ABSTRACT

The United States healthcare system has been in a period of rapid evolution over the past decade, a trend that is anticipated to continue for the foreseeable future. Physicians are increasingly responsible for the quality of care they provide, and are being held accountable not just for the patient in front of them, but also for the outcomes of their patient panels, communities, and populations. In response to these changes, as well as the projected shortage of primary care physicians, the Warren Alpert Medical School of Brown University (AMS) developed the Primary Care- Population Medicine (PC-PM) program, which builds upon the traditional curriculum with major integrated curricular innovations. The first is a Master of Science Degree in Population Medicine that requires students to take nine additional courses over four years, complete a thesis project focused on an area of Population Medicine, and take part in significant leadership training. Another significant innovative element is the development of a Longitudinal Integrated Clerkship (LIC) during the 3rd year of medical school in which the students complete a longitudinal outpatient experience with the same preceptors and patients. During the LIC students will follow a panel of patients wherever care is provided, while focusing on population health and healthcare delivery issues, in addition to medical topics throughout their clinical and didactic experiences. Though several of the innovative elements are being piloted, the inaugural PC-PM class of up to 24 students will only begin in August 2015. While the outcomes from this program will not be known for many years, the potential impact of the program is significant for AMS, medical education, and the future of healthcare delivery.

KEYWORDS: Population health; Undergraduate Medical Education; Curriculum

INTRODUCTION

The healthcare system in the United States has been in a period of rapid evolution over the past decade, a trend that is anticipated to continue for the foreseeable future. Major changes to US healthcare delivery and financing, such as the passage and implementation of the Affordable Care Act and the recent repeal of the sustainable growth rate, are impacting physician roles and expectations. Physicians are increasingly asked to provide evidence of the quality of care they are providing, and are being held accountable not just for the patient in front of them, but also for the outcomes of their panels, communities, population of patients. These new roles require skills not commonly taught in the traditional medical school curriculum. Medical schools must now make room for the “third science” of healthcare delivery, along with the basic and clinical sciences, and include topics such as quality improvement, leadership, and working in interprofessional teams.

As the U.S. healthcare system continues to evolve, an anticipated shortage of physicians, both primary care and specialists, is expected to worsen over the next ten years. Current workforce projections predict a shortage of between 46,000 and 90,000 physicians by 2025, with a potential deficit of 33,000 primary care physicians by 2035. To alleviate the anticipated shortage of primary care physicians, authorities suggest increasing recruitment of medical students into primary care specialties using means as diverse as increasing the attractiveness of ambulatory rotations in medical schools, increasing team-based care, and improving the parity between primary care and specialty incomes.

In response to the changing healthcare system and a projected shortage of primary care physicians both locally and nationally, the Warren Alpert Medical School of Brown University (AMS) began planning for the development of a Primary Care-Population Medicine (PC-PM) program in 2011. The origins of the idea for such a program date back to the initiative of the medical school, which was originally conceived of as a “primary care medical school.” Serious discussions to unite training in the three primary care specialties (Internal Medicine, Family Medicine, and Pediatrics) took place at Brown in the late 1980s and early 1990s, and Brown gained national prominence in this area.

Momentum for designing a unique primary care-population medicine program surfaced in 2011 and 2012 for several reasons:

• AMS moved into a new facility at 222 Richmond Street in the Providence Jewelry District, allowing for innovative medical education programs and an expansion of class size.

• The AMS faculty’s depth of experience and comfort

The Primary Care-Population Medicine Program at The Warren Alpert Medical School of Brown University

PAUL GEORGE, MD; ALLAN R TUNKEL, MD, PhD; RICHARD DOLLASE, EdD; PHILIP GRUPPUSO, MD; LUBA DUMENCO, MD; BRENDA RAPOZA, MBA; JEFFREY BORKAN, MD, PhD
with innovative approaches in the areas of primary care, population medicine, public health, and medical education enabled the design and implementation of the PC-PM program.

