What EHRs Tell Us about How We Deploy Health Professionals to Address the Social Determinants of Health

Carolina HEALTH WORKFORCE Research Center

Research brief, June 2020

Erica Richman, PhD, MSW
Brianna Lombardi, PhD, MSW
Lisa de Saxe Zerden, PhD, MSW

Abstract

Background: Increasing awareness of the Social Determinants of Health (SDOH) has prompted health systems to implement strategies to screen for and address patient SDOH. These resources are valuable for health systems but do not speak to the workforce needed to implement SDOH screening and related interventions. Little research has examined which health care workers screen for SDOH, who actually addresses needs related to patient SDOH, and how to incorporate screening and intervention into the clinic workflows.

Objective: This feasibility study used EHR data from a large health care system located in the southeastern United States to describe the mix of professionals identifying and addressing patient SDOH. The following research questions were considered:

1. How well does EHR documentation identify which health professionals act to address patient SDOH?
2. What actions regarding patient SDOH are documented in the EHR?

Methods: Two domains of SDOH, food insecurity, and housing insecurity, were studied. Researchers used the Electronic Medical Record Search Engine (EMERSE), a program that systematically searches EHR notes using key words or terms to identify a patient pool. Limits were set to include only patients over age 17 and who had a note documented between September 1, 2017 and August 31, 2018. After the final pool of notes was identified, analysts at the Carolina Data Warehouse randomly extracted 480 notes (240 from each SDOH: food and housing insecurity) for researchers to analyze. Using a random number generator, researchers randomly sampled 60 patient's notes under each SDOH category, all of which contained one or more of the selected terms.

Results: The mean age of patients was 52 years of age (SD=16), were slightly more likely to be female (53%, n=63), and most were either white (49%, n=59) or black (40%, n=48) (see table 1). Out of 120 notes that contained a reference to food or housing insecurity, 72% (n=86) also contained information on an intervention or action that was taken to help address a patient's need related to the specific SDOH. When an intervention was taken to help address food insecurity, 62% (n=29) of providers were social workers, 15% (n=7) were dieticians, and the remaining 11 providers were a mix of registered nurses (RNs), community health workers, medical assistants, physicians, and others. When an intervention to help address housing insecurity was documented, 64% (n=25) of providers were social workers, 10% (n=7) were physicians, and the remaining 10 providers were a mix of chaplains, RNs, care manager assistants, and others.

Conclusion: This study identified that health care team members are screening and addressing patient SDOH. The analysis revealed that with dieticians, chaplains, and other health care professionals, social work is the primary workforce addressing patient needs related to SDOH. Preliminary evidence supports social care as an effective intervention to improve patient health and well-being behavioral health providers, from peer-support specialists to LCSWs. Future work is needed to identify the most effective mix of health team members to address SDOH, as well as evaluate sustainable financial models to meet patient social needs.

What EHRs Tell Us about How We Deploy Health Professionals to Address the Social Determinants of Health

Background

The Social Determinants of Health (SDOH) are widely understood to profoundly influence health care, access, and outcomes (Link & Phelan, 1995; Marmot, 2005; Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010). The increasing awareness of SDOH has prompted health systems to implement strategies to screen for and address patient SDOH. Prominent health practice and policy entities like the National Academies of Sciences, Engineering and Medicine (NASEM) (2014), and the World Health Organization (2018) have operationalized domains of SDOH to include categories such as housing stability, food insecurity, and transportation. A recent report by NASEM (2019) titled *Integrating Social Care into the Delivery of Health Care: Moving Upstream to Improve the Nation's Health* describes the extensive impact of SDOH across all health metrics and makes a case for why technological infrastructure, such as electronic health records (EHR), are necessary to document these needs as a routine part of health care delivery. Assessment protocols have been developed to help standardize data collection procedures and determine best practices to screen for and address the SDOH. One example of this is the PRAPARE (Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences) Toolkit (National Association of Community Health Centers, 2016)

These resources are valuable for health systems but do not speak to the workforce needed to implement SDOH screening and related interventions. Little research has examined which health care workers screen for SDOH, who actually addresses needs related to patient SDOH, and how to incorporate screening and intervention into the clinic workflows. In particular, the *teams* of health professionals involved in screening and addressing SDOH is not well defined.

