Integrating Community and Clinical Data to Assess Patient Risks with a Population Health Assessment Engine (PHATE)

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Clinicians are concerned about their patients’ social determinants of health (SDH); yet, they are unsure how to effectively gather patient-level SDH data and intervene without adding to current administrative burdens. Designed properly, clinical registries offer solutions to integrate neighborhood SDH data with clinical data from electronic health records, enabling the understanding of community factors to guide patient care. Federal and state interest in adjusting reimbursements based on SDH further underscores the need for strategies that integrate SDH and clinical data. The Population Health Assessment Engine (PHATE) exemplifies a registry-based SDH data integration solution that adjusts payments, contributes to public health surveillance, organizes care around hot spots (gaps in quality or uncontrolled disease), assesses patient risk, and connects with community organizations. PHATE also permits residency training to meet community health competency milestones by incorporating the PHATE curriculum. These functions enhance value, and their utility in education and care delivery would benefit from further investigation. (J Am Board Fam Med 2020;33:463–467.)

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Introduction

Variation in social determinants of health (SDH) contributes to pervasive health disparities. Although aware of their impact, clinicians are uncertain how to ask about the SDH needs of individuals, question the accuracy of patients’ responses, and lack resources to address identified needs. In response, others have proposed using small-area SDH indices in place of or in addition to individual SDH data.

These neighborhood indices have been conceptually tested as Community Vital Signs (CVSigns). The Institute of Medicine recommended that neighborhood and clinical data from electronic health records (EHRs) should be integrated in a single or shared platform. The Population Health Assessment Engine (PHATE; pricing information is available at www.primeregistry.org/phate) builds on this recommendation by combining CVSigns and clinical records to define clinical service areas and characterize communities. In the following paragraphs, we describe how PHATE contributes to public health surveillance, helps providers organize care around hot spots, allows for patient risk assessment, and connects practices with community organizations. PHATE’s CVSigns is based on ecological SDH organized as a social deprivation index—a small area index associated with poor health outcomes, disease prevalence, and increased costs. This integration provides a reliable first-pass assessment of patient risks based on where they live.

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Using PHATE to Practice Community-Oriented Primary Care

The creation of federally qualified health centers can be traced back to community-oriented primary care (COPC), a model that addresses SDH through community engagement and integration of public health and primary care. In addition to a payment system that rewards volume over value, COPC adoption has historically been limited by technological challenges, including inadequate tools and data to define the service areas of practices, the first step in COPC. The Health Resources and Services Administration Uniform Data Set Mapper (www.udsmapper.org) tool successfully overcame these challenges by using geographic retrofitting to identify service areas for federally qualified health centers. PHATE opens up this technology to front-line clinicians at a time when value-based payment models strive to achieve a balance between efficiency and effectiveness while promoting enhanced population health management and systemic reduction of health care costs for both populations and individuals.

A New Paradigm for Care Delivery Built on COPC

PHATE is a tool that allows clinicians to build on COPC principles and forge new models for how care is delivered. Using data from the American Board of Family Medicine’s PRIME Registry, PHATE geocodes patient addresses to define a clinic’s service area and a patient’s CVSigns, directly addressing the National Academy of Medicine’s call for inclusion of SDHs into EHRs. PHATE also uses addresses, diagnoses, and quality measures to geospatially identify hotspots of disease prevalence and poor control (Figure 1). Through these functions, PHATE transforms care delivery at several levels [Insert Table 1].

Adjusting Payment and Quality Measures

With the ascension of value-based payment, providers may be reluctant to care for patients with social risk factors. In response, efforts are underway to adjust payment and measurement to account for these risks. For example, at the state level, policy makers in Ohio, Massachusetts, and Minnesota are developing approaches to accomplish this goal. At the federal level, a report from the Assistant Secretary for Planning and Evaluation calls for adjustments in payment that reward achievement or improvement in beneficiaries with social risk factors, although the details for how this will be accomplished have yet to be defined. The CVSign within PHATE could support adjustment, as is done in the United Kingdom and New Zealand.