- Senior administrators from AMS including then Associate Dean for Medical Education, Dr. Philip Gruppuso, and then Dean of Medicine and Biologic Sciences, Dr. Edward Wing, proposed the program to Brown University leadership, including then President Ruth Simmons, along with leaders in Rhode Island (RI) health care and state government, receiving enthusiastic support for the concepts and were encouraged to develop the program.

- The American Medical Association (AMA) began a grant initiative in 2013, “Accelerating Change in Medical Education” (ACE), in which they sought bold proposals for schools to change how medical students are educated.11 AMS and the PC-PM program, under the leadership of Dr. Paul George, Dr. Jeffrey Borkan and Dr. Gruppuso, received one of these $1 million dollar grants, boosting the visibility of the project and engaging national collaborators at the cutting-edge of medical education.

- The Rhode Island Foundation provided generous support, consistent with their aim to improve primary care in the State.

- Broad support for the initiative and its elements arose from students, faculty, and stakeholders across Rhode Island in government, medicine, healthcare, and elsewhere.

**VISION OF THE PRIMARY CARE-POPULATION MEDICINE PROGRAM**

The Planning Committee for PC-PM program, in 2012, consisting of senior administrative leaders at AMS and faculty physicians, set forth the following vision:

- The PC-PM program will be innovative and consistent with the reputation for excellence in medical education already held by Brown. It will enhance education in such areas as community engagement, non-traditional care settings and longitudinal educational experiences, areas that will attract outstanding students and facilitate their ability to achieve their career goals.

- Beyond training excellent primary care doctors, the program will train “clinicians plus” – leaders in education, research, and advocacy with a focus on generalist medicine and values consistent with service to the needs of patients.

- The program will be scholarly. It will provide opportunities for further academic and professional development in public health, medical education, health policy, health administration and business, as well as in clinical areas such as care of the underserved, quality improvement, and global health.

- Evidence-based approaches to pedagogy will be considered and used whenever possible – in development of curricular content, timing, sequence of experiences, extensive use of case study methods, and longitudinal clerkship experiences.

- Though established as a program with unique curricular and administrative aspects, the program will be integrated, wherever possible, with the existing medical education program in terms of administration, curriculum, space, and oversight by the Liaison Committee for Medical Education (LCME).

This vision was fashioned into a specific plan for a four-year program in which students receive both a Doctorate of Medicine and a Master of Science (ScM) degree in Population Medicine from AMS and Brown. In order to reduce the student loan burden, there will be no additional cost for the additional degree. As part of the ScM, there will be a research requirement in primary care, population medicine, or health policy, as well as interdisciplinary and leadership training. Methods for integrated, active learning will be central to its design and execution. The hope is that the graduates of this program will continue into residencies in primary care, ideally in Rhode Island; towards this end, there may be opportunities for PC-PM students to stay in Rhode Island to complete their residency training.

**ADMISSIONS**

The PC-PM program can accommodate up to 24 students per year. Students are admitted to the PC-PM program through the standard processes. Students complete an initial application through the American Medical College Application Service (AMCAS) and receive a secondary application from AMS; students have the option to indicate their interest in the PC-PM program on the secondary application. Once they indicate their interest, students complete two additional essays focused on the U.S. Healthcare System and Population Medicine. They are then screened by the AMS admission staff and offered an interview if they meet AMS’ requirements. Students are interviewed by two members of the admissions committee, with one member typically faculty in the PC-PM program. They are then admitted to AMS by a vote of the Admissions Committee.

**CURRICULAR ELEMENTS**

There are two major curricular innovations within the PC-PM program. The first is the Master of Science Degree in Population Medicine, which requires students to take nine additional courses, over four years, complete a thesis with research focused on Population Medicine, and undertake an extensive leadership program.
These courses and programs include (see Mello et al in this issue for further details):

- Health Systems and Policy I: Taught in the 1st semester of 1st year, this course focuses primarily on health disparities and social determinants of health.

