

# Payment Structures That Support Social Care Integration With Clinical Care: Social Deprivation Indices and Novel Payment Models

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The U.S. lags behind other developed countries in the use of indices and novel reimbursement models to adjust for social determinants of health (SDH) in medicine. This may be due in part to the inadequate body of research regarding outcomes after implementation of healthcare payments designed to address SDH. This perspective article focuses on four models employed both internationally and domestically to outline the implementation, successes, limitations, and research needed to support national application of SDH models. A brief history of prior models is introduced as a primer to the current U.S. system. Internationally, the United Kingdom and New Zealand employ small area indices to adjust healthcare dollar allocation based on increased social need in an area. Despite published evidence of disparate health outcomes based on SDH, research is limited on the association of SDH indices, subsequent increased reimbursement, and improved healthcare equity. In the U.S., the Massachusetts Managed Care Organization assesses and addresses social needs within communities served by Medicaid. Unsurprisingly, there is evidence of overlap between those with worse health outcomes and those with high social need. However, implementation in Massachusetts is too recent to demonstrate reduced healthcare disparities. Within Minnesota, Hennepin Healthcare System initiated a novel Medicaid waiver that provides extended services to high-need patients under a partial capitation reimbursement program. These services, including increased access to primary care, have promising results in financial improvement of the system, but have not yet demonstrated patient-oriented outcomes. The association between high social risk and poor medical outcomes has been established globally; however, healthcare payment policies designed to respond to this relationship generally lack evidence of affecting outcomes. U.S. policymakers are demonstrating increasing interest in requiring capture of SDH in health care, creating accountability for addressing SDH, paying differentially for patients with increased social risk, or all three. In countries with a legacy of adjusting healthcare payments for social risk, more robust evaluation of associated effects could be helpful. Payers, states, or health systems making similar resource commitments should build in robust longitudinal evaluations of outcomes to inform evolution of their payment policies.

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## INTRODUCTION

The evidence regarding the impact that social determinants of health (SDH) have on individual and community health outcomes continues to grow, but the science around related interventions in

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healthcare and payment options for supporting them remains slim. This is a considerable problem, as the 2014 Improving Medicare Post-Acute Care Transformation Act directed HHS to study and advise on what should be done for federal healthcare investments, and states are also developing Medicaid policies that require measurement, accountability, and payment adjustments for SDH.<sup>1–5</sup> Adler et al.<sup>3</sup> have advocated for healthcare payment mechanisms that encourage providers to address social factors that ultimately drive the need for services but caution against unintended incentives or consequences that could disincentivize care for socially at-risk patients. Other critics raise concerns that making frontline clinicians, particularly those in primary care, responsible for SDH is simply too large a burden.<sup>2,6</sup> There is concern that even if a legitimate payment adjustment method is established, it will not provide sufficient resources to meet expectations. Although it is clear that there is increasing intention to modify healthcare reimbursement to reflect risks and needs due to SDH, evidence lags on how to do so effectively.

Internationally, health disparities have been addressed in part using small-area indices of social determinants to adjust payments. The United Kingdom (UK) and New Zealand have long used small-area SDH elements to adjust payments for primary care and social services; this could inform U.S. efforts.<sup>7</sup> How to support SDH models with policy became a Congressional question leading to various federal- and state-based experiments.<sup>1,2,5</sup> The Centers for Medicare & Medicaid Services has supported demonstration projects aimed to directly address SDH.<sup>3</sup> Massachusetts implemented payment adjustment for SDH in 2016.<sup>5</sup> Massachusetts intends to evaluate related outcomes but the process is still too early in implementation to provide evidence.

This perspective paper assesses two national and two state-based models by (1) providing a brief review of their intentions and implementation; (2) describing outcomes or evaluation of the model; and (3) most importantly, identifying research needs to support a policy platform aimed at adequately addressing SDH in clinical practice.

## HEALTHCARE AND SOCIAL DETERMINANTS

For more than 80 years, the U.S. intermittently has introduced integrated healthcare models that attempt to address SDH. For example, the original community health centers (CHCs) were designed to deliver community-oriented primary care (COPC). The COPC model provided clinical care but also acted to improve living conditions, basic sanitation, malnutrition, unemployment, and community empowerment. The COPC model and

related social medicine movement came from South Africa, where it was associated with a reduction in communicable disease incidence from 82% to 7.8% in 8 years and a 17.5% decrease in infant mortality. In the U.S., CHCs received federal grants that were directly invested in non-profit, community-level organizations. The federal funds were allocated by CHCs based on community engagement and assessment. After the transition of CHCs to the HHS in the 1970s, reimbursement shifted to a Medicaid fee-for-service model and the COPC model was lost.

