REDRAWING THE BOUNDARIES OF MEDICINE:

The Case for Social Determinants of Health

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Biography

Oanh Kieu Nguyen, M.D., M.A.S. is an Assistant Professor in the Divisions of General Internal Medicine and Outcomes and Health Services Research. She earned her BS in neuroscience and political science from UCLA. She completed her medical school training at UCSD and subsequently completed her internal medicine residency training at UT Southwestern Medical Center. Following her residency, she completed the Primary Care Research Fellowship at UCSF where she earned her Master's degree in clinical research with specialization in implementation science. Dr. Nguyen joined the faculty at UT Southwestern in 2013 and is a health services researcher and a practicing general internist who provides care in both inpatient and outpatient care settings at Parkland. Her research agenda is focused on improving health care delivery for underserved populations, specifically by addressing unmet health-related social needs to improve overall health. Dr. Nguyen's research is currently supported by the NIH/NCATS, AHRQ, and a community-based research award from the Program for the Development and Evaluation of Model Community Health Initiatives in Dallas (PDEMCHID). Locally, she teaches health policy to students in the Master's program and internal medicine residents, co-directs the Internal Medicine residency's evidence-based medicine curriculum, and co-founded and co-directs the General Internal Medicine interest group for students and residents at UT Southwestern. Nationally, she is an Associate Editor for the *Journal of Hospital Medicine*.

Purpose and Overview

Social determinants of health are the conditions in which people are born, live, work, and age; and can lead to unmet health-related social needs. These unmet social needs have a direct impact on health outcomes and utilization, and are as important as traditional medical risks in contributing to morbidity and mortality. This presentation aims to discuss why physicians should care about identifying and addressing unmet social needs, by discussing the current evidence base and highlighting specific examples of innovation, including Dr. Nguyen's and her research group's local work on care transitions and readmissions.

Educational Objectives

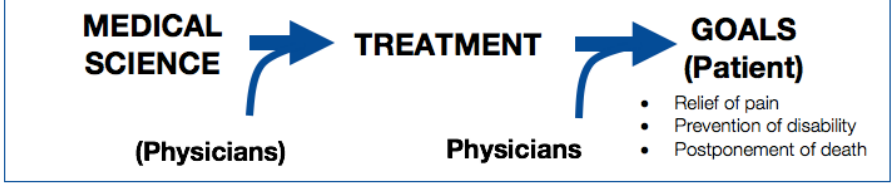
1. Understand what social determinants of health are, and why they are relevant to the practice of medicine
2. Understand landmark studies and national examples of innovation on addressing key social determinants (homelessness and food insecurity) from a medical perspective
3. Understand local efforts to identify and address social determinants from a safety-net health system perspective with respect to improving care transitions and reducing readmissions

INTRODUCTION

Physicians have frequently questioned whether attempts to address the social determinants of health lie outside the province of traditional medical care. In his 1981 address, the president of the American Association of Physicians famously proclaimed the following (received with a standing ovation from the audience):

> *Medicine is a very narrow discipline. Its goals may be defined as the relief of pain, the prevention of disability, and the postponement of death by the application of the theoretical knowledge incorporated in medical science to individual patients.*[1]

Figure 1. Conceptual Model of the Historical Boundaries of Medicine

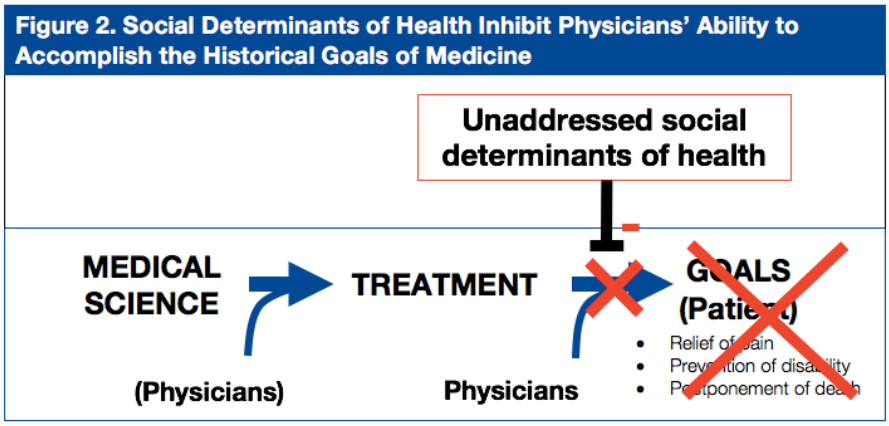


A conceptual model of the historical boundaries of medicine may be illustrated as per **Figure 1.** This view of medicine emphasizes the role of physicians as clinician-scientists strictly concerned with only the application – and sometimes the discovery – of biomedical knowledge. This sharply defined historical role of physicians has roots dating back to the founding of Johns Hopkins medical school, which was left with a strong orientation toward research and laboratory science after the departure of William Osler for Oxford.[2] As the Flexnerian model of medical education originating at Johns Hopkins was disseminated to other American medical schools, the focus on research and laboratory science quickly become the *only* model of medical education, rather than the *unique* model it was originally intended to be.

Limitations of the Historical View of the Boundaries of Medicine

If the practice of medicine was truly comprised only of the application of theoretical knowledge of medical science, this would greatly simply the job of the physician by allowing her "to work in total independence to the exclusion of any other factors but the most basic organization for medical care."[3] However, a major limitation of the historical view of the boundaries of medicine is that unaddressed social determinants can and often directly obstruct the 'application of theoretical knowledge' to individual patients (**Figure 2**). To ignore social determinants is to be complicit in one's inability as a physician to achieve even the goals of medicine, to relieve pain, prevent disability, and to postpone death.

Figure 2. Social Determinants of Health Inhibit Physicians' Ability to Accomplish the Historical Goals of Medicine



Definition of Social Determinants of Health & Health-Related Social Needs

The World Health Organization (WHO) defines the social determinants of health as "the conditions in which people are born, live, work, and age. These circumstances are shaped by the

distribution of money, power, and resources at global, national and local levels." The WHO considers the social determinants of health to be major factors driving health inequities – the unfair and unavoidable differences in health status seen within and between countries.[4]

The WHO definition is useful to identifying and understanding social determinants at a broader societal level but does not necessarily help practicing physicians to identify immediately actionable targets relevant to the care of individual patients. A more pragmatic definition of social determinants that is relevant to the practice of clinical medicine is to understand that social determinants lead to what are called 'unmet health-related social needs.' These are needs that are linked to health and health care, but may not be furnished along with clinical care and services typically delivered in clinical settings such as clinics, emergency departments, or hospitals. Social needs encompass span several domains of needs as in **Table 1**.