- Research Methods in Population Health: Taught in the 2nd semester of 1st year, this course focuses on research methods, including formulation of a population medicine research question, study design and manuscript preparation.

- Health Systems and Policy II: Taught in the summer between 1st and 2nd year, this hybrid course (partially in-class and partially web-based) will focus on the US Healthcare System.

- Quantitative Methods: Taught in the summer between 1st and 2nd year, this hybrid course (partially in-class and partially on-line) will focus on biostatistics and epidemiology.

- Research Independent Study: In this course, students will begin the research that will form the basis for their thesis project.

- Leadership: Taught primarily in 2nd year with elements integrated through the four years, this course will focus on the principles of leadership in healthcare settings.

- Clinical and Population Medicine I and II: Taught in the 3rd year, these courses will focus on the intersection between clinical and population medicine. These courses will have a focus specifically on quality improvement, the social and community context of healthcare and leadership.

- Capstone Seminar in Population Medicine: Taught in 4th year, this hybrid course (partially in-person and partially online) will revisit topics taught in the first three years while consolidating the skills students will need to be leaders in population health through residency and beyond.

As part of the integrated ScM, students will undertake research in an area related to population medicine and complete a thesis on that research. The end product will be a manuscript suitable for submission to a peer-reviewed journal. While the Master’s degree is integrated into the curriculum and designed for completion in four years, some students may consider an additional 5th year, at no tuition cost, to complete their research.

The second major element to the PC-PM program is a Longitudinal Integrated Clerkship (LIC) (see Epstein-Lubow et al in this issue for further details). Rather than moving from rotation to rotation every 6 or 12 weeks, the majority of a 3rd year student’s time in the PC-PM program will be spent in the LIC. Table 1 describes the differences between the traditional clerkship structure and the LIC at AMS. Over the course of 32 weeks, PC-PM students will spend one half-day per week with a mentor in family medicine, internal

| Table 1. Comparison of Alpert Medical School Longitudinal Integrated Clerkship and Traditional Clerkship Structure |