The chronic care model, introduced by Wagner<sup>8</sup> in the 1990s, similarly attempted to meet the complex needs of patients by providing both medical and social interventions.<sup>8</sup> The outcomes in a 2009 systematic review were clear: Patients that received a chronic care model intervention received improved care, as medication management was optimized, patients had fewer emergency department visits, and patients spent 35% fewer days in the hospital.<sup>9</sup> However, in a fee-for-service environment, providing integrated high-quality, high-value clinical care by addressing SDH was disincentivized.

Currently, there are a handful of international and regional U.S. models that address SDH with dedicated financial support. The following sections describe national programs in New Zealand and the UK that use research-derived, small-area SDH indices to standardize adjustment for clinical and social services to account for needs. Next, the Massachusetts Managed Care accountable care organization (ACO) payment adjustments and Hennepin Healthcare System are described as local options that address individual and community SDH. All four examples use area-based risk and some blend area risk with patient-level characteristics to adjust healthcare payments and resource allocation.

### The New Zealand Index of Deprivation

New Zealand, England, Scotland, Norway, and New South Wales use area-based deprivation data for payment adjustment to hospitals and medical systems. New Zealand historically established a large-area estimate of need, the Health and Equity Index of Deprivation, which was used for healthcare fund allocation in the 1980s. However, the scale of this tool was large and overlooked small pockets of need. Based on small-area data, New Zealand implemented the New Zealand Index of Deprivation (NZDep) in 1997. The motivation for implementing NZDep was to decrease unmet need and reduce subsequent costly secondary admissions. NZDep was created from factors collected in the 5-year Census of 1991<sup>10</sup> and comprised nine deprivation characteristics, as well as Maori/Pacific Islander prevalence. The information was assessed for each Mesh Block (90 people on

average). Deprivation was scaled from 1 (low) to 10 (high) and geographically mapped to visualize areas of high need. Two main types of deprivation are included in NZDep: material deprivation (resources, services, physical environment) and social deprivation (relationships, roles, and responsibilities of members of society.) Areas may have one dominant trait of deprivation or may share a combination of social and material deprivation. New Zealand's Ministry of Health uses NZDep to identify areas of high social need and re-allocates funding to providers in these areas.<sup>11</sup> Specifically, areas with high proportions of Pacific and Maori populations receive greater funds owing to high NZDep scores.<sup>11</sup> This reimbursement adjustment can result in as much as a threefold increase in healthcare funding. As a wrap-around index, in addition to healthcare funding, NZDep identifies areas in need of increased funding for schools and policing.

Data on patient-centered outcomes affected by the implementation of NZDep are incomplete. Researchers have demonstrated differences in health factors based on NZDep scores but have yet to demonstrate changes in outcomes for those at highest social risk. For example, in areas of significant deprivation, rates of childhood obesity are higher,<sup>12</sup> appropriate medication use is lower,<sup>13</sup> and access to specialized care is limited (e.g., implantable cardioverter defibrillators).<sup>14</sup> The index has also been used to identify geographic equity differences; for example, in areas of significant deprivation, there is a higher mortality<sup>15</sup> and low primary healthcare utilization.<sup>16</sup> Demonstrated change in health-related outcomes based on NZDep use is limited. However, the subsidies for first contact care have demonstrably increased access for target populations. Jonathan Foley,<sup>17</sup> one of the policy architects for NZDep, recently wrote, “the effect of this effort on reducing health disparities is not entirely clear because success ultimately relies on local implementation of a complex set of interventions that need to be evaluated more rigorously.”

Based on current research, NZDep offers a valuable index to model the health risk factors that are present in a community. However, the adjustment of payment has not been linked explicitly to a decrease in mortality, population-wide improved healthcare access, or improvement of patient-centered outcomes. The medical networks providing care for socially at-risk areas have received adjusted payment for more than 20 years. Therefore, cohort studies that retrospectively assess the efficacy of this adjustment, including mortality, onset of preventable diseases, and reduction of hospitalization, would be helpful. Additionally, evaluation of total spending in high- versus low-risk areas to study downstream effects of increased allocation of upstream healthcare dollars is needed. NZDep already offers a methodologic model for the U.S. and any proof

that it was associated with reduced cost of care or improved patient outcomes would positively impact the case for U.S. adoption.

