



Incorporating Population Medicine Into Primary Care Residency Training

Wayne S. Dysinger, MD, MPH; Valerie King, MD, MPH; Tina C. Foster, MD, MPH;
Dominic Geffken, MD, MPH

BACKGROUND AND OBJECTIVES: Expanded competencies in population health and systems-based medicine have been identified as a need for primary care physicians. Incorporating formal training in preventive medicine is one method of accomplishing this objective.

METHODS: We identified three family medicine residencies that have developed formal integrated pathways for residents to also complete preventive medicine residency requirements during their training period. Although there are differences, each pathway incorporates a structured approach to dual residency training and includes formal curriculum that expands resident competencies in population health and systems-based medicine.

RESULTS: A total of 26 graduates have completed the formally combined family and preventive medicine residencies. All are board certified in family medicine, and 22 are board certified in preventive medicine. Graduates work in a variety of academic, quality improvement, community, and international settings utilizing their clinical skills as well as their population medicine competencies. Dual training has been beneficial in job acquisition and satisfaction.

CONCLUSIONS: Incorporation of formal preventive medicine training into family medicine education is a viable way to use a structured format to expand competencies in population medicine for primary care physicians. This type of training, or modifications of it, should be part of the debate in primary care residency redesign.

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The role of the physician primarily involves working with patients one on one. In the outpatient clinic, the hospital ward, the operating theater, and multiple other settings, doctors are trained to diagnose and treat individual patients. Over the last several decades this core physician role has not changed, but the complexity of the health care environment within which it occurs has. To achieve health and healing,

individuals now commonly interact with not only their first-line health care provider but also with numerous levels of specialists and ancillary health professionals. The successful primary care physician must now support, coordinate, and often lead those with illness through multiple layered teams and systems. Although there is overlap, the required skill sets for working with teams and systems are significantly different

than those needed in the one on one environment.

In 2001, the Accreditation Council for Graduate Medical Education (ACGME) acknowledged the need for communication, system, and quality improvement skills for all physicians.¹ These new requirements have substantially changed the primary care training environment. Nine years later, however, despite significant debate and attempts at curricular innovation,^{2,3} the core educational structure for primary care residencies is still being defined. While the specialty of family medicine has developed and is currently exploring dramatic redesign,⁴ the general format for residency training is remarkably similar to that created 50 years ago when family medicine was officially recognized as a specialty.

Unlike other medical specialties, the specialty of preventive medicine grew out of the public health world and has always focused on improving the health of populations^{5,6} (see Table 1). To ensure competency in population health, preventive medicine training programs have traditionally incorporated structured experiences in health administration, health promotion, epidemiology,

From the Department of Preventive Medicine, Loma Linda University (Dr Dysinger); Department of Family Medicine, Oregon Health & Science University (Dr King); Institute for Health Policy and Clinical Practice (Dr Foster) and Department of Community and Family Medicine (Dr Geffken), Dartmouth Medical School.

Table 1: Population Medicine Competencies (Selected From Preventive Medicine Competencies)

<p>General Competencies</p> <ol style="list-style-type: none"> 1. Communicate to target groups...the levels of risk from real or potential hazards and the rationale for selected interventions. 2. Demonstrate the ability to prioritize new or ongoing projects or programs...as defined by objective, measurable criteria. 3. Use information technology for specific applications relevant to preventive medicine and public health. 4. Interpret relevant laws and regulations relating to protection and promotion of the public's health. 5. Identify ethical, social, and cultural issues relating to policies, risks, research, and interventions. 6. Identify the processes by which decisions are made within an organization or agency and their points of influence. 7. Identify and coordinate the integrated use of available resources to improve the community's health.
<p>Epidemiology and Biostatistics Competencies</p> <ol style="list-style-type: none"> 1. Characterize the health of a community. 2. Design and conduct an epidemiologic study. 3. Design and operate a surveillance system. 4. Translate epidemiologic findings into a recommendation for a specific intervention to control a public health problem. 5. Design and/or conduct an outbreak and/or cluster investigation.
<p>Management and Administration Competencies</p> <ol style="list-style-type: none"> 1. Assess data and formulate policy for a given health issue. 2. Develop and implement a plan to address a specific health issue or problem. 3. Conduct an evaluation or quality assessment based on process and outcome performance measures. 4. Manage the operation of a program or project, including human and fiscal resources.

and a variety of system and team based interactions. More recently, specific training exposures in quality improvement and patient safety have been added to the education of preventive medicine specialists.⁷ Preventive medicine physicians gain competency in working with and leading teams and systems, in applying evidence to both populations and individuals, and in tackling some of the most critical problems in primary care, such as diabetes, cardiovascular disease, and poor pregnancy outcomes (see Table 2).