<table>
<thead>
<tr>
<th></th>
<th>Longitudinal Integrated Clerkship</th>
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<tbody>
<tr>
<td>Specialties represented</td>
<td>Family Medicine, General Surgery, Internal Medicine, Obstetrics and Gynecology, Neurology, Pediatrics, Psychiatry</td>
</tr>
<tr>
<td>Number of required inpatient weeks</td>
<td>12</td>
</tr>
<tr>
<td>Number of required outpatient weeks</td>
<td>32</td>
</tr>
<tr>
<td>Elective weeks</td>
<td>4</td>
</tr>
<tr>
<td>4th year requirements</td>
<td>ICU (4 weeks; preliminary); Sub-Internship (4 weeks)</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Comprised of Shelf examination, OSCE and Direct Observation (in most cases, same as traditional clerkship structure)</td>
</tr>
<tr>
<td>Shelf exams administered…</td>
<td>Throughout the year after didactic content for a subject area delivered, with at least 1 month and typically six weeks separating exam administration</td>
</tr>
<tr>
<td>OSCEs administered</td>
<td>Intermittently throughout 3rd year</td>
</tr>
<tr>
<td>Clerkship directors</td>
<td>Same as traditional block clerkships</td>
</tr>
<tr>
<td>Didactics</td>
<td>Integrated, scheduled across entirety of LIC and includes Population Medicine content</td>
</tr>
<tr>
<td>Sites</td>
<td>For pilot, Rhode Island Hospital, Memorial Hospital and VA with inpatient rotations also at Women and Infants Hospital, Hasbro Children’s Hospital, and Butler Hospital</td>
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<table>
<thead>
<tr>
<th></th>
<th>Traditional Clerkship Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialties represented</td>
<td>Family Medicine, General Surgery, Internal Medicine, Obstetrics and Gynecology, Neurology, Pediatrics, Psychiatry</td>
</tr>
<tr>
<td>Number of required inpatient weeks</td>
<td>23</td>
</tr>
<tr>
<td>Number of required outpatient weeks</td>
<td>21</td>
</tr>
<tr>
<td>Elective weeks</td>
<td>4</td>
</tr>
<tr>
<td>4th year requirements</td>
<td>Sub-Internship (4 weeks); Surgery selective (6 weeks)</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Comprised of Shelf examination, OSCE and Direct Observation</td>
</tr>
<tr>
<td>Shelf exams administered…</td>
<td>At the end of a block rotation</td>
</tr>
<tr>
<td>OSCEs administered</td>
<td>At the end of a block rotation</td>
</tr>
<tr>
<td>Clerkship directors</td>
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<tr>
<td>Didactics</td>
<td>Scheduled per block</td>
</tr>
<tr>
<td>Sites</td>
<td>Rhode Island Hospital, Memorial Hospital, VA, Miriam Hospital, Butler Hospital, Bradley Hospital, Women and Infants Hospital and Hasbro Children’s Hospital</td>
</tr>
</tbody>
</table>
medicine, obstetrics and gynecology, pediatrics, psychiatry/neurology, and surgery. Emergency medicine experiences will also be included. Wherever possible, experiences will occur in the same hospital, hospital system, and geographic areas. PC-PM students will work with their preceptors to establish their own patient panel of approximately 30–50 patients and they will be expected to follow these patients to whatever healthcare setting they are sent. Using a protocol for prioritization, they may be present for their patients’ deliveries and surgeries, visit them on the inpatient units and nursing homes, and even participate in home care. Finally, PC-PM students will participate in didactics on clinical and population medicine topics during the LIC. The LIC is currently being piloted for 8 AMS students, with support from both the American Medical Association and the Rhode Island Foundation, during the 2015–16 academic year. Feedback will be used to assess the experience. There are plans to expand the LIC pilot with 12 to 16 students during the 2016–2017 academic year.

Students in the PC-PM program will share many of the same experiences as those in the traditional medical program. For example they will have the same basic science courses and the same Doctoring (Introduction to Clinical Medicine course) experience as the students in the traditional program. However, to encourage the start of a primary care identity, during the Doctoring course, these students will be placed in advanced Patient-Centered Medical Homes for their Doctoring mentor sites. Figure 1 depicts the curricular elements for all four years of the PC-PM program.

As part of the PC-PM program, elements of the curriculum have been or are being piloted. For example, the first course in the Master’s degree sequence, entitled Health Systems and Policy I, was taught to all 1st year medical students during the 2014–2015 academic year.

**EVALUATION PLAN**

In order to evaluate the efficacy of the PC-PM program, program faculty and staff created a multi-faceted approach employing both qualitative and quantitative strategies. These methods include evaluating the entire AMS student body on items such as empathy, tolerance of ambiguity and...
attitudes in working with underserved populations using previously validated surveys. In addition, we will conduct both interviews and focus groups with AMS students in the PC-PM program and the standard program to ascertain commonalities and differences between these populations of students.

Finally, we will look at a number of measures of success for the PC-PM program and LIC. These include the following:

1. The number of students who successfully complete the PC-PM program and graduate with both an MD and Master of Science degree in Population Medicine.
2. The number of students who enter primary care residency programs.
3. The number of students who remain in Rhode Island for residency and attending positions.
4. The number of students who become physician leaders (such as Medical Directors, Academicians, and Public Health Directors and Assistant Directors).
5. The number of physician practices recruited to be part of the LIC and the impact of students on these practices.
6. The successful introduction by students of quality improvement projects.
7. The number and range of visits to healthcare settings that students attend with patients on their LIC patient panel.
8. The ability of students to work effectively in interprofessional health care teams. This will be measured through validated surveys, including the Readiness for Interprofessional Learning Scale and direct observations by faculty.
9. Clinical competency as measured through student scores on the discipline-specific Shelf Exams, the National Board of Medical Examiner's Licensing Examinations [i.e., USMLE Steps 1, 2, and 3], and Year 4 OSCEs [Objective Structured Clinical Examinations].
10. Student satisfaction with the PC-PM program.

