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SPECIAL REPORT

Uses and Misuses of Patient- and Neighborhood-level Social Determinants of Health Data

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ABSTRACT

Health care leaders in the US are actively exploring strategies to identify and address patients' social and economic hardships as part of high-quality clinical care. The result has been a proliferation of screening tools and interventions related to patients' social determinants of health, but little guidance on effective strategies to implement them. Some of these tools rely on patient- or household-level screening data collected from patients during medical encounters. Other tools rely on data available at the neighborhood-level that can be used to characterize the environment in which patients live or to approximate patients' social or economic risks. Four case examples were selected from different health care organizations to illustrate strengths and limitations of using patient- or neighborhood-level social and economic needs data to inform a range of interventions. This work can guide health care investments in this rapidly evolving arena.

INTRODUCTION

It is increasingly clear that social and economic contexts are integral determinants of both child and adult health and well-being.[1-9] Emerging literature reveals how social determinants of health (SDH)[10] may affect health outcomes and health care costs.[11-39] As a result, there is growing consensus from professional medical organizations that in collaboration with patients and communities, the health care sector should consider new roles for itself around identifying and strengthening SDH as one part of a comprehensive strategy for improving population health.[40-42] Despite mounting interest and experimentation, no clear consensus has emerged about what strategies health care systems should assume in this arena. Risk and strength assessment and interventions around patients' social and economic contexts vary widely across organizations, often dependent on institutional leadership, resources, and patient populations.[21,22,33,38,39,43-52]

To identify SDH affecting patients, some health care settings have systematized the collection of SDH data by using standardized social screening questionnaires, including those endorsed by organizations such as the National Academy of Medicine, the National Association of Community Health Centers, and the Centers for Medicare and Medicaid Innovation.[53-55] Obstacles to patient-level screening include logistic barriers (eg, cost/time) to adding screening activities in busy clinics[a;56,57] and concerns about whether and how identified needs can subsequently be addressed.[58-64]

As an understanding of the feasibility, actionability, and potential returns of patient-level social screening evolves and best practices emerge in this area,[65-69] other health care organizations are also exploring ways to use neighborhood-level data to characterize patients' social and economic contexts.[70] In these instances, area-level data are being used as proxies for individual social and economic status while also being potentially reflective of unique contextual risk factors. To inform future efforts to incorporate SDH data into health care decision making, we describe specific examples in which delivery systems have opted to use patient- or neighborhood-level SDH data to guide intervention investments; we also discuss the strengths and limitations of these different approaches.

METHODS

We selected 4 examples from practices across the US to highlight different approaches to SDH data collection and application. These examples may help to inform decisions by clinical and population health leaders as they explore ways to more systematically incorporate patients' SDH information into care delivery. The first 2 examples highlight different ways in which *patient-level* data can inform social intervention development and deployment. These examples differ in that the first involves a program specifically designed to collect patient SDH data by adding new responsibilities to the health care team; the resulting intervention is directed at the patient level. The second example relies on existing patient-level data in the electronic health record collected for other purposes; the data then contribute to shaping a neighborhood-level intervention.

An additional 2 examples highlight interventions in which health care organizations use *neighborhood-level* social and economic data to tailor work around SDH. These cases highlight how a surge in the availability of area-level information—such as the availability of supermarkets, the number of liquor stores, or the prevalence of violent crime—and a growing capacity to integrate data sources create new opportunities to identify populations that may benefit from either patient- or neighborhood-level interventions.

Examples: Social Determinants of Health Data Uses

Patient-Level Data Inform Patient-Level Interventions

Health Leads is a national nonprofit organization in Boston, MA, that advises health care systems across the country on approaches to SDH screening and navigation, with the goal of connecting patients and caregivers with community resources.[71] Some health care systems have elected to work with partners like Health Leads to facilitate patient-level screening and interventions. Although approaches vary from centralized call centers[72] to clinic-based programs,[37,47] most begin with health care system staff

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gathering information on social and economic hardships through patient-level screening, which can help uncover challenging patient or household circumstances related to topics such as threatened eviction, food insecurity, or limited transportation access. Staff review screening responses with patients or caregivers, collaboratively select which needs to address, and develop an action plan. Staff offer support and facilitate connections to relevant community resources (patient-level intervention), and track referral status and patient-reported progress toward relevant goals.[37,73] For example, staff may support patients to connect with free legal services, to obtain food from a local food pantry, or to obtain discounted public transportation passes. Studies on the effectiveness of the program model have demonstrated both social hardship and health effects.[37,73]