Table 1. Essential and Expanded Social Need Domains

Essential Social Need Domains	Examples
Food insecurity	Limited or uncertain access to adequate & nutritious food
Housing instability	Homelessness, unsafe housing quality, inability to pay mortgage/rent, frequent housing disruptions, eviction
Utility needs	Difficulty paying utility bills, shut off notices, discounted phone
Financial resource strain	Public cash benefits, charity emergency funds, financial literacy, medication underuse due to cost
Transportation	Difficulty accessing/affording transportation (medical or public)
Exposure to violence	Intimate partner violence, elder abuse, community violence

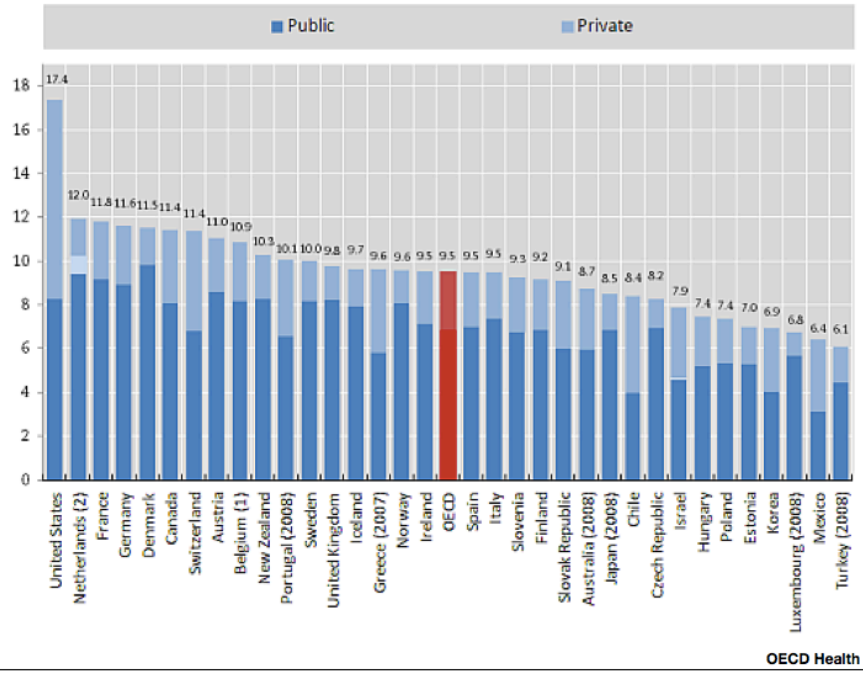
Expanded Social Need Domains	Examples
Education, language proficiency, literacy	Lack of high school equivalency (GED), limited English proficiency, limited literacy/numeracy, health illiteracy
Employment	Underemployment, unemployment
Social isolation & supports	Lack of family and/or friend network(s), minimal community contacts, absence of social engagement
Health behaviors	Tobacco use, alcohol and substance use, physical activity, diet
Behavioral/mental health	Stress, anxiety, depression, trauma

Adapted from the Health Leads Social Needs Screening Toolkit, 2016

Why Physicians Should Care About Social Needs

Unmet social needs result in direct harms and worse health for patients. Furthermore, evidence supports that addressing social needs in tandem with medical needs improves health outcomes. In terms of evidence for the importance of addressing social needs, one needs to look no further than the example of the American health care paradox. The 'paradox' is that the United States spends far more on health care but has among the worse health outcomes. In 2014, the most recent year for which data are available, the U.S. spent a total of over $3 trillion on health care, or about $9,256 per person.[5] To put that figure in perspective, the world's most valuable company, Apple, Inc. is currently worth about $600 billion dollars. The U.S. could purchase Apple five times over with the amount spent on health care in a single year. As a percentage of gross domestic product (GDP), the U.S. spent 17.4% of its GDP on health care in 2011, nearly double the average of other developed and developing member nations of the Organization for Economic

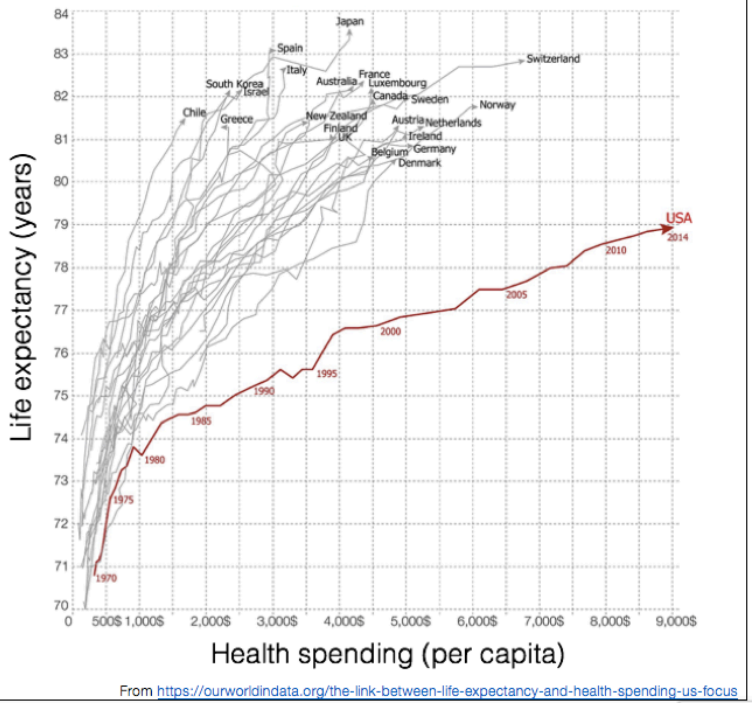
Figure 3. Health Care Spending as a Percentage of Gross Domestic Product Among OECD Nations, 2011



Cooperation and Development (OECD) and outspending the next closest spendthrift country, the Netherlands, by a sizeable margin (**Figure 3**). Despite this outsized health spending, the U.S. has among the worse health outcomes of the OECD countries, as illustrated by the difference in life expectancy. **Figure 4** shows life expectancy over time versus per capita health spending among OECD countries. The U.S., in red, clearly stands out for the slow rise in life expectancy since 1970 despite dramatically higher health expenditures than any other OECD country.

