CARE DELIVERY MODELS THAT IDENTIFY AND ADDRESS SOCIAL DETERMINANTS OF HEALTH

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ABOUT

This report explores the impact of existing care delivery models that screen patients for social determinants of health (SDOH) in various healthcare settings. Care delivery model components included screening, referral, and tracking of patients with identified unmet social needs. The primary goal of this report is to highlight the impact of such care delivery models on humanistic and economic outcomes as well as to provide researchers, public health professionals, and policy makers with a resource summarizing these models and their respective outcomes.

The models included in this report were identified through searches of peer-reviewed and grey literature. Eligibility criteria included: 1) use of a screening tool for SDOH in a healthcare setting, 2) referral of positive screens to a community organization or other community resource(s) and 3) referral and/or patient outcomes. We found each model to be tailored to address at least one of the SDOH domains listed below.

Social Determinant of Health Domains Addressed

- Education
- Employment/Income
- Food Insecurity
- Housing/Utilities – homelessness, unstable or unsafe housing
- Interpersonal safety
- Transportation
- Other (e.g., childcare needs, elder care assistance, medication assistance, parenting support, social services or other support groups)

Care models that addressed a single SDOH domain are summarized under Single Domain, while those addressing more than one domain are summarized under Multiple Domains. Information specific to each model is further organized into a separate table containing the author name(s), the screening tool used, setting of intervention, referral approach, target population, and outcome(s) summary. All models reported either process outcomes (e.g., number of referrals), patient outcomes (e.g., dietary changes or patient satisfaction), or both. Terms and Definitions on page 11 provide additional information on terms used in the report.

HIGHLIGHTS

We identified 15 care delivery models that screened patients for unmet social needs, referred patients to necessary community resources, and tracked subsequent outcomes.

> ➢ Eight of those models addressed multiple domains
> ➢ The seven remaining models targeted a single domain

Models spanned various practice settings but did NOT include community pharmacies.

A strong collaboration between healthcare system(s) and community resource(s) was essential in facilitating the referral and tracking process.

Some models reported positive outcomes on patient health such as reduction in glycosylated hemoglobin (HbA1c) levels, improvements in diet, and reduced systolic/diastolic blood pressure.

Barriers to resource use or screening and referral processes included:	Facilitators for resource use included:
➢ Patient-related stigma and privacy concerns ➢ Ineligibility or perceived ineligibility of benefits related to the community resource ➢ Complexity in the administration of screening (e.g., burdens associated with paper screening)	➢ Proactive approach to the referral process (e.g., initiating the enrollment process for patients in-clinic) ➢ Improving accessibility to community resources (i.e., regarding convenience and the ease of use of resource)

SINGLE DOMAIN

Domain: Food Insecurity

Six care models screened patients for food insecurity, referred patients to appropriate community resources, and tracked their outcomes. [1–6] See Table 1 for more information about the models in this domain.

Healthcare setting: These models were implemented in a variety of healthcare settings such as primary care (e.g., primary care practices, pediatric clinics) and acute care settings (e.g. hospital systems).

Screening and referral: The most common tool used to screen for food insecurity was the Hunger Vital Sign,[7] and most models used either a direct referral or electronic referral approach to link food insecure patients with relevant community resources. For example, one model shared patients' contact information with a nonprofit organization after receiving the patients' consent. This nonprofit then directly contacted the patients with information and provided assistance with applying for SNAP benefits.[5] However, a different model collaborated with Unite Us to design and execute a digital referral platform.[4]

Outcomes: Although all models tracked and reported process outcomes, only one reported a positive impact on patient health by demonstrating reductions in HbA1c levels and improvement in STC-Diet scores.[1]

Barriers and Facilitators

Two models reported barriers to successful referrals including factors such as stigma, privacy concerns, ineligibility, or perceived ineligibility of benefits related to the relevant community resource, and complexity of administration.[2,3] One model identified two main facilitators for successful referrals, which included 1) initiating the enrollment process for community resources in-clinic, and 2) increased proximity and ease of use of community resources.[3]

SINGLE DOMAIN

Domain: Housing/Utilities

One care model addressed the "Housing/Utilities" SDOH domain, and is coined the 10th Decile Project.[8]

Healthcare setting: This model includes a collaboration between homeless services, hospitals, and health centers.

Screening and referral: The model used a self-developed screening tool designed to screen for homelessness, and a warm handoff referral technique to link positive screens to relevant community resources. In other words, trained hospital staff screened patients and introduced positive screens to case managers responsible for connecting them to primary and behavioral health services.

Outcomes: Housing stability and health outcomes were improved, and there was a significant reduction in per person cost to the healthcare system. See Table 1 for more information on the reported outcomes.

