEMENT INTO INTERNAL MEDICINE RESIDENT EDUCATION

Craig Noronha, MD, PGY3 Department of Medicine, BUSM; Ambili Ramachandran M.D. Department of Medicine, BUSM; Myfanwy Callahan M.D. Department of Medicine, BUSM; Gouri Gupte M.D. Health Law, Policy, and Management, BU SPH

Background: The American College of Graduate Medical Education requires that residents annually evaluate individual performance data for their continuity clinic and develop a data-based action plan, demonstrating skills to meet the core competencies of practice based learning and systems-based practice. However, limited curricula with assessment strategies for these practice improvement modules (PIM) within graduate medical education exist.

Intervention: Since 2014, a practice improvement curriculum has been instituted for internal medicine residents within Boston University Medical Center. The module includes a chart audit of 10 patients within the resident's continuity clinic with questions designed to highlight areas for improvement within each resident's practice. After the chart audit, the residents are required to identify and implement a specific practice improvement project.

Results: In 2015-16 the PIM focused on cancer screening. Based on data from 91 participating resident physicians, 43% of patients over 50 years were due for colorectal cancer screening, and 49% of age-appropriate women were due for cervical cancer screening. Overall, cervical cancer screening rates were 67% (national goal 93%) and colorectal cancer screening rates were 57% (national goal of 70.5%). Barriers to providing appropriate preventive care included competing clinical concerns, patient preference, communications barriers, and missing outside records. Post-intervention chart audit highlights improvements that have occurred since implementation of the curriculum.

Conclusion: Much of resident clinical experience occurs in via direct patient care modalities. However, healthcare is increasingly focused on population and panel level care. Resident's education needs to adapt to provide these skills. By imbedding the PIM within their continuity clinic, residents are given the ability examine their clinical practice from a larger perspective often lost in the daily continuity clinic experience. Aside from experience in evaluating patient data from a panel level, the curriculum develops knowledge, skills, and attitudes in quality improvement, communication, electronic health record use, and systems based practice.

AHEAD OF THE CURVE: RESTORING IMPLANTS USING CEREC AT THE PRE-DOCTORAL LEVEL

Hesham Nouh, BDs, DSc, MSD,
Department of General Dentistry, BU GSDM.

WINNER

Introduction: Dental Implantology education at the pre-doctoral level is scarce among dental schools as is digital dentistry. The seamless addition of digital dentistry into the curriculum is meant to empower students with the most current technology. According to the CODA standards 2-23, graduates should be able to evaluate, assess, and apply current and emerging science and technology to the field of dental medicine.

Here we present a new didactic module integrating digital dentistry and implantology along with a workshop enabling students to not only acquire a digital impression of an implant, but also create and propose a restoration for that implant, using CAD/CAM technology.

Methods: 109 DMD II students received an introductory lecture on dental implantology. Students were then separated into 4 groups of approximately 30 students each for the workshop portion of this module. One CEREC acquisition unit was shared by a pair of students. Each pair was also assigned a Nobel Biocare model with NBRS 5.0 implant placed in tooth position #30, a scan post, and a scan body. Before starting the hands on workshop, a lecture and live demo were provided. Each student then acquired the impression and proposed a restoration. A 5 question survey was sent to the DMD II class to evaluate their learning experience.

Results: A 76% response rate was recorded. 43% of the students found the course material extremely benefitial.43% thought the course was offered at the correct time during their dental education. 53% found the hands on portion to be extremely beneficial. 95% would like to see more digital integration with dental implants. 47% feel confident making a digital impression for a dental implant using CEREC after receiving this module.

DIGITAL INTERACTIVE LEARNING: INTEGRATING GUIDED SURGERY IN THE POSTDOCTORAL PROSTHODONTICS DEPARTMENT

Walter Odisho DDS; Wongie Lee DDS, Resident Department of Postdoctoral Periodontology BUSDM; Alexander Bendayan DDS, CAGS, Department of Restorative Sciences and Biomaterials, Clinical Director of Postdoctoral Prosthodontics; Jess Liu DDS, MsD, CAGS Faculty Department of Postdoctoral Periodontology BUSDM

Background: The Commission of Dental Accreditation (CODA) standards defined that starting July 2016 PG Prosthodontics Residents must be competent in the planning, surgical placement and restoration of dental implants as part of their training. A pilot case was set in place to incorporate the technology in the program prior to July 2016.