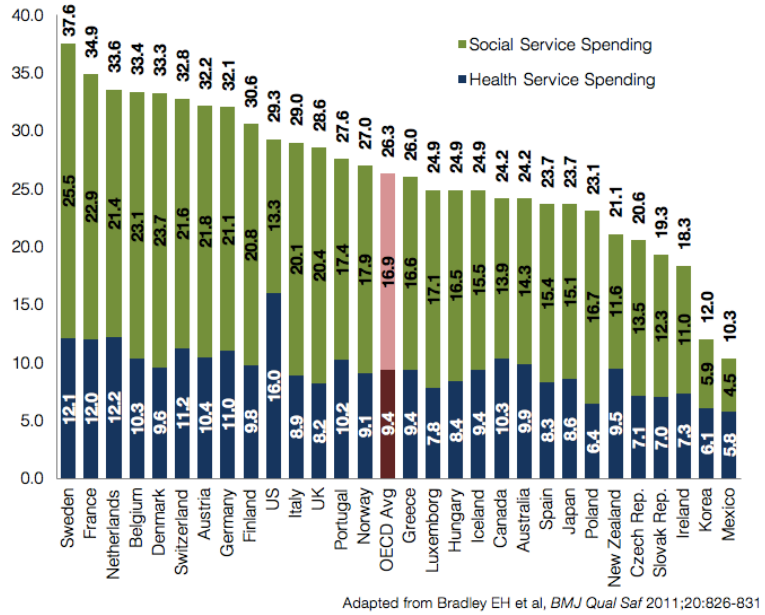
New data suggest that the American health care paradox may not be as much of a paradox as it seems to be at first glance. The U.S. spends far more on health care but also *far less* on social services than most other industrialized nations.[6] Although the U.S. spends a percentage of GDP on health and social services combined that is on par the OECD average, the proportion of U.S. GDP spent on social services was far lower than that of other nations and exceeded that only of the Slovak Republic, Ireland, Korea, and Mexico. (**Figure 5**) Further, the U.S. is one of only two industrialized nations that actually spends *more* on health care than social services. (**Figure 6**)

Figure 4. Life Expectancy vs. Health Spending Among OECD Countries



The proportion of social services spending relative to health services spending is important because the social-to-health services spending ratio has a stronger influence on improved health outcomes than health spending alone. This is a phenomenon that is true internationally, among OECD countries, as well as among the fifty states and the District of Columbia in the U.S.[6,7]

Figure 5. Total Health & Social Services Spending Among OECD Countries as a Percentage of GDP, 2005

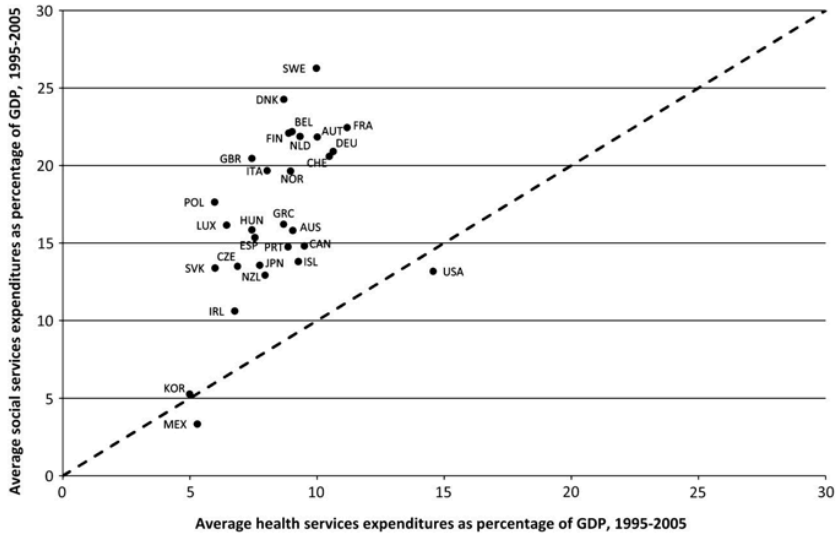


Adapted from Bradley EH et al, *BMJ Qual Saf* 2011;20:826-831

A second study by Bradley and colleagues assessing the influence of social-to-health spending on health outcomes and mortality in the U.S. found that every 20% increase in the social-to-health spending ratio was associated with significant decreases in the prevalence of obesity, asthma, and mental and physical disability; and with decreased disease-specific mortality in acute myocardial infarction, lung cancer, type 2 diabetes, and neonatal mortality.[7] (**Table 2**)

At an individual level, social and behavioral factors have been demonstrated to have a greater influence on individual health than the provision of health care itself. Up to 60% of the risk of premature death is influenced by social and behavioral factors versus an estimated 10-20% of risk influenced by the provision of medical care.[8] By this calculus, addressing 'social needs' is aligned with the defined goals of medicine and is more likely to make a difference on individual health and well-being than the provision of medical care alone.

Figure 6. Social Services Versus Health Spending Among OECD Countries, 1995-2005



Bradley EH et al, *BMJ Qual Saf* 2011;20:826-831

CURRENT LITERATURE ON ADDRESSING SPECIFIC SOCIAL NEEDS

The literature on the social determinants of health is vast and deep, and spans across many disciplines, including public health, social epidemiology, preventive medicine, economics, and public policy, among others. Given the breadth and depth of this topic for the purpose of this venue, I have chosen to focus on the literature that specifically pertains to the link between the most significant unmet social needs and health outcomes and utilization, highlighting key landmark studies.

Table 2. Social-to-Health Spending Ratio & Health Outcomes in U.S. States		
For every 20% increase in social-to-health spending ratio		
Outcome	**Change in Outcome**	**p-value**
Health Metrics (among adults)		
Obesity (BMI ≥30)	-33%	0.01
Asthma	-11%	0.04
Mentally unhealthy ≥50% time	-43%	0.007
Activity limitations ≥50% time	-37%	<0.001
Mortality Rates (per 100,000 people)		
Acute myocardial infarction	-4.02 deaths	0.03
Lung cancer	-2.72 deaths	0.001
Type 2 diabetes	-0.45 deaths	0.004
Neonatal	-4.15 deaths	0.325

Adapted from Bradley EH et al, *Health Affairs* 2016;5:760-768

Surprisingly, despite the breadth of literature describing and cataloging the social determinants of health in general, there is a dearth of literature assessing the impact of specific social services interventions on health outcomes, utilization, and costs. A recent systematic review on this topic identified 39 studies, and found that housing assistance, food assistance, and care coordination interventions were the domains of interventions with the best 'return on investment,' defined as those with the clearest effect on improving various disease-specific health outcomes.[9] Notably, the data for reduction in health care costs was mixed across these domains of interventions; additionally, the studies identified were too heterogeneous in the populations included and types of interventions assessed to allow for a meta-analysis of study data.