Weaving the population-based skills found in preventive medicine training into typical primary care education would appear to be a natural step toward incorporating ACGME competencies and helping physicians achieve the proficiencies required in our currently complex health care environment. This has been done successfully elsewhere⁸ and has been already described for internal medicine and preventive medicine.^{9,10} We identified the only three current US graduate medical education programs that have intentionally and systematically added preventive medicine residency education to family medicine training. We describe the structure for each

of those three programs and summarize what each program's graduates are doing in their careers. We then discuss similarities and differences of each program and review the implications of redesigning primary care training with more conscious and concrete population medicine exposures, tools, skill sets, and competencies.

Methods

Data Collection

The program directors for each residency were interviewed and asked to answer a series of open-ended questions around residency structure and curriculum as well as resident recruitment, retention, and job descriptions upon graduation. Statistics for residency graduates are tracked independently by each program using ongoing residency graduate surveys. Residency directors were also asked to specifically identify barriers to and benefits of incorporating extensive population training into primary care residency education and to review the financial models used in program development. Since all programs are small, certain residency graduate information was also known to the program directors. Residency director answers

were qualitatively collated into a narrative that became the first draft of this paper. These data was collected and collated in September 2010.

Program Descriptions

The Dartmouth-Hitchcock Leadership Preventive Medicine Residency (DHLPMR), begun in 2002, is a dual residency "addition" model, by which we mean that the duration of training in each specialty is largely preserved. This program was established with the express purpose of developing "physicians who seek to become capable of leading change and improvement of systems where people and health care meet." The DHLPMR program uniquely offers the opportunity to combine population-based training with any graduate medical education program offered at Dartmouth-Hitchcock Medical Center.¹¹ In the family medicine/preventive medicine track based at Concord Hospital, residents complete 1 year of training in family medicine, then begin their preventive medicine rotations and Masters of Public Health (MPH) coursework in conjunction with their family medicine training. The Dartmouth Institute (TDI) is the site for the MPH coursework.

Table 2: Examples of Population Medicine Training

Training Location	Sample Activities
County/city/state Public Health Departments	<ul style="list-style-type: none"> • Evaluation and coordination of childhood obesity treatment programs • Participation in epidemiology surveillance and acute outbreak investigations • Development of a needle exchange policy
Quality improvement organizations	<ul style="list-style-type: none"> • Development of a pay for performance system • Evaluation and tracking of an outpatient congestive heart failure program • Development of an infectious disease database and tracking mechanism
Managed care organizations (eg, Kaiser, Cigna, Aetna, Medicaid managed care)	<ul style="list-style-type: none"> • Development and evaluation of a diabetes in pregnancy intervention clinic • Evaluation of an asthma disease management program • Evaluation of a clinical practice guideline on immunizations
Integrated health care systems (eg, hospitals and hospital networks)	<ul style="list-style-type: none"> • Creation and implementation of a hand hygiene program • Development of Patient-centered Medical Home components at multiple primary care offices • Exploratory work on development of an accountable care organization
Large companies/industry (ie, GE, Xerox, Exxon)	<ul style="list-style-type: none"> • Review of evidence-based benefit design • Development and evaluation of a health risk assessment program • Implementation of a cafeteria wellness meal system
Population medicine at other clinical sites (ie, community health centers, student health, employee health)	<ul style="list-style-type: none"> • Preparation and implementation of an electronic medical record system • Creation and implementation of a mammogram tracking system • Evaluation of an influenza immunization program