Methods: The case report presented is the case of a 44-yearold male with missing #19, and #30. It describes the digital workflow for the implant planning and placement #19 and 30. Merging the data of the digital proposal designed with the computer-aided design and computer-aided manufacturing (CAD/CAM) to the Cone Beam Computer Tomography (CBCT) scan. The diagnosis and Implant planning were performed by a digital impression. Implant planning was carried out by Residents and Faculties from the Periodontics and Prosthodontics Departments in a 3D Implant software. After agreement a digital file was generated then imported into the software of the CAD/CAM for the design and milling of our surgical guides. Such devices were milled in house and tried in the patient mouth prior implant placement.

Results: Guided surgical implant placement was achieved uneventfully at planed position.

Conclusion: The use of CAD/CAM and CBCT scan for 3D implant planning and guided surgery provides an accurate implant placement. The use of this system reduces the time of the surgical procedure significantly. This pilot program has become the protocol for all cases planed by the prosthodontics residents.

THE EFFECT OF ELDERLY PATIENTS' LIFE STORIES IN ENHANCING DOCTOR-PATIENT RELATIONSHIPS

Jane Qu, BUSM '18, Laura N. Goldman, M.D., Department of Family Medicine, BUSM, Joanne E. Wilkinson, M.D., Department of Family Medicine, BUSM

Objective: While medical residents feel positively about their elderly patients, they feel less strongly about caring for this demographic in their future careers.[2,3,5] Research shows that life stories help care staff better understand elderly patients' needs and strengthen caregiver-patient relationships.[1,4] We sought to determine whether having elderly patients' life stories available affects the attitudes of medical professionals in caring for the elderly and the relationships that they have with their patients.

Methods: We created written biographies for elderly patients at four nursing homes. BUSM family medicine residents and nurse practitioners participated in semi-structured interviews about their relationships with their nursing home patients, knowledge of their patients' life stories, and thoughts on geriatrics as a profession, both before learning their patients' biographies and at minimum two months after receiving them. Data were analyzed using qualitative techniques from grounded theory. Thus far, fourteen biographies have been created. Five family medicine residents and one nurse practitioner have participated.

Results: Before learning the life stories, residents and NPs believed geriatrics was a valuable field but many did not plan to specialize, finding the population challenging due to dementia affecting communication ability. They knew little about their patients' backgrounds and wished to learn more but struggled with doing so while balancing their patients' medical concerns. After receiving the stories, their views on geriatrics were unaffected. The stories, however, enhanced their connection with and understanding of their patients. They also felt sad reflecting on the contrast between the way their patients were previously and currently. Ultimately, they appreciated the stories and saw their utility for facilitating end-of-life discussions.

Conclusions: While life stories did not affect medical professionals' attitudes on geriatrics, they may serve a role in health care by enhancing the doctor-patient relationship and facilitating medical decision-making such as end-of-life care.

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DEVELOPMENT OF A FAMILY MEDICINE SPECIALTY TRAINING PROGRAM IN LESOTHO

Kristin Shaw, Department of Family Medicine, BUSM; Sebaka Malope, MD, Lesotho Ministry of Health; Rudolf Schumacher, MD, Lesotho Ministry of Health; Elizabeth Nkholongo, MPH, Lesotho-Boston Health Alliance (LeBoHA); Brian Penti, MD, Dept of Family Medicine, BUSM; Jeffrey Markuns, MD, EdM, Dept of Family Medicine, BUSM; Brian Jack, MD, Dept of Family Medicine, BUSM

Background: Lesotho has a severe shortage of human resources for health. Many young and talented Basotho leave the country each year to attend medical school, but usually they do not return, in part because of the lack of opportunity for continuing education and specialty training in Lesotho. Here, we describe a family medicine specialty training program (FMSTP), which aims not only to recruit Basotho physicians back to Lesotho but also increase the number of well-trained physicians in Lesotho who have the knowledge, skills and commitment to meet the health needs of the people of Lesotho, especially in district hospitals.

Methods: The FMSTP accepts Basotho doctors after they have completed medical school and at least 1 year of internship. The first 2 years of the 4 year program are focused most intensely on clinical training, with registrars working very closely with faculty trainers at their district hospital, and close supervision by the FMSTP faculty and clinical supervisors. Monthly week-long contact sessions are held at the FMSTP academic center in Motebang Hospital and students use e-learning in the weeks between contact sessions. The final 2 years of the program focus on specialty and community-based rotations coupled with a research project chosen by the registrar. Throughout the 4 years, clinical training is integrated with management and public health training to ensure the graduates are equipped to be leaders at the district level.