Homelessness and Housing Instability

Homelessness is defined as by the U.S. Department of Health and Human Services as "an individual who lacks housing (without regard to whether the individual is a member of a family), including an individual whose primary residence during the night is a supervised public or private facility (e.g., shelters) that provides temporary living accommodations, and an individual who is a resident in transitional housing."[10]

An individual may also be considered to be homeless if that person is 'doubled up,' a term that refers to a situation where individuals are unable to maintain their housing situation and are forced to stay with a series of friends and/or extended family members. In addition, previously homeless individuals who are to be released from a prison or hospital may be considered homeless if they do not have a stable housing situation to which they can return.[11]

In a seminal 1998 study of homeless adults in New York City, Salit and colleagues found that homeless patients had higher rates of emergency department and hospital use, as well as longer lengths of hospital stay and higher associated hospital costs. On average, homeless patients stayed in the hospital 36% longer than non-homeless patients even after adjusting for severity of illness, comorbidities and demographic characteristics; the additional cost of these hospital days was equivalent to $3,591 in 2016 dollars.[12] A 2001 study by Kushel and colleagues confirmed that the trends in increased acute health care use were also observable in a nationally representative sample of homeless adults.[13]

Housing instability is less severe than homelessness, and is defined as difficulty paying rent, spending more than half of one's income on housing, moving frequently, and/or living in crowded conditions. Despite being less severe and more difficult to recognize than homelessness, housing instability is nonetheless also associated with postponing needed medical care and increased use of acute health services (i.e., emergency department and hospitalization).[14]

Table 3. Relative Reduction in Health Use Among Homeless Adults Randomized to Housing First, Adjusted for Baseline Characteristics*

Outcome	Relative Risk Reduction, % (95% CI)	p-value	Estimated Magnitude of Benefit **
Hospitalizations	29 (10-44)	0.005	49 fewer hospitalizations
Hospital days	29 (8-45)	0.01	270 fewer hospital days
ED visits	24 (3-40)	0.03	116 fewer ED visits

*Adjusted for sex, race, age, education, insurance, veteran, prior hospital or ED visit, HIV status, hospital site, current alcohol or other drug use, physical function quality of life, mental health quality of life, and mental health disorders

**For every 100 persons offered the intervention over 1 year

Adapted from Sadowski LS et al, *JAMA* 2009

A landmark randomized controlled trial in 2009 of a 'Housing First' strategy among 405 hospitalized homeless adults in Chicago showed that a housing first strategy was associated with significant reductions in the rate of hospitalization and emergency department visits, as well as in the number of days spent in the hospital among homeless adults.[15] (**Table 3**) It is important to note that 'Housing First' interventions typically consist of both placing individuals in stable, permanent housing plus providing case management and other needed supportive services, rather than only providing housing alone. They are best thought of as interventions that provide housing *first*, not housing *only*. There have been other Housing First trials as well, though this particular study was notable for specifically including homeless adults with chronic *medical* illness rather than those with serious mental illness and/or substance use disorders as in other studies.

The largest randomized controlled trial of housing to date is the At Home/Chez Soi Demonstration project, a four-year study of 2,000 homeless adults with serious mental illness across 5 Canadian cities from 2009-2013. Participants were randomized to permanent supportive housing plus individualized recovery-oriented supportive services versus treatment as usual. It is worth noting that participants in the treatment as usual arm still had access to existing housing and supportive services though the quality and availability of these services was not as robust as in the intervention arm. Initial results from the study show improvements in quality of life, community functioning and reduced community service use and costs for those in the intervention arm.[16] There was also a modest reduction in emergency department and hospital visits. Further analysis and publication of study results in the peer-reviewed literature is ongoing.

Food Insecurity

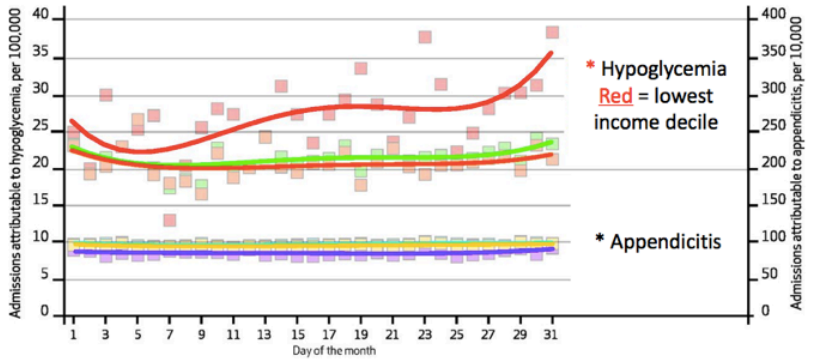
Food insecurity is defined by the United States Department of Agriculture (USDA) as a state in which "consistent access to adequate food is limited by a lack of money and other resources at times during the year."[17] It may also be more broadly defined as "limited or uncertain availability of nutritionally adequate and safe foods, or inability to acquire foods in socially acceptable ways."[14,18] National estimates suggest that 1 in 7 households cannot reliably afford food, making it highly likely that this is an issue all physicians will encounter in their clinical practices.[17]

Across several studies, food insecurity has been demonstrated to be associated with cost-related medication underuse, poor disease control, and limitations in the activities of daily living (in older adults) across individuals with a variety of chronic conditions.[19-21]

The adverse health consequences of food insecurity have been best studied in the context of adults with diabetes, in whom food insecurity is associated with increased risk of hypoglycemia, increased use of acute health care services (i.e., emergency department visits and hospitalizations), and poor diabetes control.[22,23] The reasons for these adverse outcomes are manifold; recent evidence also suggests a physiologic mechanism that may further exacerbate the effect of food insecurity on hypoglycemia.[24]

A landmark 2014 study by Seligman and colleagues illustrates the direct effects of food insecurity on health care utilization. This observational study assessed monthly patterns in hypoglycemia-related hospital admissions among low-income adults using 8 years of data from California's Office of Statewide Health Planning and Development, which collects data about all accredited California hospitals at the time of patient discharge.[25] This study found a cyclic pattern of hospitalizations for hypoglycemia, with rates of hospitalization steadily increasing throughout the course of a month and peaking at the end of the month. (**Figure 7**) This pattern was most clearly observed for individuals in the lowest decile of income, suggesting that the increase in hypoglycemia-related hospital admissions among low-income individuals at the end of the month occurs concurrently with the exhaustion of food budgets at the end of the month.