**DISCUSSION**

The rapidly evolving US healthcare system and the projected shortage of primary care physicians are requiring the reassessment of how medical students are educated and trained. New knowledge, attitudes, and skills are needed for the increased demands of practice, and medical schools must adapt, adding the third science of healthcare delivery to the basic and clinical sciences. Other institutions, such as Duke with their Primary Care Leadership Track and The University of Virginia with their Generalist Scholar Track, have implemented potential solutions. However, the PC-PM program at AMS is unique among programs with its longitudinal emphasis on seamlessly integrated population medicine throughout the four years of medical school and the awarding of a Master of Science degree in Population Medicine at its conclusion. In addition, by developing a sizable number of assured primary care residency positions in the state, this program will provide the next generation of primary care “clinicians-plus” who will be the future practitioners, leaders, educators, researchers and advocates for primary care and population medicine.

There are potential barriers for the PC-PM program. As with any expansion of medical school class size, there must be increased capacity for clinical training. This is especially true with LICs, which are resource consuming. AMS is working on engaging partners, new and old, to ensure the same high level of training for its students. In addition, recruiting talented and dedicated students into primary care specialties remains a challenge, as student loan debt increases and primary care physician salaries lag. Finding partners (such as foundations, hospital systems or others) to offset the cost of medical education is a priority.

Barriers notwithstanding, the Primary Care-Population Medicine program is an innovative and exciting program that provides students with the knowledge, skills and attitudes they need to function as physician leaders in an ever-changing healthcare system. We anticipate the PC-PM program will lead to improvements in the outcomes, quality and organization of healthcare in the state, while at the same time fostering research in primary care, population medicine and health policy. While the evaluation of the program outcomes will not be known until students graduate and move on to residencies and practice, there is great potential of the program to affect medical education at AMS, in Rhode Island and nationally.

References


Authors
Paul George, MD, MHPE, Director of the Primary Care-Population Medicine Program and Associate Professor of Family Medicine, Department of Family Medicine, and Office of Medical Education, The Warren Alpert Medical School of Brown University, Providence, RI.

Allan R. Tunkel, MD, PhD, Associate Dean for Medical Education and Professor of Medicine and Medical Science, Office of Medical Education and Department of Medicine, The Warren Alpert Medical School of Brown University, Providence, RI.

Richard Dollase, EdD, Director of the Office of Medical Education, The Warren Alpert Medical School of Brown University, Providence, RI.

Philip Gruppuso, MD, Professor of Pediatrics, Department of Pediatrics and Office of Medical Education, The Warren Alpert Medical School of Brown University, Providence, RI.

Luba Dumenco, MD, Lecturer in Pathology and Laboratory Medicine and Director of Preclinical Curriculum, Office of Medical Education, and Department of Pathology and Laboratory Medicine, The Warren Alpert Medical School of Brown University, Providence, RI.

Brenda Rapoza, MBA, Coordinator of the Primary Care-Population Medicine Program Office of Medical Education, The Warren Alpert Medical School of Brown University, Providence, RI.

Jeffrey Borkan, MD, PhD, Assistant Dean for the Primary Care and Population Medicine Program, Professor and Chair of Family Medicine, Department of Family Medicine, and Office of Medical Education, The Warren Alpert Medical School of Brown University, Providence, RI.

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Correspondence
Paul George, MD, MHPE
Office of Medical Education
Alpert Medical School of Brown University
Box G-M 109
70 Ship Street
Providence, RI 02903
Paul_George@brown.edu

Paul_George@brown.edu