Findings: The FMSTP commenced in January, 2008 and was the first, and only, higher education program in Lesotho to receive full accreditation from the Council on Higher Education in 2015. To date, two locally trained family medicine physicians have graduated from the program and the first graduate is now the FMSTP Deputy Director. Graduates of the program are recognized, and compensated, as specialist physicians by the Lesotho Ministry of Health. The Boston University School of Medicine certifies that graduates successfully complete the program as outlined in the detailed curriculum documents approved by the Council on Higher Education.

Interpretation: Our program currently has six students enrolled in the program and an additional three to four students will begin in March 2016. We are also working with the Ministry of Health to expand our program to the southern provinces of Lesotho and partnering with medical schools throughout southern Africa to promote Family Medicine training in the region. As the program continues to expand, success will be measured by the percent of Basotho medical students returning to Lesotho, retention rates of district physicians, and quality and comprehensiveness of health care provided at district hospitals.

TRANS*FORMING MedEd: DEVELOPING A TRANSGENDER/GENDER IDENTITY CURRICULUM FOR MEDICAL STUDENTS

Samuel Sheffield BUSM '17, Jamie Weinand BUSM '17, Douglas Hughes MD, Associate Dean for Academic Affairs, Department of Psychiatry, BU School of Medicine, Joshua D. Safer, M.D., Department of Medicine, BUSM

Trans*forming MedEd: Developing a Transgender/Gender Identity Curriculum for Medical Students

Authors: Samuel Sheffield, BUSM '17; Jamie Weinand, BUSM '17, Douglas Hughes, M.D., Joshua D. Safer, M.D.

Background: Transgender patients suffer health care disparities[1]. In part, those health care disparities reflect societal stigmatization/prejudice and in part a lack of education/training in medical schools/residencies[1]. There are also specific barriers to care and medical interventions for transgender and gender nonconforming individuals which need to be addressed in medical training[2,3]. To address these gaps, our school is educating the next generation of physicians on transgender care and health issues[1]. Our approach is guided partly by the AAMC's 2014 recommendations:

- "Sensitively and effectively eliciting relevant information about sex and gender identity from all patients in an appropriate manner."
- "Perform a complete and accurate physical exam with sensitivity; knowing when portions of the exam are essential and when they may be unnecessarily traumatizing (i.e. repeated genital exams)"
- "Increase health care professionals' awareness and knowledge of health [needs] of LGBT and gender nonconforming individuals, and individuals born with differences of sex development."
- (AAMC, 2014. "Implementing Curricular and Institutional Climate Changes to Improve Health Care for Individuals Who Are LGBT, Gender Nonconforming, or Born with DSD.")

Methods: Boston University School of Medicine has implemented a novel and progressive LGBT curriculum, which includes transgender care, throughout its four-year curriculum.

In first year, the Integrated Problems Course features a case of a lesbian patient struggling with her sexuality. In this setting, the faculty supervisor assists the student, reinforcing respect of LGBT patients and discussing health care issues specific to the case for this patient. In Introduction to Clinical Medicine, an online module and quiz reviews gender identity terminology and how to interview transgender, gender-nonconforming, and intersex patients. In Physiology, a faculty member teaches the current, evidence-based understanding of the biology of gender identity. Finally, in the Human Behavior in Medicine Course, there is a lecture on "LGBT Healthcare Disparities".

In the second year curriculum, there is a lecture in Endocrinology devoted to specific medical issues and treatment strategies for transgender and intersex patients. In Psychiatry, a lecture focuses on the mental health needs of transgender people, followed by a panel of transgender patients who relate how their medical and mental health needs are and are not met by the medical system.

The third year Clerkships deal with various aspects of LGBT issues such as, in the Pediatric Clerkship, helping young patients and their parents deal supportively with coming out as LGBT.

Finally in the fourth year, there is the Transgender Medicine Elective. In the Transgender Elective students spend time in endocrinology, primary care, surgery, and adolescent medicine clinics sharing in the care of transgender individuals in varying stages of transition across the age spectrum. As well, students experience a support group, observe surgical practice, and participate in self-study on topics of the students' choosing.