Figure 7. Hospitalizations for Hypoglycemia by Income, 2000-2008



Adapted from Seligman HK et al, *Health Aff*, 2014

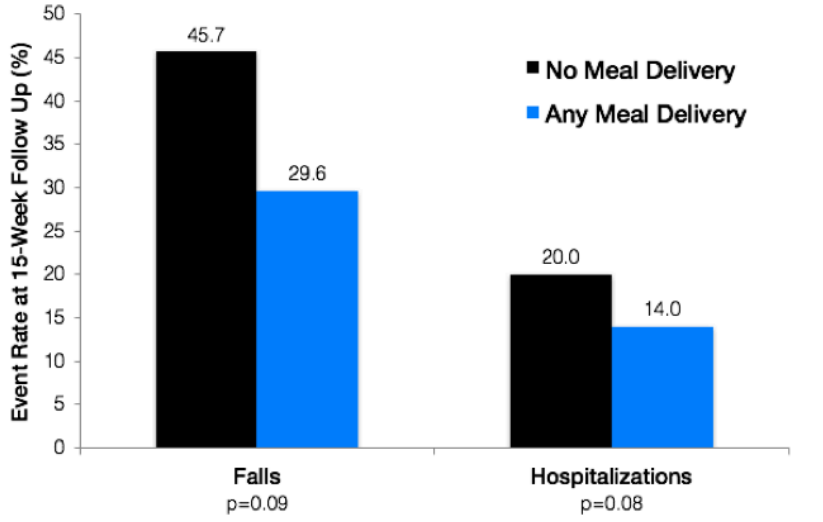
Given that food insecurity is a relatively new area of study for medical researchers, most research has focused on characterizing the association between food insecurity and poor health outcomes.[26] The farthest reaching nutritional assistance 'interventions' in terms of scope are federal assistance programs, including the Supplemental Nutrition Assistance Program (SNAP, colloquially known as 'food stamps') and the Women, Infants and Children's nutritional assistance program (WIC). There are limited and mixed data on the effect of SNAP in non-pregnant adults.[9] It should be noted that enrollment in SNAP or WIC does not completely alleviate food insecurity – benefits are provided monthly but they typically only last for the first two to three weeks of the month, and many households rely on additional other sources of food assistance.[27]

Two recent pilot studies of other food assistance interventions show promising results. The More Than a Meal Pilot Study, conducted in 2013, was an RCT of 626 older adults on the Meals on Wheels waiting lists across 8 sites in different states (including 3 sites in Texas). Participants were randomized to three arms – 1) daily meal delivery five times a week, 2) weekly meal delivery with frozen meals to last five days; or 3) usual care (i.e., remaining on the waiting list with no meal delivery). It is worth noting that the average waitlist time for Meals on Wheels at these sites was 6 months. This study found that participants randomized to any meal delivery had fewer falls and hospitalizations than those in the control arm.[28] Though the results did not reach 'statistical' significance, the difference in the event rates was nonetheless substantial and certainly clinically noteworthy. (**Figure 8**).

In a recent study, a pilot food bank intervention of 687 food pantry clients with diabetes at 3 sites across three states (including Texas) sought to help these individuals improve their glycemic control through an intervention bundle consisting of on-site A1c monitoring, diabetes-tailored

food packages lasting for 1-2 weeks, referrals for primary care, and self-management support and education. This study showed a modest improvement in glycemic control as measured by a hemoglobin A1c, with a change from 8.11% to 7.96% among participants. This change was more marked among individuals with 'uncontrolled' diabetes (defined as an A1c of greater than 7.5%), with an average A1c of 9.52% at baseline and a reduction to 9.04% after 6 months of follow-up.[29] Results from the fully powered randomized controlled trial are expected in 2018.

Figure 8. Reduced Falls and Hospitalizations with In-Home Meal Delivery



Adapted from Thomas KS and Dosa D "Results from a Pilot RCT of Home-Delivered Meal Programs," 2015

LOCAL EFFORTS IN UNDERSTANDING AND ADDRESSING SOCIAL NEEDS

Our research locally on understanding and addressing social needs has focused on identifying and addressing social needs in the context of readmissions and care transitions between hospital and home. This is primarily because of the unique policy relevance of 30-day hospital readmissions. Up to 1 in 5 adults is readmitted to the hospital within 30 days of discharge and since the implementation of the Hospital Readmissions Reduction Program by the Centers for Medicare and Medicaid Services in 2012, hospitals are subject to financial penalties for excessively high rates of readmissions. Although these readmissions penalties have stimulated intense efforts by hospitals to prevent readmissions, we still know little about the underlying causes and the best strategies to prevent readmissions.

Readmissions

Our group found that social factors as measured by electronic health record (EHR) surrogates, are important predictors of 30-day readmission in heart failure.[30] (**Table 4**) Our EHR-based heart failure readmission risk prediction model using electronic data from Parkland Health & Hospital System included social and behavioral risk factors such as number of address changes, poverty, history of missed visits and demonstrated that including these factors improved prediction of 30-day readmissions compared to other risk prediction strategies, with a C-statistic of 0.72.

Table 4. Multivariate Predictors of 30-Day Readmission for Heart Failure

Variables	Odds Ratio (95% CI)	*P*
Mortality risk factor		
Tabak mortality score (per 10 point increase)	1.52 (1.31–1.76	<0.001
Readmission risk factors		
Clinical		
History of depression or anxiety	1.44 (1.00–2.07)	0.05
Demographic		
Single	1.47 (1.08–2.01)	0.02
Male	1.37 (1.02–1.84)	0.03
Number of home address changes	1.13 (1.07–1.19)	<0.001
Medicare	1.59 (1.17–2.17)	0.004
Residence census tract in lowest socioeconomic quintile	1.30 (0.98–1.74)	0.08
Health behavior		
History of cocaine use	1.78 (1.17–2.72)	0.01
History of missed clinic visit	1.35 (0.99–1.83)	0.06
Used a health system pharmacy	0.72 (0.51–1.02)	0.08
Utilization patterns		
No. prior inpatient admissions	1.17 (1.07–1.27)	<0.001
Presented to emergency department 6 AM–6 PM for index admission	1.38 (1.05–1.81)	0.02

Amarasingham R et al, *Medical Care*, 2010

Our subsequent studies comparing the effectiveness of readmission risk prediction strategies using data from 6 hospitals in north Texas shows that EHR surrogates for social need are consistently important predictors of readmission risk across diverse settings and populations. Payer and marital status were predictors of readmission in our multi-condition model (**Table 5**), and income was an important predictor of readmissions in pneumonia. (**Table 6**).[31,32]