EHRs present a new data source for tracking not only when and how SDOH are screened for and addressed, but which providers are involved in the process. EHRs are now used by approximately 86% of office-based physicians in the U.S. (Myrick, Ogburn, & Ward, 2019) and are considered one of the most efficient ways to ensure the consistent inclusion of SDOH in care plans (Cantor & Thorpe, 2018; Gold et al., 2017). However, the extent to which providers document SDOH, and the workforce tasked with addressing them remains unknown. The objective of this study was to assess the feasibility of using EHR data to understand the workforce attending to patient SDOH, the process they use to screen and assess needs, and what is being done to intervene on behalf of the patient. This project evaluates EHRs as a mechanism to identify the workforce addressing SDOH in healthcare and begins to establish a methodological approach that can help healthcare systems

deploy their workforce purposefully and efficiently as the SDOH become integrated into standard care processes.

This feasibility study used EHR data from a large health care system located in the southeastern United States to describe the mix of professionals identifying and addressing patient SDOH. The following research questions were considered:

1. How well does EHR documentation identify which health professionals act to address patient SDOH?
2. What actions regarding patient SDOH are documented in the EHR?

Methods

Two domains of SDOH, food insecurity, and housing insecurity, were studied. Researchers used the Electronic Medical Record Search Engine (EMERSE) (Hanauer, 2006), a program that systematically searches EHR notes using key words or terms to identify a patient pool (Hanauer, Mei, Law, Khanna, & Zheng, 2015). In order to know what to search for most effectively, researchers iteratively developed and tested *term bundles*, or groups of words or phrases that EMERSE searched for in the text of patient notes. Terms were reviewed by experts in the field and compared to existing term bundles used by other investigators seeking notes related to SDOH in EMERSE. Term bundles for food insecurity included terms such as *food stamps*, *food pantry*, and *meals on wheels*. Examples of terms related to homelessness included *housing assistance*, *emergency shelter*, and *living in their car*. For a full list of terms, see Appendix A. This work was reviewed and approved by the University of North Carolina at Chapel Hill's IRB (#18-2646).

Researchers reviewed notes identified using the term bundles by EMERSE to determine if those particular words pulled notes related to food and housing insecurity as expected, and then adjusted the terms accordingly. For example, researchers originally thought that "SNAP", or "Supplemental Nutrition Assistance Program" (a large federal nutrition assistance program, also known as food stamps) would identify accurate notes but the word "snap" is used far more in EHR documentation in other contexts and ultimately did not identify food insecurity. Limits were set to include only patients over age 17 and who had a note documented between September 1, 2017 and August 31, 2018. After the final pool of notes was identified, analysts at the Carolina Data Warehouse randomly extracted 480 notes (240 from each SDOH: food and housing insecurity) for researchers to analyze. Using a random number generator, researchers randomly sampled 60 patient's notes under each SDOH category, all of which contained one or more of the selected terms.

Note Analysis. The following variables were abstracted from each note: patient age, race/ethnicity, gender, note date, note author type, note author credentials, type of encounter, clinic name, words in the note regarding SDOH, whether an action was taken to help address a SDOH (intervention), and what those actions were. Finally, interventions were counted, categorized by type, and analyzed in relationship to note author.