Results: Feedback from medical students has been generally very positive, and studies of individual curricular elements have also demonstrated a favorable impact on student attitudes and knowledge. For example, in a study of the impact of the transgender medicine content in Endocrinology students reported a 67% drop in discomfort providing care for transgender patients subsequent to the teaching unit (P<.001)[2].

During the process of developing the online module for Introduction to Clinical Medicine, a focus group of transgender women patients provided advice for future physicians. Participants raised several key issues, but prominent among their concerns were prior experiences of blatant transphobia and discriminatory treatment by healthcare providers.

Discussion: Respect and sensitivity alone are insufficient for transgender individuals, but our experience with curricular reform has taught us that student comfort providing care to transgender patients is both amenable to curricular intervention and important to patients. We hope to continue learning from our experiences and from the experiences of our patients and community members.

References:

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BRONCHOSCOPY SIMULATION TRAINING FOR MEDICAL STUDENTS: A USEFUL TOOL?

Helene M. Sterbling, M.A, BUSM, M.D. '18; Christopher R. LaChapelle, D.P.T., BUSM, M.D.'16; Matthew R. Egyud, M.D., Department of Surgery, BUSM; Sowmya R. Rao, PhD., Dept. of Surgery, BUSM; Hiran C. Fernando, M.B.B.S., Dept of Surgery, Division of Cardiothoracic Surgery, BUSM; Virginia R. Litle, M.D., Dept of Surgery, Cardiothoracic Surgery, BUSM.

Objective: Simulation training is a safe and accessible teaching tool for invasive clinical procedures. Bronchoscopy simulation training has been shown to accelerate bronchoscopy skill acquisition and helps alleviate anxiety associated with first-time procedures in residents and fellows. However, few studies have explored the use of bronchoscopy simulation in undergraduate medical education. We examined medical students' perceptions of self-guided bronchoscopy simulation training, as well as the impact of the training on students' bronchoscopy skills.

Methods: In this ongoing prospective study, a total of 18 medical students were recruited at an academic institution following IRB approval. Participants completed a pre-training survey and bronchoscopy skills assessment test before beginning a self-guided bronchoscopy simulation training. The pre-survey assessed participants' previous experience with bronchoscopy. A thoracic surgeon evaluated students' bronchoscopy skills and knowledge of pulmonary anatomy on the EndoVR simulator (CAE Healthcare, Inc.) using the validated Bronchoscopy Self Assessment Tool (BSTAT) checklist. Participants were asked to train on the simulator for a minimum of 15 minutes per week over four consecutive weeks. Online and didactic educational resources were made available to the participants. A post-training BSTAT and survey were completed at the end of the study. The post-training survey assessed participant's perception of the training.

Results: Of the 18 medical students enrolled, 15 completed the study (83.3%). Three participants had prior exposure to bronchoscopies through observation of less than five procedures. Students trained for an average of 85 minutes (SD=28). The average pre-training score was 14.1 out of 65 possible points on the BSTAT score sheet (21.7%). The average post-training score was 45.8/65 (70.5%). The highest and lowest post-test score were 61/65 (93.8%) and 17/65 (26.2%), respectively. Participants' pre- and post-simulation BSTAT scores were significantly different ($p<0.0001$). All participants reported finding the training useful. Students' comments most frequently requested in-person training from an attending physician to complement the simulation training. Six out of 15 students reported feeling well prepared for future live bronchoscopies after completing the simulation training.

Conclusions: Medical students can improve their knowledge of bronchial anatomy by completing a brief self-directed bronchoscopy simulation training. Adding physician-led sessions to independent simulation training may improve students' confidence in their bronchoscopy skills. Further investigation is needed to determine the impact of bronchoscopy simulation training on academic performance and on the possible development of student interest in thoracic or pulmonary fields.

DEVELOPMENT OF AN INTERDISCIPLINARY INTERVENTION TO ADDRESS POLYPHARMACY IN A SAFETY NET POPULATION

Michael Voisine, DO, Michelle R. Johnson, MD, Sharda Mukunda, MD, Irina Vovnoboy, MD, Danielle Miller, PharmD, RPH, Won Lee, MD, Heidi Auerbach, MD. Department of Medicine, Section of Geriatrics, BMC, BUSM.