Patient-Level Data Inform Neighborhood-Level Interventions

Between 2009 and 2010, Cincinnati Children's Hospital Medical Center in Cincinnati, OH, and their partners at the Legal Aid Society of Greater Cincinnati aggregated addresses of patients hospitalized with asthma (patient-level data) from 2 primary care practices. The process led to identifying 16 housing units in 6 local building complexes with a common owner where children were experiencing disproportionately high rates of asthma-related morbidity.[44,74] Once the cluster was verified quantitatively, the team worked with individual tenants and a collective tenants' association from the housing complex to advocate for building-wide repairs (neighborhood-level intervention). These activities lowered the numbers of asthma triggers (eg, mold, cockroaches) for those patients that initially prompted cluster identification. Activities also extended across the building complexes, resulting in complexwide repairs.

Neighborhood-level Data Inform Patient-level Interventions

As part of Cincinnati Children's Hospital Medical Center's commitment to decreasing health inequities, the hospital has selected 2 local neighborhoods in which to focus disparity-reducing activities. Neighborhoods were chosen on the basis of census and other area-level data showing disproportionately high rates of both all-cause morbidity and underlying risks related to poverty, such as housing instability and poor transportation access (neighborhood-level data). Each morning, a multidisciplinary team of physicians, nurses, social workers, and community engagement consultants receives an alert from the electronic health record identifying any child hospitalized from these high-risk neighborhoods. This prompts in-depth chart review and a bedside huddle focused on the potential preventability of the hospitalization, identifiable care gaps (eg, need for vaccinations, overdue for primary care follow-up), and transition needs. When appropriate, patients are connected with additional supports during the hospitalization (eg, social work consultation, connection to a community health worker) and/or specialized transition-related service delivery such as postdischarge nurse home visits, medication delivery, or school-based outreach programs (patient-level intervention).

Neighborhood-level Data Inform Neighborhood-level Interventions

Kokua Kalihi Valley Comprehensive Family Services runs 9 federally qualified community health centers in Honolulu, HI.[75] The organization's mission involves serving all community residents, not only clinic patients. As a result, new program development is based on the needs and strengths of the entire community. Neighborhood-level data on food security, safety, and employment help inform these neighborhood-level interventions.

Table 1. Strengths and limitations of patient- and neighborhood-level social determinants of health data applications

Health data	Patient-level interventions	Neighborhood-level interventions
Patient-level data	*Strengths:* Screening data collected directly from patients are likely more sensitive and specific to condition. Screening and intervention are both in context of shared clinical decision making, so can more closely tie interventions to patients' priority needs.	*Strengths:* Using a patient lens may increase the health care system's engagement in upstream activities. Data may be more quickly accessible and aggregated.
	Limitations: Cost of screening entire clinical population. Sampling bias and social desirability bias may affect patients' responses to health care practitioners. High cost of intervening at individual level to address neighborhood-level issues (eg, housing inadequacy, food deserts).	*Limitations:* Sampling bias and social desirability bias may affect patients' responses to health care practitioners. Subject to "exception fallacy": Patients from health care system may not reflect neighborhood population adequately.
Neighborhood-level data	*Strengths:* Increases health care system's engagement in upstream, neighborhood-level activities. Potential to focus on entire population facing health consequences, which could enhance value of interventions.	*Strengths:* Uses a population-level lens; may be more "objective." More capacity to affect population-level change.
	Limitations: Subject to "ecological fallacy": Some patients in this neighborhood may not be at higher risk. Lack of timely and detailed data limits depth of understanding. Potential to increase stigma. Potential to reinforce inequity across factors other than neighborhood (ie, easier to intervene on behalf of relatively healthier individuals in same neighborhood).	*Limitations:* Can use only social determinants of health data that are available (practitioner has less control over how data are collected). May not have a direct impact on health system's catchment population. Lack of timely data limits ability to monitor and adjust interventions.

For example, the clinical organization leases and operates the Kalihi Valley Nature Preserve, which it maintains as a strategy for producing healthier food and encouraging physical activity for all residents (neighborhood-level intervention).