Results

The mean age of patients was 52 years of age (SD=16), were slightly more likely to be female (53%, n=63), and most were either white (49%,

n=59) or black (40%, n=48) (see table 1). Out of 120 notes that contained a reference to food or housing insecurity, 72% (n=86) also contained information on an intervention or action that was taken to help address a patient's need related to the specific SDOH. When an intervention was taken to help address food insecurity, 62% (n=29) of providers were social workers, 15% (n=7) were dieticians, and the remaining 11 providers were a mix of registered nurses (RNs), community health workers, medical assistants, physicians, and others. When an intervention to help address housing insecurity was documented, 64% (n=25) of providers were social workers, 10% (n=7) were physicians, and the remaining 10 providers were a mix of chaplains, RNs, care manager assistants, and others (see table 2).

Distinguishing the authors of EHR notes was a complicated task as there were multiple ways to identify the author and they were often inconsistent. The variable "note author" was auto generated from the EHR data but often conflicted with the author credentials and/or the author job title recorded in the body of the note text. A frequent example of this was found in how the EHR "note author" variable identified the author as a physician, but the note writer identified themselves as having a Master of Social Work (MSW), and a job title of case manager. When authors' professions were not clear, researchers conducted post-hoc analyses to help validate the profession of each individual. This process included reading note text and conducting internet searches (using publicly available websites) on authors to discern their credentials or degree type. Discrepancies around note authorship primarily occurred in two ways. First, notes authored by professionals who cannot consistently bill for clinical encounters were often listed in the data as authored by a physician or other provider who creates and bills for clinical encounters. In these cases, further investigation was required to reveal the source of the confusion: that professionals who provided assistance with SDOH often had to record their documentation as sub-notes underneath a billable encounter note authored by another provider. Second, job titles and credentials were sometimes unclear. For example,

Table 1. Patient Demographics (n=120)

	Food Insecurity		Housing Insecurity		Total	
	Mean	sd	Mean	sd	Mean	sd
Age	54	19	49	14	52	16
	n	%	n	%	n	%
Gender (female)	33	55%	30	50%	63	53%
Hispanic	4	7	0	0	4	3%
Race	n	%	n	%	n	%
White	31	52%	28	47%	59	49%
Black	23	38%	25	42%	48	40%
Other	6	10%	7	12%	13	11%

case managers were the second most likely profession to help patients address a SDOH but, after reviewing the note text, it became clear that 68% (17 of 25) of case managers were social workers. At the outset, this information was not apparent in the data.

Interventions. Interventions related to food and housing security fell into seven overlapping categories and one distinct category for each SDOH. The seven common interventions for both food insecurity and housing were: (1) homeless/food insecurity coordination, (2) resources provision, (3) referrals, (4) sharing of contact number and message of personal support (5) education, (6) follow up appointment scheduling, and (7) referral to internal social worker or dietician. For patients experiencing food insecurity, the additional intervention included giving patients a bag of food. For those experiencing housing insecurity, the additional intervention was the provision of therapeutic support; however, this should not be interpreted

Table 2. Professionals that provided patients with SDOH interventions

Professional that Provided Intervention	Food Insecurity		Housing Insecurity	
	n	%	n	%
Social Worker	29	62%	25	64%
Dietician	7	15%		
Physician	2	4%	4	10%
RN	2	4%	2	5%
Chaplain			2	5%
Community Health Worker	2	4%		
Care Manager Assistant			2	5%
Case Manager	1	2%	1	3%
Physician Assistant	1	2%	1	3%
Counselor			1	3%
Medical Assistant	2	4%	1	3%
Care Coordinator	1	2%		

Table 3. Intervention Frequencies (more than one intervention may have been referenced in each note)

Intervention (86 of 120 notes)	Food Insecurity		Housing Insecurity	
	n	%	n	%
Homeless/Food Coordination	2	3%	19	29%
Resource Provision/Identification	21	30%	16	24%
Contact Info	18	26%	9	14%
Referrals	15	21%	8	12%
Therapeutic Support/Counseling*	-	-	8	12%
Referred to Social Worker/Dietician	1	1%	4	6%
Follow up appointment	2	3%	1	2%
Education	4	6%	1	2%
Food Given	7	10%	-	-
Total	70	100%	66	100%

as a billable therapy session. Interventions aimed at addressing food insecurity were most likely to be resource provision (30% of interventions), sharing contact numbers and message of personal support (26%), and referrals (21%). For housing insecurity, interventions were most likely to consist of homeless coordination (29%), resource provision (24%) and sharing contact numbers and message of personal support (14%). It is important to also note that more than one intervention may have been referenced in each note and Appendix B offers examples of specific notes found within the data. See Table 3 for full list of interventions and frequencies base on each social determinant.