Polypharmacy is associated with medication nonadherence, financial burden, falls, adverse drug reactions, hospitalizations, and mortality. Our objective was to develop a patient-centered, interdisciplinary intervention to reduce polypharmacy in an urban academic ambulatory geriatrics practice. A needs assessment was performed via anonymous surveys of patients/caregivers and staff (3 nurses, 9 physicians, 3 practice assistants) to determine perceptions of polypharmacy. Providers cited multiple prescribers and complex comorbidities as major contributors. Patients/caregivers associated polypharmacy with noncompliance and high monthly deductibles. Through interdisciplinary meetings, an intervention was developed targeting patients with substantial polypharmacy ($\geq$10 medications) with the goal of increasing referrals to the geriatrics pharmacist and documenting polypharmacy in the EMR. Nurses printed medication lists daily for scheduled patients and flagged those with $\geq$10 medications. Lists were given to all patients prior to their visit with the provider to review for errors. A provider education session, posted reminders, and flagged medication lists prompted providers to add the ICD-10 code to EMR problem-based charting and to refer to the pharmacist. Over a 5 week intervention period, 258 of 540 scheduled patients (48%) were flagged by nurses as having $\geq$10 prescribed medications. There was an increase in patients identified in the EMR with polypharmacy ICD-10 codes by 11% (n=29). There were 14 new referrals to the pharmacist. 8 of 13 (61%) providers participated in the intervention. Further studies are needed to assess the sustainability, clinical impact, and cost-effectiveness of improved identification of polypharmacy and referrals to a pharmacist in this ambulatory geriatric population.

INTER-PROFESSIONAL EDUCATION: DO HEALTH PROFESSIONAL STUDENTS BELIEVE IN THE POWER OF COLLABORATION?

Jamie Waller, Michelle Henshaw, DDS MPH, BU Henry M. Goldman School of Dental Medicine and Ned Rimer, MBA Med, BU Questrom School of Business

This research project examined the influence of an Interprofessional Education (IPE) workshop on pre-doctoral health student attitudes towards collaboration. The Readiness for Interprofessional Learning Scale (RIPLS), was used to quantify changes in student attitudes before and after participation in the workshop. Participants included fourteen students from various health-related disciplines. The workshop consisted of three components, including team-building activities and discussions which exposed students to each field of health care. Students were challenged to make connections among each profession represented, in order to demonstrate the benefit to patients that can be attained from inter-professional learning. Data analysis was performed using a Likert scale, where responses were scored on a scale from 1 to 5, where 1 represented the lowest level of agreement, to 5 being the highest level of agreement. A two-tailed t-test was calculated, operating under the following null hypothesis: "the difference in respondent values between the pre and post survey questions is equal to 0." All fourteen "positive" survey items had both pre- and post- survey values above a value of 4.5, indicating a very strong level of agreement with statements that supported IPE collaboration. All five "negative" survey items decreased between pre and post survey data collection, which demonstrates a stronger level of disagreement with statements against collaboration after the IPE session had been completed. While no results were statistically significant, the findings paralleled pre-existing data regarding IPE, which suggests that any interdisciplinary pre-doctoral activity has value in increasing knowledge and openness to collaboration among future health professionals.

ENRICHING MEDICAL EDUCATION THROUGH GARDENING: EXAMINING THE CURRENT STATE OF NUTRITION EDUCATION IN MEDICAL SCHOOL.

Daniel J. Wallman, BUSM '16, David Hui, BUSM '18, Joanna Ortega BUSM '19, Janice Weinberg, ScD. Department of Biostatistics BUSPH, Anna D. Hohler, M.D. FAAN, Department of Neurology, BUSM.

Objective: This study aims to evaluate the current state of gardening and nutritional knowledge of medical students and subsequently improve upon that state by facilitating and promoting the use of a community garden.

Methods: A 5-pont Likert survey on gardening experience and nutritional knowledge was conducted on first and second year medical students at Boston University School of Medicine. Responses ranged from "strongly agree" to "strongly disagree". To simplify the data, a binary analysis was conducted, assigning "strongly agree" and "agree" options as affirmative responses and "neutral", "disagree" and "strongly disagree" as negative responses.

Results: 61 students completed the survey. 24.6% of respondents are knowledgeable in gardening, 37.7% can confidently identify basic garden-variety plants and herbs and 52.5% are comfortable harvesting from a garden. 78.7% of respondents are comfortable cooking with ingredients obtained from a garden, 95.1% feel nutrition and eating healthy is important to them, 32.8% think gardening helps them relax and distress and 49.2% of respondents are confident in educating patients about sources of nutritional food.