PHATE could also adjust quality measures. Minorities have poorer outcomes due to higher levels of medical risk, worse living environments, and greater challenges in adherence and lifestyle; at the same time, providers serving these beneficiaries may have poorer performance due to fewer resources, more challenging clinical workloads, and lower levels of community support. Adjusting payments without adjusting measures would put practices with disadvantaged patients at risk for receiving enhanced resources and having have them taken away for poor quality. PHATE supports measure adjustments within PRIME while also identifying equity gaps that need improvement.

Public Health Surveillance

Federal, state, and local public health departments use clinical data to assist in disease surveillance. These partnerships help generate real-time data and small-area estimates. Currently, public health departments use national surveys, such as the Behavioral Risk Factor Surveillance System, to monitor disease and health behaviors, but unfortunately, the Behavioral Risk Factor Surveillance System is limited by cost, reliance on self-report, and telephone access. Registries with tools like PHATE can provide additional public health data, including diagnosis codes, medications, laboratory values, and SDH information.

Organizing Care around Hot Spots

Public health departments are starting to use geographic variation in health care to identify hot spots—clusters of high-need, high-cost patients—and inform targeted interventions. Cincinnati’s Community Health Assessment found a 20-year variation in life expectancy across neighborhoods. In response, the Cincinnati Health Department partnered with community organizations to develop strategies for at-risk neighborhoods. Cincinnati pediatricians identified geospatial patterns for hospitalizations, and armed with these data, they reorganized care delivery. Specifically, they received alerts when patients from specific neighborhoods were admitted and deployed comprehensive care teams to address social needs and transitional care support.
By identifying disease and poor-quality clusters, PHATE allows primary care teams to similarly reorganize care to address hot spots.

**Assessing Patient Risk**

PHATE’s merger of EHR and neighborhood data allows for the incorporation of geography to improve risk assessment for patients. For example, Lichkus references PHATE’s applicability in identifying the geographic distribution of patients who screen positive for food insecurity. PHATE, therefore, allows for a better understanding of neighborhoods with greater risk of food insecurity and other risks in local communities. A good understanding of risks will allow providers and public health officials to investigate why some locations experience a differential burden; it will also encourage collaboration with local organizations to improve access to services.

**Connecting with Community Organizations**

PHATE coordinates work at patient and community levels, fulfilling the National Academy of

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**Table 1. How the Population Health Assessment Engine Can Be Used to Improve Health**

| Level          | Function                  | Example                                                                                                                                 |
|----------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| System level   | Adjust payments           | Massachusetts and Minnesota adjust Medicaid reimbursements based on SDHs                                                              |
|                | Contribute to public      | MacroScope (New York City) and the electronic medical record Support for Public Health (ESP; Massachusetts) use EHRs for public health surveillance |
| Practice level | provide health surveillance | The University of Cincinnati’s comprehensive care team aims to reduce hospital admissions for children coming from high poverty neighborhoods |
|                | Organize care around hot spots | QRISK uses geographic data to calculate risk for cardiovascular disease in the United Kingdom                                    |
|                | Assess patient risk       | Community Rx uses diagnosis codes and links patients to relevant community resources                                                   |

SDH, social determinants of health; BRFSS, Behavioral Risk Factor Surveillance System; NAMCS, National Ambulatory Medical Care Survey; EHRs, electronic health records; QRISK, cardiovascular disease risk algorithm, ESP, Emergency Service Program.
PHATE provides an innovative way to integrate neighborhood and EHR data, allowing users to adjust payment, contribute to public health surveillance, organize care around hot spots, assess patient risk, and connect with community organizations. PHATE is a tool that can reduce clinical burden, support intrinsic interest in addressing SDH, and train the next generation of clinicians. Working across various registries and EHRs, PHATE would benefit from further evaluation of its utility for education and clinical care.

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