EDITOR'S NOTE

Mapping Primary Care: Putting Our Patients in Context

"Stone, kidney disease, strangury, and sciatica are very apt to attack people, and ruptures occur, when they drink water of very many different kinds, or from large rivers, into which other rivers flow, or from a lake fed by many streams of various sorts, and whenever they use foreign waters coming from a great, not a short, distance. […] Such waters then must leave a sediment of mud and sand in the vessels, and drinking them causes the diseases mentioned before. …" —Hippocrates, *On Air, Waters, Places (Part 9)*[1]

Hippocrates, writing circa 400 BC, said that one's health depends on the air one breathes, the water one drinks, and the environment in which one lives. Place matters in health. In several articles in this issue of the *Journal of the American Board of Family Medicine*, authors explore the ways in which place matters for practicing clinicians, medical educators, and primary care researchers.

Knowing a patient's context can make the difference between just treating a child's injury and also calling protective services. Before my present position at the University of Virginia I worked in rural Alaska. I remember being in the emergency department one night when a mother from an Eskimo village brought her toddler in for treatment for burns on his feet. The boy had circumferential, second-degree burns on his feet and ankles and looked as though he had been dipped feet-first into a pot of boiling water. Mom said the child had jumped into a pot of freshly boiled water that had been on the floor.

I had flown out to this village and made a number of home visits. I remembered visiting a patient with disseminated tuberculosis, sitting with her on the floor as she butchered a seal and rendered its fat on a camping stove. Stepping into a pot of boiling water on the floor is easy to do under those circumstances.

Harder to do is taking my advice to increase your physical activity by walking in your neighborhood for 30 minutes several times a week, as I recently advised a patient of mine. When I asked her several weeks later why she hadn't started the new exercise, she told me she didn't feel safe doing it. "Is there a lot of crime in your neighborhood?" I asked. "No, doc," she said. "There are no sidewalks and no streetlights." A few minutes of looking at Google Earth before talking to this patient about walking exercise on her neighborhood streets would have made for better advice from the start.

Experiences like these make Ethan Berke's[2] suggestion that we use place as a vital sign in everyday clinical practice ring true. He explains that understanding a patient's geographic context helps shape clinical decision making and treatment choices. Dr. Berke provides an extremely helpful overview of the importance of geographic information systems (GIS) science and technology to primary care research and practice. Dr. Berke describes early uses of geographic information in disease surveillance and the growing use of GIS in today's public and population health. GIS provide a powerful set of tools for understanding health risks to populations and for planning and evaluating interventions to improve population health.

The recent epidemic of the novel H1N1 influenza underscores the importance of disease surveillance to help direct health systems' resource allocation and to keep communities informed regarding disease risk. In their article, Horst and Coco[3] report on a feasibility study they conducted to assess the usefulness of GIS in tracking common illnesses seen in primary care offices and emergency departments. Using data from 26 primary care sites and 1 emergency department in a single health care system, these researchers tracked common respiratory and gastrointestinal syndromes during a 13-month period. Horst and Coco identified clusters of these illnesses during specific time periods and locations within their defined community. Theses authors feel that understanding the temporal and spatial variability of these illnesses may aid in health resource allocation.

The usefulness of GIS technology in primary care research and practice is further demonstrated

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in several other articles in this issue of the *JABFM*. Dulin et al[4] report an exciting and innovative use of GIS as a tool for assessing a community's present and future primary care needs. Working in a community-based participatory research framework, these researchers collaborated with community-based physicians (through a practice-based research network), community organizations, and key community leaders to develop a method for identifying areas in their community in need of improved access to primary care services. Using this community-based participatory research approach, they identified key attributes describing primary care need and possible areas in need of increased primary care services were identified using GIS mapping.

In a second article, Dulin et al[5] apply this assessment approach, which they dub "Multiple Attribute Primary Care Targeting Strategy," to identify specific areas in their community where the growing Hispanic population lacks adequate primary care services. The authors point out that these identified geographic areas can be targets for interventions to improve access to primary care, and the geospatial model they've developed can be used to track the effectiveness of such interventions.

Federally qualified community health centers (FQCHCs) increasingly have become important safety-net providers of primary care services to medically underserved areas. Bazemore et al[6] describe how they used GIS to integrate practice-derived patient data with area-level population data to generate maps depicting an urban FQCHC's patient distribution, population penetration, and service area. In a similar vein to that of Dulin et al,[4,5] Bazemore and colleagues involved the primary care clinicians at the center, clinic administrators, and community members in evaluating the results of this spatial analysis. The results helped this FQCHC develop strategies for improving their services and increasing revenue.

In a research letter, Bazemore et al[7] report on a study in a different city in which they used GIS to demonstrate the effect of moving a family medicine residency program's clinic providing care to a population of African-American and Hispanic patients with chronic disease. Thus, GIS tools prove to be valuable instruments for evaluating primary care health services delivery.

Whereas Dulin et al[4,5] and Bazemore et al[6,7] used GIS technology to assess primary-care service delivery in urban areas, Booza et al[8] use GIS tools to help evaluate a program designed to increase the number of primary care physicians who practice in rural Michigan. They used 3 different measures of rurality to judge whether medical students who expressed a special interest in rural clerkships were placed in rural settings for their clinical training experiences. Their results varied, depending on which definition of rural was used in the analysis. No matter the definition, however, students clearly received clinical training experiences near rural or semirural areas.

One of the most important contributions GIS technology and spatial analyses make to primary care is helping us better manage our service delivery and educational programs. Booza et al[8] report that the process evaluation they conducted highlighted important gaps in their recruitment of clinical preceptors. This gap is being addressed now with special recruitment efforts in those more rural areas of the state.

Family medicine, as a discipline, has a unique understanding of the links between patients, their families, and their communities. GIS provide us with a powerful tool for deepening that knowledge, explaining it to others, and using it to design interventions that improve the health of the communities we serve. After reading the papers in this issue of the *JABFM*, I've put a Google Earth icon right on my computer's desktop.

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