### **The United Kingdom: the Carr–Hill Formula**

Like New Zealand, the UK has used social risk scores in adjustment of healthcare funding for more than 40 years. During the early 1980s, general practice payments were adjusted using the Jarman Score,<sup>18</sup> but owing to increasing healthcare costs in the early 1990s, Carr–Hill and colleagues began testing individual versus area-based measures. The goal was to identify the socioeconomic determinants that impacted consultation rates in general practice. Until 2001, the aim of the Carr–Hill formula was to provide equal opportunity to access (to National Health Service services) for those at equal risk. In 2001, criteria shifted to contribute to the reduction in avoidable health inequalities.

The Carr–Hill team tested a range of socioeconomic data directly from patients (age, sex, ethnicity, marital/cohabitation status, whether or not a sole parent, economic position last year and last week, occupation sufficient to generate the registrar general's social class classification, and housing tenure) compared with small-area measures collected in the decennial Census (housing tenure, social class, unemployment status, permanent sickness, student status, car ownership, single parent households, dependent children, elderly living alone, overcrowded households, educational qualifications, and limiting longstanding illness). The analysis demonstrated that characteristics of individual patients were much more powerful predictors of consulting patterns than the characteristics of the areas in which patients live. Importantly, poverty, a dominant factor in most deprivation indices, was not available for inclusion.

Despite the individual level predictive value, the Carr–Hill formula (Global Sum formula) defaulted back to area-based information, including patient age and sex, Standardized Mortality Ratio and Standardized Long-Standing Illness for patients aged <65 years, the number of newly registered patients, rurality, and costs of living. The UK abandoned research findings that individual-level social risks were more predictive of utilization in favor of area-based measures for adjusting payments because they found collection of individual measures to be unreliable.<sup>19</sup> In a 2007 Review of General Medical Services, the Global Sum formula was declared “a robust and credible methodology underpinning equitable and transparent distribution of some £1.6 billion of public funds and informing allocations of a further £2 billion.”<sup>20</sup> Like New Zealand, the UK also modifies resources for social services using small-area indices, but

several years ago there was a divergence such that the English Indices of Deprivation are used for this purpose.

The Carr–Hill formula is likely to undergo another round of modification in the next year to improve its specificity, but outcomes evidence is limited. A 2010 study evaluated the Carr–Hill formula from 1997 to 2010. The research also included an investment of £20 billion from private sectors.<sup>21</sup> The initial goal of a 10% reduction in the gap for life expectancy and child mortality was not achieved. However, there were considerable reductions in both endpoints. A 2018 study found significant reductions in procedural wait time inequalities across the socioeconomic gradient between 2002 and 2011; for example, coronary artery bypass graft surgery wait times were 35% longer in the most disadvantaged quintile of neighborhoods in 2002 but were 9.5% in 2011.<sup>22</sup>

Like NZDep, the Carr–Hill formula offers useful insight into the medically relevant social risk of a geographic area. The formula is associated with reduction in adverse patient-oriented outcomes, but not to the extent anticipated. The limited outcome data associated with the Carr–Hill formula form a foundation for U.S. consideration when implementing a similar index. Further evidence on the impact of mortality gap reduction and decreased burden of disease would be more helpful. As it stands, the UK already enjoys a narrower health equity gap than the U.S. and better health outcomes along the risk distribution.<sup>23</sup> Sir Michael Marmot<sup>24</sup> attributed this to differences in primary care access, but there may be many features of health care and social services that contribute to the difference. Study of the highest-risk geographies and the benefits of adjusting clinical and social service resources would be valuable. Those in the most socially deprived areas have the most to gain from increased healthcare services. It would also be useful to study the individual-level factors that were not accepted into the model to inform other countries when considering implementation of these tools. Individual-level data, theoretically, should be easier to collect in England than the U.S. given stability of patient rosters in the British National Health Service. Despite this stability, the UK resorted to use of area-level data, suggesting that it was still too difficult, impractical, or both to collect individual-level data routinely. Several other research ideas that would add to the support for a deprivation index in the U.S. include: Did the socially at risk become less at risk over time based on the investment? Did access to primary care increase for the most at-risk geographic areas? What was the stability of individual-level characteristics versus their neighborhood measures, and if not correlated, is it important to consider for funding formulae? These are important foci for future research and consideration in the U.S.