Conclusion: Medical students are ill-equipped to competently offer nutrition counseling. We describe a self-sustaining community gardening initiative run by medical students. Gardening has the potential to increase nutritional knowledge and provide a wellness activity to counteract the negative physiological effects of medical school.

"A REACHABLE MOMENT": INITIATION OF MEDICATIONS FOR SUBSTANCE USE DISORDERS AS PART OF AN ADDICTION CONSULT SERVICE

Zoe M. Weinstein, M.D. Resident, Department of Internal Medicine, BUSM

Background: Inpatients with active co-morbid substance use disorders (SUD) often have their SUD unaddressed during a typical hospital admission, and this contributes to overall long-term increased cost and risk of readmission (Baser, Chalk, Fiellin, & Gastfriend, 2011; Lynch et al., 2014; Walley et al., 2012). Multiple effectiveness trials have started medications for SUD in the hospital in an effort to improve impatient addiction treatment and reduce re-hospitalization(Caldiero, Parran, Adelman, & Piche, 2006; Collins ED, Kleber HD, Whittington RA, & Heitler NE, 2005; Liebschutz JM, Crooks D, Herman D, & et al, 2014; Shanahan, Beers, Alford, Brigandi, & Samet, 2010). While these studies have been effective in engaging patients in care, as is commonly seen, in many instances the resources were not continued long-term.(Bauer, Damschroder, Hagedorn, Smith, & Kilbourne, 2015)

Some institutions have tried to replicate some of these effects in real-world settings by creating a special resource for patients with SUD including an inpatient addiction specialty service (McDuff et al., 1997; Murphy, Chabon, Delgado, Newville, & Nicolson, 2009; O'Toole et al., 2006), however these prior efforts have not been optimal, as some of these services were not able to start medications inpatient(McDuff et al., 1997; O'Toole et al., 2006) or struggled with sustainability due to hospital finances.(Murphy et al., 2009) Recently there has been a call to the research community to increase the study of implementation of addiction-related issues, specifically increase the uptake of FDA-approved pharmacotherapies and moving the treatment of addiction towards a chronic care model.(Ducharme, Chandler, & Harris, 2016)

Setting: Boston Medical Center is a large urban academic hospital, which has multiple geographically proximate outpatient addiction treatment clinics and has newly started an Addiction Consult Service (ACS) in August 2015.

Intervention and Strategy: The goal of this study is to do a formative evaluation to examine the feasibility and acceptability of creating and sustaining this new strategy to start SUD medications in the hospital in a real world setting: an Addiction Consult Service (ACS). The intervention would be the inpatient initiation of FDA-approved medications, and all of the required services to support these medications, as some prescribing guidelines formally recommend counseling and other support services to enhance the effectiveness of the medications("Clinical Guidelines for the Use of Buprenorphine in the Treatment of Opioid Addiction|SAMHSA," 2005; Kraus et al., 2011). The strategy to do this would be the inpatient placement of addiction experts to assist the medical teams in the form of the ACS. The ACS would be led by an Addiction Medicine board certified physician, who is comfortable with the use and management of medications for SUD, and familiar with outpatient treatment clinics and able to help with facilitated referrals.

Proposed Methods and Design: As part of the rollout of the ACS, there would be a formal formative evaluation to identify barriers and facilitators of the service, and to identify possible additional resources to assist with the identified barriers. The formative evaluation would be

guided by the PARiHS framework. Additionally we wish to perform a formative evaluation (instead of summative) so that we can more directly feedback the results into improving the service in real time.

Using the PARiHS framework we will explore the domains of Evidence, Facilitation and Context with a mixed methods approach. We will use both quantitative and qualitative methods to assess these domains. For the quantitative component we will have structured survey tools for which will be distributed to 3 sets of stakeholders: hospital stakeholders, outpatient stakeholders and target patients. Quantitative measurement tools will include the Organizational Readiness to Change Assessment (ORCA) tool, Patient Attitudes and Beliefs Scale (PABS) and the Post-treatment Attitudes and Expectations Questionnaire (PAEQ). The qualitative component would include semi-structured individual and focus group interviews with stakeholders and direct observation of ACS daily workflow.

Hospital stakeholders would include hospital physicians, social workers, nurses and case managers. Outpatient stakeholders would be providers (nurses, MDs, clinic staff) from the methadone clinics, buprenorphine clinics and other medication treatment clinics that patients would be connected to at the time of discharge. Target patients would be those receiving services from the ACS.