Table 5. Predictors of 30-Day Hospital Readmission Across Medical Conditions

	Odds Ratio (95% CI)	
	Univariate	Multivariate*
Demographic characteristics		
Age, per 10 years	1.08 (1.05–1.11)	1.07 (1.04–1.10)
Medicaid	1.97 (1.70–2.29)	1.55 (1.31–1.83)
Widow	1.44 (1.28–1.63)	1.27 (1.11–1.45)
Utilization history		
Prior ED visit, per visit	1.08 (1.06–1.10)	1.04 (1.02–1.06)
Prior hospitalization, per hospitalization	1.30 (1.27–1.34)	1.16 (1.12–1.20)
Hospital and clinical factors from first day of hospitalization		
Nonelective admission	1.75 (1.51–2.03)	1.42 (1.22–1.65)
Charlson Comorbidity Index, per point	1.19 (1.17–1.21)	1.06 (1.04–1.09)
Laboratory abnormalities within 24 hours of admission		
Albumin <2 g/dL	2.57 (1.82–3.62)	1.52 (1.05–2.21)
Albumin 2–3 g/dL	1.68 (1.50–1.88)	1.20 (1.06–1.36)
Aspartate aminotransferase >40 U/L	1.37 (1.22–1.55)	1.21 (1.06–1.38)
Creatine phosphokinase <60 μg/L	1.48 (1.30–1.69)	1.28 (1.11–1.46)
Mean corpuscular volume >100 fL/red cell	1.68 (1.38–2.04)	1.32 (1.07–1.62)
Platelets <90 × 10^3/μL	2.20 (1.77–2.72)	1.56 (1.23–1.97)
Platelets >350 × 10^3/μL	1.34 (1.17–1.54)	1.24 (1.08–1.44)
Prothrombin time >35 seconds	2.58 (1.74–3.82)	1.92 (1.27–2.90)
Hospital and clinical factors from remainder of hospital stay		
Length of stay, per day	1.08 (1.07–1.09)	1.06 (1.04–1.07)
Hospital complications		
Clostridium difficile infection	3.61 (2.19–5.95)	2.03 (1.18–3.48)
Pressure ulcer	2.43 (1.73–3.41)	1.64 (1.15–2.34)
Venous thromboembolism	2.01 (1.36–2.96)	1.55 (1.03–2.32)
Laboratory abnormalities at discharge		
Blood urea nitrogen >20 mg/dL	1.86 (1.70–2.04)	1.37 (1.24–1.52)
Sodium <135 mEq/L	1.70 (1.52–1.91)	1.34 (1.18–1.51)
Hematocrit ≤27	1.61 (1.40–1.85)	1.22 (1.05–1.41)
Vital sign instability at discharge, per instability	1.29 (1.20–1.40)	1.25 (1.15–1.36)
Discharged to hospice	0.51 (0.30–0.89)	0.23 (0.13–0.40)

Nguyen OK et al, *J Hosp Med*, 2016

Social Needs Are Not Unique to Safety Net Settings

Unmet social needs affect individuals across *all* and sometimes unexpected settings. A national survey of physicians by the Robert Wood Johnson Foundation found that 85% of physicians thought that problems created by unmet social needs are relevant to everyone, not just those in low-income communities.[33] A recent report from the Urban and Environmental Policy Institute at Occidental College found that 45% of full-time administrative employees working at the University of California nonetheless reported sometimes going hungry to make ends meet.[34] Our study of factors associated with frequent utilization of hospital care in an academic tertiary referral center among individuals *with* established primary care – a context generally assumed to include primarily privileged individuals – nonetheless showed that 'high users' were more likely to be of minority status and have public insurance, surrogate markers for poverty and social needs.[35]

Care Transitions

Social factors are important predictors of readmission risk and frequent health care utilization.[36] Despite the heightened risk experience by individuals with unmet social needs, our systematic review of transitional care interventions found that there are limited interventions for social needs currently embedded in health systems.[37,38] 'Transitional care' interventions are hospital-based interventions designed to help patients more safely transition from hospital to home. They can be thought of as hospital SWAT team intervention bundles that are designed to reduce readmissions, and typically include some mix of

Table 6. Predictors of 30-Day Hospital Readmission in Pneumonia

	Odds Ratio (95% CI)	
	Univariate	Multivariate [a]
Full-Stay Pneumonia-Specific Model		
Median income per ZIP code < $30,000	1.71 (1.08 - 2.71)	1.92 (1.18 - 3.12)
Platelets > 350 x 10^3/μL	2.18 (1.49 - 3.18)	2.35 (1.57 - 3.52)
Prior hospitalizations in past year	1.35 (1.19 - 1.53)	1.26 (1.10 - 1.44)
Vital sign instabilities on discharge ≥ 1	1.60 (1.16 - 2.20)	1.47 (1.05 - 2.07)
Updated PSI, per 10 points	1.23 (1.17 - 1.30)	1.22 (1.15 - 1.29)
Disposition status at hospital discharge		
Home	[Reference]	[Reference]
Home with home health	2.37 (1.51 - 3.73)	1.61 (0.99 - 2.62)
Post-acute care facility	2.12 (1.50 - 3.01)	1.39 (0.94 - 2.03)
Hospice	0.79 (0.24 - 2.61)	0.23 (0.07 - 0.83)

Makam AN and Nguyen OK et al., *J Hosp Med*, 2016 (In press)

inpatient education, medication reconciliation, discharge coaching and a post-discharge call or visit. We reviewed 47 studies of state-of-the-art interventions and found that individuals who are potentially higher risk for readmission due to social or behavioral needs were often excluded from interventions. These included patients with cognitive impairment or dementia; those with no telephone or who were homeless; those with mental illness; and those lacking adequate caregiver support. Further, we found that not only were individuals with social needs excluded but also that no studies included interventions with any components to address unmet social needs.

Thus, our research group at Parkland conducted a needs assessment study to gauge the feasibility of electronic care coordination across medical and community social service settings in Dallas and found that these sentiments were unanimously echoed by providers caring for a shared population of high-need individuals.[39]

Health systems not only lack effective referral systems to prescribe 'treatments' for social needs, they lack the means to even screen individuals for social needs. There are no current guidelines or validated tools for social needs screening in medicine. Physicians rarely take on primary responsibility for screening, and may often assume that interdisciplinary team members – particularly case managers and social workers – are doing any necessary social needs screening. However, our research suggests that this assumption may be perpetuating gaps in social needs screening. In our aforementioned needs assessment study, we found that case manager and social worker teams embedded in clinical settings were often stretched far beyond their capacity.[39] For example, a typical team was responsible for between 40 to 50 patients each day. Case managers and social workers had no systematic way of prioritizing or triaging which patients should be evaluated for unmet social needs first, unless patients self-identified these needs or unless other health care staff raised concerns. Otherwise, screening tended to take place randomly, with the vast majority of patients remaining unscreened due to time constraints.

Current Knowledge Gaps and Next Steps

Our work to date on social needs and readmissions and care transitions has highlighted several additional key knowledge gaps that need to be addressed in order to enable us to successfully design interventions to more effectively address social needs from a health perspective:

First*, what is the actual prevalence of individuals in our community who have concomitant medical and social needs?* What are their specific needs, and which ones should be prioritized? We are currently conducting an ongoing mixed methods study of Dallas County residents receiving food assistance from Crossroads Community Services, Dallas's largest nonprofit food redistribution organization. This project was funded through the Community-Based Research Pilot Award Program from the Program for the Development and Evaluation of Model Community Health Initiatives in Dallas (PDEMCHID). Our preliminary data show that of the nearly 12,000 individuals receiving assistance from Crossroads in the past year, at least two-thirds also received medical services at Parkland. The most common health conditions among individuals who also receive care at Parkland are hypertension (27.5%) and diabetes (15.5%). Notably, the prevalence of diabetes in this cohort far exceeds the national prevalence (9%).