Table 1: Single SDOH Domain Models that Addressed Food Insecurity and Housing

Author	Domain	Target Population	Tools Used, Setting, Referral Approach	Outcomes tracked		Reported Outcome Summary
				P	**PO**	
Ferrer RL, et al[1]	FI	Patients with type 2 diabetes	HVS, 1 primary care practice, simple referral	✓	✓	• A1c levels decreased (absolute change) by 3.1% in the intervention group vs 1.7% in the control group[a] • STC-Diet scale improved by 2.47 points on a 21-point scale in the intervention group • BMI difference between the groups was not significant
Knowles M, et al[2]	FI	Families with children (<5 years of age)	HVS, 3 pediatric clinics, electronic referral	✓	NS	• Of the 7,284 families screened through paper and EHR screening, 1133 (15.6%) screened positive • 630 of 1,133 (55.6%) consented and referred to partner agency; 27 of 85 applications approved (12 SNAP, 13 Medicaid, 2 Homestead) • Identified four major barriers to screening and referral
Marpadga S, et al[3]	FI	Patients with diabetes	HVS, 1 diabetes clinic (referral site for primary care safety net clinics), warm handoff	✓	NS	• 143 of 240 (60%) patients screened positive • 104 referrals to food resource programs, and about 32% of these successfully connected • Identified seven barriers and two facilitators to food resource use
Hennessey Z, et al[4]	FI	Adults	Program-developed CIRA-FNS,[b] 2 public hospitals, electronic referral	✓	NS	• 1,713 participants screened, of whom 93% provided consent • 2,199 referrals; 86% had a documented outcome, 57% resulted in enrollment of food and nutrition services • Provided 871 families food and nutrition services

Carpenter A[5]	FI	Child caregivers	HVS, 5 CHP clinics, direct referral	✓	NS	• Of the 37 patients that agreed to a referral, 30 (81%) had successful contact with resource • Eight (26.7%) were screened for SNAP benefits, and five (62.5%) applied for benefits.
10th Decile Project[8]	H/U	Frequent users of emergency health services	10th Decile Triage Tool, 15 hospitals, 5 health centers, warm handoff	✓	✓	• Of the 465 patients screened, 235 (51%) enrolled in the 10th Decile Project or another program; 110 (47%) were housed in six months, and 230 (98%) within two years • Emergency room visits reduced by 71%, hospital admissions down by 84%, inpatient days down by 80% • Per person emergency room costs, inpatient costs, and total cost to the public sector down by average of $54,106
Stenmark SH, et al[6]	FI	Families with children	HVS, 2 pediatric clinics, direct referral	✓	✓	• Project in progress; outcomes being tracked include diet quality, food security, health care system utilization, and patient and provider satisfaction with screening and referral processes

Abbreviations: BMI=Body mass index, CIRA-FNS=Coordinated Intake and Risk Assessment for Food and Nutrition Services, CHP=Children's Hospital of Pittsburgh, EHR=Electronic Health Record, FI=Food Insecurity, HC=Healthcare, H/U=Housing/Utilities, HVS=Hunger Vital Sign, NS=Not specified, P=Process, PO=Patient outcomes, STC-Diet=Starting the Conversation-Diet

[a] The intervention group, unlike the control group, received regular produce allotment from food bank, brief teaching from a dietician, and home-based education from a community health worker.

[b] Developed through a combination of known validated tools (PRAPARE, Health Leads, iScreen).[7,9,10]

MULTIPLE DOMAINS

Domains: Education, Employment/Income, Food Insecurity, Housing/Utilities, Interpersonal Safety, Transportation, Other

We found eight care models that addressed more than one SDOH domain or multiple SDOH domains that fell into the "Other" category.[11–18]

Healthcare setting: The settings for each model varied widely, but the *most common* were hospital systems and community health centers.

Screening and referral: Some models used validated screening tools,[7] such as WE CARE and PRAPARE,[9] while others developed their own screening tools based on previously published literature or other unspecified means. Simple referrals and warm handoffs were the *most common* referral approaches. For example, one model executed simple referrals by providing an information sheet of community resources to families with identified unmet social needs,[15] while another model utilized warm handoffs by introducing patients to an on-site social worker who was responsible for connecting patients to relevant community resources.[14] Direct referrals were not used, and only one care model notably used an electronic referral system where EHR-based tools were used to refer patients.[19]

Outcomes: Only one model reported patient outcomes, but this model demonstrated a positive impact on patient health by reporting improvements in systolic and diastolic blood pressure.[11]

Refer to Table 2 for more information on each model and its reported outcomes.