This residency does have flexibility in allowing residents to enter at various times during their residency training, although to date most graduates have entered as Paul Ambrose fellows, which allows the resident to begin the MPH coursework in the fourth year of medical school and complete the combined residency in 4.5 years. (Paul Ambrose, MD, MPH, graduated the New Hampshire Dartmouth Family Practice Residency in 1999. He was an instrumental force in the inception of the Preventive Medicine Residency at Dartmouth Medical School. He went on to obtain his MPH at Harvard School of Public Health in 2000. He was the Luther Terry Fellow-US Department of Health and Human Services 2000–2001. He died on September 11, 2001, as a passenger on American Airlines flight 77, the airplane

that crashed into the Pentagon. The Fellowship is named in his honor). After the initiation of MPH coursework, the Paul Ambrose fellows complete the first year of family medicine inpatient rotations. During the second and third years of residency, family medicine elective time is used to complete TDI coursework, develop quality improvement projects, and maintain family medicine continuity clinic in rotations that are dually counted as family medicine/ preventive medicine experiences. Family medicine requirements are completed at 3.5 years. This combined program has received approval by the American Board of Family Medicine, the American Board of Preventive Medicine, and the ACGME. The residency culminates with a year-long preventive medicine practicum, which is a

quality improvement project for a defined population of patients. During this time they also complete a longitudinal public health experience as well as structured training in team membership and adaptive leadership. This pathway has received approval from both the American Board of Family Medicine and the American Board of Preventive Medicine. Some residents do complete a “stacked” model in which they finish their family medicine training prior to entering DHLPMR.

The Oregon Health Sciences University (OHSU) began in 1997 as a residency “track” program. Two interns out of each class of 12 are selected for the track, which has its own Match number. During the intern year, residents in the track attend preventive medicine seminars while on ambulatory rotations.

Interns who do not already have an MPH apply for entry to the Oregon MPH program. The majority of residents have completed the Health Management and Policy MPH degree at Portland State University (PSU), one of the Oregon MPH's affiliated programs. Residents who complete the PSU MPH also take additional coursework in epidemiology to more fully prepare them for careers in preventive medicine. Residents use elective rotations in the second and third year of their family medicine training to take their MPH courses. While on ambulatory or elective rotations they participate in preventive medicine seminars. At the end of the third year of residency, they are finished with their family medicine residencies and are board eligible in family medicine. These residents are then admitted into the OHSU preventive medicine residency and spend the next year in practicum settings where they receive hands-on experience in population-based health care and health policy. During that year they complete a research project, and finalize their MPH degree. These preventive medicine residents also have a teaching role within the family medicine residency in the quality improvement, clinical epidemiology, and public health/prevention portions of the family medicine curriculum. The OHSU experience is structured as two independent but cooperative residencies. There is a separate residency director for this track in family medicine who is also an associate residency director in the preventive medicine program. There is a strong ethos of communication between these two residency programs and their respective residents and residency directors. This has enabled a seamless training experience across the two residencies and 4 total years of residency for the OHSU residents.

The Loma Linda University (LLU) Family and Preventive Medicine Residency began in 2006 and is a residency "interweave" model. This program accepts four residents per

year using a separate Match number into a 4-year curriculum where family and preventive medicine are interlinked throughout the training period. Although the first year is primarily a family medicine internship year, residents do begin MPH class work within their first 2 months. The second year incorporates 3 months of preventive medicine rotations. The third and fourth years are equally divided between family medicine and preventive medicine rotations. There are also 6 months of electives distributed over the second, third, and fourth years. Upon program completion, residents have finished their MPH and developed specific skill sets in both one on one patient care as well as population or system-based competencies. The LLU program has a separate family and preventive medicine program director and coordinator. The LLU program sought and received support for its 4-year curriculum from both the American Board of Family Medicine and the American Board of Preventive Medicine.

Results

Graduate Statistics

Since 2005, a total of 24 physicians have completed the Dartmouth combined program in all specialties. There have been five graduates of the program who combined training with family medicine; an additional five graduates have combined training with internal medicine or pediatrics. There are currently five residents in combined training with family medicine and three combined with internal medicine. The family medicine graduates are working in both academic and community settings, and all have both clinical responsibilities and defined time for work on quality improvement in their organizations. Similarly, the internal medicine and pediatrics graduates are mostly in academic practices with substantial protected time for improvement-related work. All of the 10 primary care/preventive medicine graduates are board certified in their primary care specialty,

and so far six have taken and passed boards in preventive medicine. Two more will sit for preventive medicine board certification in the next year. All graduates have reported that their training was seen as an asset by potential employers, and that there is a recognized need for physicians with the skills to think about populations and how to improve their care.