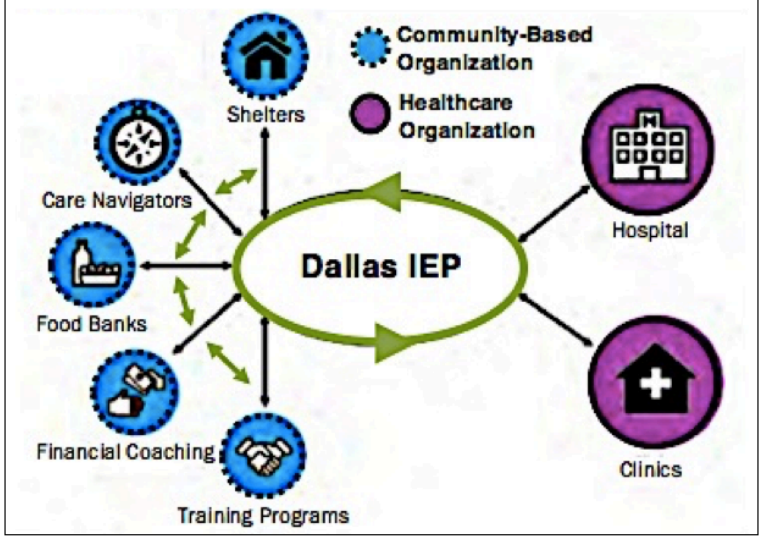
Second, although physicians, other medical providers, and social service providers see a clear need for care coordination across sectors, *do individuals also see a link between health and unmet social needs? Do they want or need screening and coordination across health and social*

service settings? Our preliminary focus group data from our PDEMCHID-funded project suggest that Crossroads clients perceive social needs to be a daily obstacle in meeting health needs, and often result in difficult tradeoffs between seeking social services versus medical care. Nonetheless, most individuals were highly motivated towards self-care and were forward-thinking and planning for the future. Further, clients were enthusiastic about the idea of care coordination between community and medical settings.

Third, *can we create an automated, systematic method to screen for social needs*? Though it is doubtful that an automated system will entirely replace more detailed and nuanced in-person screening, an automated system could at least help overworked personnel more effectively prioritize and triage their efforts. This is an ongoing area of investigation within our group, which hopes to develop a 'next-generation' automated readmissions risk prediction model that will distinguish which patients are at high risk due to medical illness versus those at high risk due to social needs (versus those with both) using data from the electronic health record.

Finally, *how can we more effectively leverage community-clinical linkages to address social needs*? Our collaborators at PCCI (formerly known as the Parkland Center for Clinical Innovation) have developed an electronic platform known as the Dallas Information Exchange Portal (**Figure 9**) to enable more effective information sharing and care coordination between medical providers at Parkland and community social service providers in Dallas County. Our group is planning to leverage the Dallas IEP as part of an enhanced transitional care intervention strategy that will address both social and medical needs among the highest need patients hospitalized at Parkland in order to both reduce readmissions and improve health among these individuals.

Figure 9. Dallas Information Exchange Portal (IEP) Sharing Network



CONCLUSION

The influence of the unique circumstances and social health determinants of an individual – or the 'personome,' – has just as powerful an effect on health as an individual's genome, pharmacogenome, or metabolome.[40] Knowing one's patient as a person and the circumstances of their existence is as essential as understanding an individual's physiology, molecular biology and genetics. To paraphrase, the potential of biomedical science and genomics to allow health care providers to develop and prescribe exactly the right medication at the right dose to the right patient matters only if this treatment is available at the right pharmacy at the right price so that it will actually be taken in the right amount on the right day at the right time.

Understanding the circumstances and context in which patients are receiving medical care, and tailoring care that is appropriate for those circumstances is key to championing 'personomics' – providing highly tailored, personalized and patient-centered care. In this age of 'precision medicine,' understanding and addressing social needs is something physicians can do now, without needing to wait for highly specialized technologies or treatments, in order to deliver better and more individualized care to their patients. As medical technology continues to grow more sophisticated, it will nonetheless fail to enable truly personalized medicine if a physician doesn't truly understand who and what the life circumstances of her patients are. Eliciting, diagnosing, and addressing social needs is a low-tech but high-touch intervention strategy that is key to delivering the best possible medical care to our patients – and thus, is certainly *within* the boundaries of medicine.

"The major problems of health care that we have in this country do not exist because of a lack of knowledge. They exist for a lack of will."

– Mitchell H. Katz, Director, Los Angeles County Department of Health Services

APPENDIX. WHAT CAN PHYSICIANS DO NOW TO ADDRESS SOCIAL NEEDS?

Screening for Social Needs

There are no current formal guidelines or recommendations in internal medicine on screening for health-related social needs. Pediatrics is at the forefront of innovation in this area, with the American Academy of Pediatrics issuing a policy statement in October 2015 recommending regular screening for food insecurity across *all* health care settings by pediatricians. The Hunger Vital Sign™ is a validated two-question screening tool developed to identify young children in households at risk of food insecurity, though it has been used in other populations as well: http://www.childrenshealthwatch.org/public-policy/hunger-vital-sign/

More comprehensive, validated screening tools for social needs for use by physicians and other clinical providers remain a work in progress. The best tool to date is the Health Leads Screening Toolkit, available for download for free at: https://healthleadsusa.org/resources/tools/. The toolkit allows physicians and other providers to select questions to develop or tailor a screening tool based on the specific population of interest and goals. There are sample questions that cover screening for food insecurity, housing instability, utility needs, financial resource strain, transportation, and exposure to violence, as well as recommendations for collection of demographic information important to determine eligibility for services. Many of the questions have been validated for use in specific populations or settings, but the Toolkit as a whole has not been formally assessed across diverse populations and settings.

A sample recommended screening tool from the Health Leads Toolkit covering several categories of essential social needs is included as at the end of this Appendix. Even if you do not use the complete screening tool, you may find this resource is helpful in providing guidance on *how* to ask about specific needs in a sensitive manner.

Commonly Used Local Resources

This section is by no means comprehensive or exhaustive; rather, it is meant as a starting place for physicians to become familiar with local resources and is primarily based on accumulated personal knowledge, though I am admittedly not a social services expert. For assistance with referring patients for services to meet social needs, physicians should seek appropriate professional assistance from interdisciplinary team members, such as case managers, social workers, financial counselors, and pharmacists.

The most comprehensive list available of local resources in Dallas is available via 2-1-1 Texas (http://www.211texas.org), which is a program of the Texas Health and Human Services Commission. In Dallas, this is directory is maintained and operated by the Community Council of Greater Dallas. Individuals, caretakers, or care providers requiring assistance can call 2-1-1 directly for information and referrals.

Health Care Coverage and Access

Although I have not explicitly covered the issue of health insurance coverage in this talk, lack of health insurance is by far the most pressing health-related social need for many Americans and specifically, Texans. As one of 19 Medicaid non-expansion states after the passage of the Affordable Care Act, Texas has the highest rate of uninsured any of the fifty states at 16% as of

2015, or about 4.3 million individuals. The rate of uninsurance in Dallas County is 23% (as of 2014, the most recent year for which data are available). Physicians should be aware that the vast majority of uninsured individuals in Texas and in Dallas County are employed permanent residents and/or U.S. citizens.