Measures: The surveys and interviews would involve assessment of stakeholder perceptions of Context (organizational readiness, provider receptiveness etc.), Evidence (their clinical experience with the ACS, impression of patient experience) and Facilitation (education about ACS and the target patient population, presence of champion, sense of partnership between ACS and stakeholders). Implementation measures, which would be abstracted from the electronic medical record and the ACS team patient registry would include the capture rate (proportion of patients seen by the service), proportion with medications started, and the linkage rate (proportion attending post-discharge follow-up appointments).

Anticipated Challenges: Some likely challenges include the large number of stakeholders and thus the difficulty in recruiting a significant and representative number, especially for qualitative interviews.

Additionally there may be conflicting priorities and views of different stakeholders. The ACS itself is a complex of intervention, which is dependent on outpatient providers as well and availability of outpatient linkage, and thus this formative evaluation is imperative, given the challenges of sustaining prior models.

ANATOMY LABORATORY AS AN OPPORTUNITY TO EDUCATE ABOUT SKIN LESIONS

Connie Yang, B.A., BUSM '16 and Allison R. Larson, M.D.,
Department of Dermatology, BUSM

BACKGROUND: Anatomy laboratory offers opportunities to integrate clinical medicine with foundational science in medical school. Most medical schools offer no exposure to clinical dermatology in the first-year curriculum.

OBJECTIVE: Our aim was to describe and report student survey results of a novel teaching opportunity during gross anatomy laboratory in which dermatology faculty led students in exploring skin findings on cadavers and in thinking about their potential relationship to external exposures or internal disease.

METHODS: 180 students attended an hour-long session during which skin lesions were examined. One attending and 3 resident dermatologists first spent dedicated time at all 24 tables of students, then circulated to answer questions. Following the teaching session, students were given the option to fill out an online survey regarding the impact of this teaching session on their understanding of skin lesions and their relationship to underlying systemic disease and external exposures.

RESULTS: 100 students completed the survey. 59% felt they developed a better understanding of skin lesions and 60% felt they developed a basic framework for how skin examinations can give clues to external exposures. 32% of students felt they gained a better understanding of how skin findings could correlate with underlying systemic disease and 62% felt that the skin examination helped them feel more connected with their cadaver. 10% of students stated a dermatologist did not stop by their table. In a comments section, some students expressed a desire to learn about skin findings beyond what they saw in their own cadavers.

CONCLUSIONS: This brief teaching intervention illustrates one approach to introducing basic dermatologic diagnoses and concepts with the foundational science curriculum to first-year medical students. Overall, students felt the teaching session helped them develop a better understanding and appreciation for dermatology.

USE OF EYE TRACKING TO MEASURE MEDICAL GROSS ANATOMY KNOWLEDGE AND FORGETTING

Ann Zumwalt, Ph.D.; Ala'a El-Shaar, M.S., Corinne Nagle, M.S., Jessica Hill, B.A.
Department of Anatomy and Neurobiology, BUSM

A major goal of medical educators is to enable our students to achieve long-term, accurate knowledge retention. However, measurement of such knowledge is generally limited to indirect measures such as exams and skills assessments.

The goal of this study is to examine the efficacy of eye tracking as a noninvasive, direct measure of knowledge and learning. It is well established in the eye-tracking literature that experts focus more quickly and with fewer fixations on salient information, as compared to novices. Recent work by our laboratory has examined whether these principles are useful for tracking learning in the same individuals over time. In the current study, 23 medical gross anatomy students examined anatomical images immediately after the course ended and again 6 months later. They were asked to identify named structures by fixing their gaze on the location of that structure in the image (n=86 structures). At the end of the course they identified 84% correctly, whereas 6 months later they identified 78% correctly, with the decrease primarily being in the topics they learned in the final 1/3 of the course.

At both time points the students' gaze patterns were more "expert-like" when they answered correctly than when they answered incorrectly: correct responses were associated with faster response times, shorter scan paths and were associated with fewer and shorter fixations compared to incorrect responses ($p<0.001$ for all variables). At the 6-month follow-up students answered more quickly and with higher fixation frequency than they did at the end of the course for both correct and incorrect responses. All other variables were similar at the two time points.

In conclusion, eye-tracking variables were correlated as predicted with task performance (correct/incorrect responses). Further analysis is required to discern if and how task performance and gaze variables track with student course performance.