Discussion

While many professions identify addressing SDOH as part of their scope of work, few studies have attempted to use EHRs to empirically evaluate who is regularly attending to these issues. This feasibility study is among the first of its kind to evaluate the EHR as a mechanism to describe

the mix of professionals identifying and addressing patient SDOHs. The 2019 NASEM report considered how health care systems could address the SDOH and better address health-related social risk factors identified by patients but recommended that SDOH could be improved by using an adept workforce with interventions and skills to disrupt the social risk factors that impact health. With this in mind, findings from our study map to key recommendations identified within the report.

Based on how notes were documented, EHR data on their own were insufficient to reveal the workforce addressing the SDOH. Further investigation was necessary to accurately identify the professionals addressing a need related to food and housing insecurity. Because more than 70% of the interventions that addressed patients' SDOH were carried out by professionals who could not consistently bill for clinical encounters (62% social workers and 8% dieticians), their authorship was frequently masked. Social workers and dieticians often documented their work within the clinical en counter of a provider who did bill, (such as a physician or nurse practitioner) or they created a note associated with an already-existing encounter. Allowing EHR clinical encounters to be created by providers regardless of billing permissions could increase the data abstraction process and general usability of EHR data in workforce and SDOH research. As health systems move to value-based models of care, they are going to require the technological infrastructure to more easily identify the functions of team members.

Results from this study indicate that a wide range of professionals help address patient needs related to SDOH but that social workers are carrying the majority of this workload. In the literature and confirmed by this study, social work is a critical workforce addressing SDOH in health care (NASEM, 2019) and they are increasingly being hired on integrated and interprofessional teams (Stanhope, Videka, Thorning, & McKay, 2015). Given their importance in addressing social needs in health care settings, understanding social worker roles and titles within health care organizations is essential. In this study, social workers' documentation was noted under several position titles including care coordinator, care manager, case manager and, of course, social worker. As a group, social workers tended to coordinate care with community resources to help patients get through a cri

sis situation and offer themselves as direct resource. Although social workers employed in health care are limited in their reach beyond hospital and clinic doors, their lasting value lies in the connections they establish for patients when referring and enrolling them in community programs that help build more enduring support (Fraser et al, 2018). Dieticians, who often provide medical nutrition therapy in health care settings were the second most likely profession to address patient SDOH. The role dieticians play in addressing SDOH is not well defined but examples of their contributions in these data included nutrition education (i.e. providing *myplate* materials, carb counting handouts), providing resources like food pantry locations, and helping patients sign up for grocery assistance programs. Future research is needed to understand dietician's role in addressing food insecurity in healthcare settings and how best to incorporate this expertise as members of integrated/interprofessional teams. Also, chaplains, not typically included in heath workforce research, had a small but clear role in engaging with patients struggling with housing insecurity. In this study, chaplains provided referrals and resources.

One of the key findings of the 2019 NASEM report was how to harness digital technologies and infrastructure to better address social needs into healthcare delivery. EMERSE served as an innovative digital tool and essential component of this research study. EMERSE, as an EHR search engine has the potential to help practitioners, researchers, and administrators more effectively capture/gather EHR data quickly and efficiently. However, there are limitations to consider when using this tool. One limitation is that false positives will likely emerge. When search results identify a social need, it is only identifying the presence of specific words, it does not necessarily mean that anything was done to intervene or that anything was needed. Another limitation is that food and housing insecurity are a result of a network of complex personal factors and systemic conditions. Realistically, health care providers rarely have the capacity or the resources to treat more than the related symptoms. In most instances, interventions were aimed at short term relief and did not mitigate the larger social inequities that are likely to perpetuate the problem. However, the 2019 NASEM report suggests that having awareness of the SDOH or social problem is the first step in the health sector better integrating social and health care needs into usual care.