Marketplace and public health insurance: Individuals may obtain assistance in navigating the federal health insurance marketplace (healthcare.gov) to purchase a private insurance plan and in determining eligibility for other public health insurance including Medicare and Medicaid through the Parkland Patient Financial Services Office or one of Parkland's community clinics.

Parkland Financial Assistance (PFA): PFA provides sliding-scale financial assistance for health care to eligible Dallas County residents. It is not a health insurance program. Members are eligible to receive financial assistance for medical services only at Parkland locations. Depending on the level of assistance, members are still responsible for varying levels of co-pays for all health care encounters and prescription medications.

Patients who have public insurance (Medicare or Medicaid) or with private health insurance purchased through the federal marketplace may also qualify for PFA as a supplemental health plan. PFA allows these patients to receive services at Parkland without being liable for payments and deductibles charged by their health insurance plan if their income is less than 200 percent of the federal poverty level.

Potentially eligible individuals should be referred to the Parkland Patient Financial Services Office or one of Parkland's community clinics for further assessment and enrollment.

Housing Assistance

Affordable, low-income housing is scarce in Dallas. For assistance with obtaining rent assistance or permanent low-income housing, it is best to enlist the help of a professional – your friendly clinic or hospital social worker.

For patients with medical illness and emergency housing needs, the most well-known shelters are the Salvation Army Shelter next door to New Parkland Hospital, and The Bridge, located in downtown Dallas. Shelters may have semi-private 'transitional beds' available for individuals for whom an emergency mat in a common space or dormitory-style housing may not be ideal. You should express this need to your social worker so that he or she can help direct the patient to appropriate facilities.

As an interesting aside, Dallas has a pilot Housing First initiative called The Cottages at Hickory Crossing (http://www.citysquare.org/programs-to-support/housing/), run by CitySquare, a non-profit community organization. These 50 'tiny homes' are permanent housing with on-site medical and mental health services, intended for extremely high-need homeless persons.

Food Assistance

All individuals who screen positive for food insecurity should be referred to a social worker to assess for eligibility for SNAP and WIC benefits, which provide monthly assistance. Physicians should be aware that many individuals will also require additional assistance beyond that provided by SNAP or WIC. Referrals are best coordinated with a social worker familiar with the vast

landscape of services available in Dallas. Individuals with stable housing may get monthly food supplies from nonprofit food redistribution organizations affiliated with the North Texas Food Bank such as Crossroads Community Services and other groups. For homeless individuals, there are many sites throughout the Dallas area that provide meal services.

Older adults (ages 60 and up) may qualify for in-home meal delivery by Meals on Wheels (MOW). In Dallas, MOW is run by the Visiting Nurse Association (VNA). The waiting list for MOW can be up to several months long. Individuals with Medicaid and/or medical needs may receive priority; this information should be communicated to help potentially expedite receipt of services.

Medication Assistance

Because cost-related medication underuse often occurs in tandem with food insecurity, physicians should be aware of opportunities to reduce out-of-pocket costs pertaining to medications for patients. Physicians should also be aware that for patients with polypharmacy, even modest monthly out-of-pocket costs can quickly become unaffordable when summed up for several monthly medications. Counseling patients on which medications are highest priority and which should not be skipped or stretched can help minimize potential adverse effects.

Preventive Services covered under the Affordable Care Act (ACA): Some pharmacy benefit plans may provide certain preventive services at no cost to members. These may include: aspirin to prevent cardiovascular disease; bowel preparations for colorectal cancer screening; fluoride supplementation in children; folic acid supplementation for women expecting or planning to be pregnant; tobacco use counseling and cessation intervention; immunizations; women's health preventive services (i.e., birth control, emergency contraception). Specific plans may cover additional items not explicitly noted here. For additional information please refer to http://www.hhs.gov as well as directly contacting the benefit plan of interest.

$4 Formulary: This is a prescription savings program offered by Walmart. Selected generic medications are provided at a cost of $4 per month. No membership is required to participate. Patients can receive additional savings for 90-day prescriptions, which are offered at $10 per 90 days. The complete list of medications is available at: https://i.walmartimages.com/i/if/hmp/fusion/genericdruglist.pdf (updated 10/07/16)

Commonly prescribed medications that are available include oral antihyperglycemic medications for diabetes (notably, metformin including the extended-release formulation; glipizide, glimepiride, and glyburide in the micronized formulation); oral antihypertensives (including lisinopril-HCTZ combination tablets, carvedilol, and furosemide); selective serotonin reuptake inhibitors (fluoxetine, paroxetine, and citalopram); and several classes of antibiotics (amoxicillin, acyclovir, cephalexin, ciprofloxacin, fluconazole, isoniazid, sulfamethoxazole-trimethoprim).

Patient Assistance Programs for Prescription Drugs: For non-generic medications, most drug companies offer some sort of assistance to low-income and/or uninsured individuals and will provide brand name drugs at low- or no-cost. However, the application process can be arduous and confusing, especially for individuals who have limited literacy or fluency in English. Googling '[drug name]' plus '[patient assistance]' is the easiest way to find such programs. Insulin and hepatitis C treatments are frequent medications of interest.

APPENDIX. Health Leads Sample Social Needs Screening Tool

Recommended Screening Tool

This is a sample social needs screening tool – please tailor it based on your population, scope, and goals.

Example introductory text: This form is available in other languages. If you do not speak English, call (800) 555-6666 (TTY: (800) 777-8888) to connect to an interpreter who will assist you at no cost.

Name: _____ Phone number: _____

Preferred Language: _____ Best time to call: _____

		YES / NO
	In the last 12 months, did you ever **eat less than you felt you should** because there wasn't enough money for food?	Y N
	In the last 12 months, has your **utility company shut off your service** for not paying your bills?	Y N
	Are you worried that in the next 2 months, you **may not have stable housing?**	Y N
	Do problems getting **child care make it difficult for you to work** or study? *(leave blank if you do not have children)*	Y N
	In the last 12 months, have you needed to see a doctor, **but could not because of cost?**	Y N
	In the last 12 months, have you ever had to go without health care because you didn't have **a way to get there?**	Y N
	Do you ever need help **reading hospital materials?**	Y N
	Are you **afraid you might be hurt** in your apartment building or house?	Y N
	If you checked YES to any boxes above, **would you like to receive assistance** with any of these needs?	Y N
	**Are any of your needs urgent?** For example: I don't have food tonight, I don't have a place to sleep tonight	Y N

FOR STAFF USE ONLY:

- Place a patient sticker to the right
- Give this form to the patient with patient packet
- PRINT your name and role below.

Staff Name: _____

Place patient sticker here

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