Eighteen residents graduated from the two OHSU residencies between 2001 and 2010. Three residents left the track during their family medicine training. In two of these cases the position was back-filled with another resident from their family medicine residency class. All joint program graduates are board certified in family medicine, and all but one is board certified in preventive medicine. OHSU residency graduates work in a diverse group of settings, and all are making use of their joint training. Eight graduates are in academic family medicine practice with research and teaching as part of their jobs. Two of these individuals also work part-time in key health policy roles in the state of Oregon, and one directs a rural health research center. Four of the eight in academic departments conduct their clinical practices in Federally Qualified Health Centers (FQHCs) or state-designated rural health centers (RHCs) where they have explicit population health mandates. Two graduates work in international settings, managing public health research and service delivery programs. Eight other residency graduates have primarily clinical jobs. Seven of them work in FQHCs, RHCs, or "mission" clinics focused on under-insured or uninsured populations within a larger health care system. Two of these graduates incorporate health services administration or public health responsibilities as part of their work. Graduates report that their joint training was important in securing their positions and has given them enhanced career opportunities.

As the newest program, Loma Linda has three graduates and 16 residents in training. One resident dropped the family medicine portion of her training and completed only preventive medicine. All others are on track to complete the 4-year program. Of the graduates, one is working temporarily in an academic setting and preparing for a global health position. Another is working for a community hospital doing both primary care and community intervention activities. A third is employed by a small rural primary care practice where he does typical family medicine and is implementing group and community health care programs. Many of the current residents see career paths in global health, academia, and primary care practices that allow application of population and individual patient care. All three graduates have completed family medicine Boards. Two have completed preventive medicine Boards, and the third plans to do so in the future.

Barriers and Benefits

Multiple challenges were identified in incorporating population medicine training into primary care residency education. The most significant was the merging of two cultures. The typical physician mindset is that of reductionism and a search for clear, distinct answers to specific problems. Although population medicine also searches for understandable answers to problems, it does so in the context of multiple factors that require a broad perspective and a comfort with numerous ambiguities. These two cultures at times lead to conflict. Each of the three programs described incorporated three distinct educational components—residency training in family medicine, a Masters of Public Health degree, and residency training in preventive medicine. The logistics of merging or interweaving each component also provides multiple challenges.

There are also benefits. All three residency programs have found their combined training programs

to be attractive to prospective trainees. There is a significant cadre of medical students who are fascinated by the opportunity to define primary care education as something that prepares them to take care of both individuals as well as communities. Because there are currently so few programs that offer this type of training in a systematic way this leads to a large possibility of matching motivated students with a track record for successful engagement, which in turn increases the quality of the program as a whole. In part because of the type of student such programs attract, and in part because of the training program that inculcates systems-based approaches, by their final year residents are frequently actively working on improving the training program they are completing, again ratcheting up the quality even higher.

Financial Models

The OHSU and LLU programs were developed using current graduate medical education (GME) funds. Funded residency slots already existed in family medicine as well as preventive medicine. The funding for current separate slots were simply combined and redistributed to achieve funding for combined residency training slots. Funding for the Dartmouth program took advantage of a Center for Medicaid and Medicare Services (CMS) program in the late 1990s that incentivized rural hospitals to develop new GME programs. Dartmouth is considered a rural hospital. This program allowed Dartmouth to use existing family medicine slots and add multiple newly funded preventive medicine residency slots to financially create their combined program.

Discussion

Program Similarities and Differences

All three programs have sought to consciously integrate their educational experiences about systems, communication, and improvement with the clinical work of family

medicine and the didactic content of the MPH degree. Residents are not expected to create their own training track or achieve either their individual or population-based competencies randomly or through electives. A definitive, systematic, consistent set of rotations, classes, and other didactic experiences exists that is followed in a relatively similar format by each resident who enters the program. All three programs have used a certain amount of interweaving of population and individual care skills throughout their training programs. This is not sequential training but an inter-digitated method of exposing residents to specific experiences that teach the one on one interactions, others that provide population or system-based encounters and competencies, and others that provide components of both on a regular basis.