DISCUSSION: VALIDITY THREATS

Each of these 4 approaches to collecting and using data depends on the interest and capacity of both the health care organization and the surrounding community. We highlight them to demonstrate a range of ways that health care organizations can incorporate information about patient- or neighborhood-level SDH into decisions about relevant patient- or neighborhood-level interventions. Table 1 summarizes strengths and limitations of the different data applications.

Two quadrants of Table 1 are worth special highlight—those that use patient-level data to guide neighborhood interventions and those that rely on neighborhood-level data to guide patient-level interventions. There may be compelling reasons to use aggregated patient-level data to inform neighborhood-level activities, especially when neighborhood surveillance data are difficult or impossible to obtain, lack sufficient granularity, or are collected/reported too infrequently to meaningfully guide interventions. A primary threat to validity when using patient-level data to guide neighborhood-level interventions, however, is when patients are not representative of the neighborhood's population. This can lead to the *exception fallacy*, which is when conclusions about a group are formed on the basis of nonrepresentative cases.[76] For instance, using data on the health impacts of local food pantries only from sick patients referred from a hospital overlooks the potential impacts of pantries on many other beneficiaries. This could lead to changes in hospital investments that could have substantial unintended consequences on other populations. To limit the effects of this bias, health care organizations can work with relevant local stakeholders to use additional data sources that are more representative of the neighborhood to inform neighborhood-level interventions.

Similarly, the use of neighborhood-level data to inform patient-level interventions may make sense when universal patient-level screening is infeasible. In this case, neighborhood-level data can help to initiate risk-stratification and to target screening resources toward populations most likely to benefit. However, using neighborhood-level data to guide patient-level interventions presents a threat known as the *ecological fallacy,* or the possibility of making incorrect assumptions about individuals on the basis of the profile of a group.[77] For instance, low-income patients who live in high-income areas may not be captured by clinical intervention programs triggered by neighborhood-level risk algorithms, yet those patients may experience higher stress or other negative health outcomes. Alternatively, patients may be subject to stigma from processes such as automated referrals to resources associated with lower socioeconomic status. Future work in this area should deepen our understanding of the overlap and differences in patients captured using individual level measures (eg, financial strain or reported income) vs neighborhood-level measures (eg, mean area-level poverty).[78] Meanwhile, to limit these unintended consequences, health care systems that stratify patients by neighborhood-level characteristics to target patient-level interventions should validate and refine assessments with patient-level data whenever possible and collaboratively select interventions in the context of shared clinical decision making.

CONCLUSION

The health care sector has experienced a steadily growing interest in identifying and incorporating information on patients' SDH in the context of care delivery. This stems from both increased awareness about the health effects of SDH and new value-based payment models that incentivize prevention. Despite this enthusiasm and experimentation, little guidance has existed to date for health care providers about how best to translate interest into action. Moreover, health care organizations of different sizes (and with different degrees of community connectedness) are likely to differ in their readiness and capacity to incorporate these new data.[79,80] Early adopters illustrate wide variation in both data collection approaches, instruments, and interventions. With this range of applications, weighing the strengths and limitations of different kinds of data is and will continue to be increasingly important, especially in light of the growth in big data-based predictive analytics that help to make both patient and population-level data more accessible.[81]

Beyond employing the right data in the right context, systems that aim to increase capacity to interpret and apply SDH data should also bring diverse perspectives to the explanation of trends and more creativity to the design of interventions. To do so, they might consider undertaking SDH analyses and investments in the context of partnerships with patients, families, and neighborhood organizations. Incorporating community perspectives into health care systems' interpretation and use of SDH data is part of the design of the alignment track in the new Centers for Medicare and Medicaid Innovation Accountable Health Communities demonstration project,[82] although these findings are still many years out.

Finally, we recognize that the health care sector's activities in this area are only a small part of reversing longstanding resource allocation decisions through power differentials on the basis of race, wealth, or other factors that have perpetuated health inequities.[83-86] At the same time, the sector is expanding previous efforts to recognize the influence of social and economic factors on health[87] and to act on that information. For now, health care systems investing in addressing SDH must avoid basic threats to validity in translating data into specific interventions, ensuring that data being applied are maximally relevant to the proposed level of intervention. ❖

[a] Some emerging research suggests that despite concerns about cost and time, clinic-level capacity to address patients' social needs may protect against practitioner burnout. Insofar as reduced burnout saves health systems money, it may be that the practitioner burnout benefits of social screening could be added to other potential savings.

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