### Managed Care Model: Massachusetts

In addition to a nationwide index to allocate federal healthcare spending, Massachusetts offers a state-specific evaluation and response to SDH as a model for funding and resource management. The Massachusetts Managed Care Model was created after the Medicare Access and Children's Health Insurance Plan Reauthorization Act of 2015. This Act shifted healthcare emphasis from volume to value, offering quality programs under the Merit-Based Incentive Payment System and bonus payments for participation in eligible Alternative Payment Models (APMs.) In 2015, 23% of total U.S. healthcare payments were tied to an APM, increasing to 34% by 2017.<sup>25</sup> This was a consequential shift due to the nature of APMs, focusing on metrics including quality and utilization. Health systems were thus incentivized to attend to population health, including SDH, as these focus areas had great potential to improve quality and decrease utilization.

Beginning in 2016, MassHealth began an expanded managed care model that allocated increased reimbursement to MCOs serving socially and medically high-risk patients to reduce health inequities. Massachusetts policymakers wished to improve upon the information gathered by diagnostic codes and combined SDH data into a unique reimbursement model. The state applied for and received the federal Delivery System Reform Incentive Payment waiver, which allowed for funding of this adjusted structure. The SDH-adjusted model was derived by Ash et al.<sup>26</sup> using diagnostic codes as medical risk and age/sex indicators combined with indicators for housing stability, mental health, disability status, substance use, and neighborhood stress scores (Census block determinant).<sup>27</sup> Specifically, the neighborhood stress score accounts for the percentages of families living <100% of the federal poverty level, living <200% of the federal poverty level, unemployed adults, households that receive public assistance, households without a car, households with children and a single parent, and people aged ≥ 25 years who do not hold a high school degree. The combined model was intended to model areas of highest cost care, or those in greatest need of complex care management; notably, it is not modeled for health inequities.

This model better predicted the 2017 costs associated with the services covered by managed care payments and alternative payment models than diagnostic codes alone. To prevent disincentivizing plans from enrolling for those at high medical need, risk-adjusted models corrected allocation of funds, thereby providing higher reimbursement to plans that enrolled a sicker population.<sup>28</sup> The architects of this revised payment model suggest that healthcare sector assessments for SDH, such as housing assistance and care coordination for mental



health disorders, may reduce disparities; however, there have been no evaluations to date.<sup>26</sup> In January 2019, Massachusetts also took steps to increase funding to social services to address SDH by granting \$3 million to programs that impact housing instability, substance use, violence, and nutrition.<sup>29</sup>

The Massachusetts adjusted payment model using geographic indices, a measure of individual social risk and mental health, as well as diagnostic codes may correctly predict cost, but more time is required to understand the impact on patient outcomes and cost reduction. Systems and practices that receive increased investment need time to demonstrate the impact of services and tools enabled by funding. The nascent model could also offer an opportunity to better understand what frontline practices do with the resources and whether those solutions are associated with better outcomes. Assessing changes in local care access and use as a function of new resource allocation might explain these findings. Early outcomes could give direction and assurance to other states considering similar policies. Policymakers should consider a combined risk model similar to Massachusetts when restructuring health-care funding if outcomes suggest patient and systemwide benefit.

### **Accountable Care Organization With Medicaid Waiver: Hennepin Health Center**

The ACO at Hennepin Health Center in Minnesota started in 2012 and addressed the needs of those most at risk because of SDH. The model focused on a large adult patient panel affected by homelessness and poverty in addition to multiple comorbid chronic health conditions. These patients were frequently hospitalized with poorly controlled chronic conditions exacerbated by acute care concerns due, in part, to a lack of social support. Four organizations within the area coordinated to provide comprehensive care in hopes of improving patient care and reducing costs. Initially, a patient panel was identified. The general patient population was reviewed for multiple comorbid conditions, frequent hospital use, and emergency department use. Beyond hospital records, the ACO used supplemental information provided by the department of corrections, housing agencies, and foster care to empanel a target group of patients. After the patient panel was identified, patients were contacted personally by community health workers. Patients were reached at home, homeless shelters, or known street locations. These individuals were offered an appointment with primary care immediately or the next day.