Each program also has administrative structures that are built specifically to implement, coordinate, and evaluate the combined training approach. All three residencies have methods of creating a professional community among their dual-trained residents and faculty above and beyond that available for each separate residency.

To maintain family medicine accreditation, each program has had to create somewhat similar curricula around individual patient care. There is some variation, however, in the population-based educational experiences that meet the preventive medicine training requirements. At Dartmouth and Concord, the emphasis is on leadership, patient safety, quality improvement, and team membership.¹² At OHSU there is an emphasis on developing competencies in health policy, leadership, and public health. The areas of strength for LLU are lifestyle medicine and global health. Each emphasis develops competencies in systems-based practice, including data management, health administration, and promotion, but the settings vary.

The length of time used to achieve these experiences and skill sets also

varies. Residents at Dartmouth/Concord complete the program in 5 years, while both OHSU and LLU use a 4-year format. Dartmouth/Concord emphasizes the availability of this program to their primary care residency applicants and accepts residents into the program after they have proven themselves in their internship year. Some residents also join the Dartmouth program via the Paul Ambrose fellowship as described earlier in this paper. The OHSU and LLU programs interview applicants specifically for their combined training tracks and match them with a separate Match number. Program similarities and differences are further clarified in Table 3.

Summary

Three primary care residency programs independently incorporated formal population-based training into their curriculum using a combined family medicine/preventive medicine residency training format. Although not reviewed in this article, there are also six general internal medicine residencies that have

combined the population-based training found in preventive medicine into their residencies in a formal 4-year training.^{9,10} Adding the population health and systems-based competencies of a preventive medicine residency appears to be valuable to any type of primary care graduate medical education program.

Combining a full preventive medicine residency with primary care training is not the only way to improve resident competencies in systems and populations. Others have incorporated an MPH degree¹³ or have included specific curriculum in quality improvement and patient safety,^{14,15} community health,^{16,17} clinical and health services research, or other experiences.¹⁸ Dual formal certification that has ongoing ACGME review and oversight has proved attractive to residents, employers, institutions, and funders in other settings.^{19,20} The experiences of the three residencies described in this article indicate that this is also true in family medicine/preventive medicine programs.

A common theme among graduates of these programs is that they “see the world differently.” Understanding systems, knowing about the tools needed to change and improve those systems, and the practical experience of leading change in our complex health care environment all contribute to the ability to be a productive health care leader. There is an approximately one third overlap of required curricular areas between family medicine and preventive medicine. Dual training leverages this substantial concordance and extends the practical application of both sets of skills into practice.

This study compares and contrasts three training programs that consciously and systematically incorporated the population-based training found in preventive medicine residency education into primary care residency education. Although our qualitative methods allowed us to gather valuable details from the educator perspective, this review would be strengthened if additional data were also collected directly

Table 3: Program Summaries

	Dartmouth	Oregon	Loma Linda
Integration type	Track and addition	Track and addition	Interweave
Population training strengths	Leadership, team, quality improvement, patient safety	Health policy, leadership, public health	Lifestyle medicine, global health
Length of training	5 years (or modified 4.5 years)	4 years	4 years
Number of trainees	2 per year	2 per year	4 per year
Number of graduates	5 family medicine	18	3
Family medicine board certification	5	18	3
Preventive medicine board certification	3	17	2
MPH	5	18	3
Academic affiliations	2	8	1
Clinical practice	5	18	3
Population health roles	5 work in quality improvement	11 in FQHCs 7 in public health	3 work with community interventions

FQHC—federally qualified health center

from residency graduates and their employers.

Expanded competencies in population health and systems-based medicine such as those found in joint training programs are valuable but not necessarily required of all primary care physicians. Basic improvements in systems-based care such as those now required by the ACGME may be sufficient for many. If the challenges of primary care are to continue to be attractive to medical students, and if the primary care disciplines wish to continue to contribute in a valued way to the US health care system, increasing the number of programs that offer dual training should be part of the debate.

CORRESPONDING AUTHOR: Address correspondence to Dr Dysinger, Loma Linda University, Department of Preventive Medicine, 24785 Stewart Street, Loma Linda, CA 92350. 909-558-7518. wdysinge@llu.edu.

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