Table 2: Multiple SDOH Domain Models

Author	Domain	Target Population	Tool Used, Setting, Referral Approach	Outcomes tracked		Reported Outcome Summary
				P	**PO**	
Berkowitz SA, et al[11]	E/I, FI, H/U, T, O	Adults with chronic disease	Health Leads, 3 academic primary care practices, warm handoff	✓	✓	• 1,774 out of 5,125 patients screened positive for at least one unmet need; 58% enrolled in Health Leads (HL) program • Greater improvement in systolic blood pressure (SBP), diastolic blood pressure (DBP), and LDL-C in those enrolled in the intervention over those who declined
Gottlieb LM, et al[12]	Edu, E/I, FI, H/U, T, O	Families with children	14-item questionnaire,[a] 2 safety-net hospitals, simple referral or warm handoff[b]	✓	✓	• Intervention arm reported fewer unmet social needs than the control arm 4 months post-enrollment • Caregivers reported greater improvement in their child's health
Drake C, and Eisenson H[13]	E/I, FI, H/U, T, O	Community health center patients	PRAPARE, 1 community health center, warm handoff	✓	NS	• 1,700 LCHC patients have been screened, 1,222 received referrals for LCHC or community services • Most referrals related to food (26.1%) and medical care access[c] (31.8%)
Power-Hays A, et al[14]	Edu, E/I, FI, H/U, T, O	Patients with sickle cell disease	WE CARE, 1 pediatric hematology clinic, simple referral and/or warm handoff	✓	NS	• 156 screens with 66% positive for at least one unmet social need • 80% of positive screens were referred to a community organization • 45% of patients who were referred, and available for follow-up phone call reached out to the community organization

Garg A, et al[15]	Edu, E/I, FI, H/U, O	Families with infants 6 months old or younger	Program-developed tool,[d] 8 urban community health centers, simple referral	✓	NS	• 336 mothers enrolled in the study (168 per group) • More intervention mothers received at least one referral (70% vs 8%) and were enrolled in a new community resource (39% vs 24%) than control[e] • Intervention mothers had greater odds of being employed, receiving childcare support and fuel assistance; lower odds of being in a homeless shelter
Hsu C, et al[16]	O (multiple)[f]	Adults	NS, 3 primary care practices, warm handoff	✓	NS	• 45% of referred patients reported using the resource • 86% who had set a goal progressed toward that goal • High patient satisfaction with the CRS role
NC Medicaid[17]	E/I, FI, H/U, IS, T, O	Medicaid Managed Care	NCDHHS Screening Tool, NS, electronic referral	✓	NS	• Project in progress, tracking of the number of referrals and outcomes of the connection/ collaboration is ongoing
Spencer A, and Hashim S[18]	E/I, H/U, T, O	Low-income patients	NS EHR-based screening tool, 6 hospital systems and 2 care organizations, electronic referral	✓	✓	• Project in progress; tracking of patient outcomes, social service utilization, and related costs is planned

Abbreviations: CRS=Community Resource Specialist, Edu=Education, E/I=Employment/Income, FI=Food Insecurity, H/U=Housing/Utilities, IS=Interpersonal Safety, T=Transportation, O=Other, LCHC=Lincoln Community Health Center, LDL-C=Low-Density Lipoprotein Cholesterol, NCDHHS=North Carolina Department of Health and Human Services, NS=Not specified, P=Process, PO=Patient outcomes, PRAPARE=Protocol for Responding to and Assessing Patients' Assets Risks and Experiences, WE CARE=Well Child Care, Evaluation, Community Resources, Advocacy, Referral, Education

[a] Developed using previously published literature.[10,20–22]

[b] A simple referral system was used with the control group whereas a warm handoff referral technique was used on the intervention group.

[c] Food related referrals included referrals to food pantries and charity kitchen information. Referrals related to medical care access included resources to co-pay assistance and medication assistance programs.

[d] Developed using previously published literature.[23]

[e] Control group received standard of care which included access to basic social work services and social history questions in EMR. Providers were *encouraged* to refer families to clinic support staff and community resources if applicable. The intervention group was systematically screened for unmet needs, were provided simple referrals and applications to community resources and were followed-up.

[f] Intervention patients were reported as being referred to social services, physical activity, parenting support, and other support groups.

ADDITIONAL INFORMATION

Terms and Definitions

Direct referral is a referral system that requires the patient's consent to forward their contact information to the corresponding community resource. The community resource is then responsible for directly contacting the patient.

Electronic referral is a referral system that uses electronic health record-based tools or others to refer and track patients and their outcomes.

Food insecurity is characterized as an unreliable source of adequate food typically caused by a lack of money or other resources.

HbA1c (Glycosylated Hemoglobin) levels reported as a percentage. The higher the percentage, the higher the blood sugar levels over the past two to three months. The normal level is below 5.7%, prediabetes is 5.7% to 6.4%, and diabetes is 6.5% or above.[24]

Patient outcomes are defined as either health outcomes (e.g., chronic conditions, HbA1c, Body Mass Index, etc.), patient-reported outcomes (i.e., patient surveys evaluating changes in diet quality, knowledge of and self-efficacy around health eating), cost reduction/savings, or patient/provider satisfaction.

Process outcomes are defined as reported process indicators (e.g., population size, number of referrals, number of patients receiving resources, etc.) or application status.

Simple referral is a referral system where healthcare providers simply hand over information about relevant community resources to the patient (e.g., a list of local food banks and their contact information).

STC-Diet is an 8-item dietary assessment where a lower score generally indicates a more healthful diet.[25]

Warm handoff is a referral technique where patients screened positive are introduced to an on-site intermediary person in the healthcare system (e.g., community resource specialist) who is responsible for connecting them to community resources.

Note: Screening tools reported in the referenced studies may not be validated. Details about screening tools are outlined in the footnotes for Tables 1 and 2, wherever applicable.

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