Hennepin's outpatient medical center provides intensive services and care planning by multidisciplinary teams including behavioral health specialists, nurse care coordinators, advanced practice providers, pharmacists,

and addiction counselors. The intensive services, originally thought to be a stabilizing short-term service, have evolved into a necessary long-term support for easily destabilized patients and families. Local businesses were engaged, including housing social services specifically to support secure and stable housing. Partnering non-profit organizations incorporate outpatient substance abuse care and counseling into the model. Finally, patients are trained in vocational skills to allow for financial independence and employment stability.

This Medicaid demonstration project, which includes a licensed health plan, reimburses Hennepin Health via per monthly capitation payment to cover services for medical, dental, and behavioral health. Medical providers are reimbursed through fee-for-service payments from Hennepin Health. The county provides further support via a human services fund. The fund finances housing and addiction treatment. Each of the four partnering organizations assume full financial risk as a part of the ACO and have invested in the structure at the onset of the program. Early signs suggest that the venture has been successful, as medical expenditures have fallen 11% annually since its inception 7 years ago, acute care use has decreased by 9.1%, and outpatient care has increased by 3.3%.<sup>30</sup>

Hennepin's results are promising. Yet, specific health outcomes of patients have yet to be explored fully. Correlations that can be drawn between the partial capitation, SDH-related allocations, and patient outcomes will be essential in guiding policy. Researchers in the area should evaluate patient outcomes. Rather than isolating traditional, and arguably incomplete metrics of quality, research should evaluate fulfillment of patient social needs, improvement in employment and homelessness, and mental health outcomes. The development of strategic interventions by systems or clinics, based on community need, are likely to be different contingent upon geography. Hennepin may provide the backbone practical structure to a local reimbursement model that promotes community outreach specific to local needs. Lower medical expenditure is an important outcome but patient-oriented outcomes are also needed.

## **DISCUSSION**

As SDH have a clear impact on the health of patients, how the U.S. identifies, measures, and acts upon these variables will alter and likely improve personal and community health. Despite higher per-capita and total healthcare spending in the U.S. per person versus other developed countries, the nation has not achieved similar health and mortality outcomes.<sup>29</sup> Countries that spend proportionally more on social services show health and

mortality benefits.<sup>29</sup> A greater investment in clinical care is unlikely to affect health outcomes substantially unless it supports efforts to resolve patients' social risk and support community interventions. As a recent National Academy of Medicine Vital Directions report emphasized, "It is an issue not of how much money is invested in health but of whether the dollars are spent on factors that provide the greatest benefit."<sup>3</sup>

The models presented here offer methodologic choices and some early evidence for means to adjust U.S. health-care payments specifically to address SDH. Reducing health inequities and increasing access to care sets a high bar for providers and systems. Research is needed, without question. Better understanding about use of ecologic indices versus individual measures, including their applicability and difficulty in capture, is needed. How any adjustment process translates into access and services, thereby improving outcomes, is a core research gap. The UK and New Zealand may be able to do more retrospective analyses while Massachusetts and Hennepin could build prospective and forward-facing evaluations. The available information does suggest improved health access and costs for the population and offers reassurance that a small area–based model is a viable option for adjusting payment in the U.S. As modeled by the UK, New Zealand, and Massachusetts, focusing on healthcare spending may not be sufficient; additional funding should be provided to social services communities with high need. Funders should predefine the goals of reduced total cost and improved patient health outcomes at the outset and use these to titrate funding rather than simply looking for cost offsets that do not align with accountability or expectations of meeting SDH needs.

Although long-term outcomes have yet to be determined in the U.S., the long-term benefits of attention to community needs and SDH are still detectable in South Africa and the Mississippi Delta more than half a century after COPC implementation. Short-term outcomes may not be a rational expectation for communities with longstanding social problems. The arc for modifying health outcomes is likely long—one should expect to see a trend toward improved equity rather than a leap. Eliminating social disparities is not a new aspiration and expecting healthcare spending to suddenly achieve this is unreasonable. This timeline should not paralyze decisions about how to adjust healthcare investments in the near future. The U.S. should collaborate with foreign role models to learn from the methods and outcomes, and invest in regional efforts in the U.S. by learning from their pioneering efforts. Nearly 6 years since the Improving Medicare Post-Acute Care Transformation Act challenged HHS to offer policy recommendations, there is sufficient information to act.

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