There were a few instances in which addressing SDOH was achieved by referring the patient to a professional who could specifically address the patient's need(s). For example, physicians and nurses would indicate a referral to social work when a SDOH was identified in a visit. This finding suggests a team approach is being used to meet patients SDOH. It is difficult however, to identify the cumulative effect of team interventions in singular notes. As addressing SDOH is an ongoing process a series of notes needs to be analyzed to document the sequence and content of team interventions.

Additionally, it is important that even if not every member of the healthcare team provides an intervention to address a social risk, all providers should know to whom they should refer patients and how to make appropriate referrals to others on the healthcare team. While this can occur in practice settings, it can begin in educational training. For example, the 2019 NASEM report suggests fu-

ture curricula include: "evidence on the social determinants of health, protocols for working in interprofessional teams to address social needs in health care settings, [and]… competencies relating to collecting, securing, and using data and technology to facilitate social and health care integration" (p. 12). Schools that train health professionals should incorporate the expertise of the workforce identified in addressing the SDOH—primarily social work, but also include others such as dieticians and chaplains as identified in this study. It is important that providers know who to call and who can help not just with social risk screening, but for resources/referral/other interventions as identified within study findings.

Conclusion

This study identified that health care team members are screening and addressing patient SDOH. The analysis revealed that with dieticians, chaplains, and other health care professionals, social work is the primary workforce addressing patient needs related to SDOH. Preliminary evidence supports social care as an effective intervention to improve patient health and well-being. This study was a step in understanding how EHRs can be used to identify and extract information about the workforce intervening on behalf of patient social needs. Future work is needed to measure the effectiveness of SDOH interventions, identify the ideal mix of team members to meet patient needs, and evaluate payment in these models of care.

References

Bodenheimer, T., & Sinsky, C. (2014). From triple to quadruple aim: Care of the patient requires care of the provider. *The Annals of Family Medicine*, 12(6), 573-576.

Braveman, P. A., Cubbin, C., Egerter, S., Williams, D. R., & Pamuk, E. (2010). Socioeconomic disparities in health in the United States: What the patterns tell us. *American Journal of Public Health,* 100(S1), S186-S196. https://www.cdc.gov/nchs/data/nehrs/2017_NEHRS_Web_Table_EHR_State.pdf

Fraser, M. W., Lombardi, B. M., Wu, S., Zerden, L. D. S., Richman, E. L., & Fraher, E. P. (2018). Integrated primary care and social work: A systematic review. Journal of the Society for Social Work and Research, 9(2), 175-215.

Cantor, M., & Thorpe, L. (2018). Integrating data on social determinants of health into electronic health records. *Health Affairs*, 37(4); 585–590.

Gold, R., Cottrell, E., Bunce, A., Middendorm, M., Cowburn, S., Mahr, P., & Melgar, G. (2017). Developing electronic health record (EHR) strategies related to health center patients' social determinants of health. *Journal American Board of Family Medicine,* 30(4): 428–447. doi:10.3122/jabfm.2017.04.170046.

Hanauer, D. A. (2006). EMERSE: the electronic medical record search engine. In *AMIA annual symposium proceedings* (941). American Medical Informatics Association.

Institute of Medicine (2014). Capturing Social and Behavioral Domains and Measures in Electronic Health Records: Phase 2. Washington, DC: The National Academies Press.

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior,* 80-94.

National Academies of Sciences, Engineering, and Medicine. 2019. Integrating Social Care into the

Delivery of Health Care: Moving Upstream to Improve the Nation's Health. Washington, DC: The National Academies Press. https://doi.org/10.17226/25467.

National Association of Community Health Centers (2016). PRAPARE Implementation and Action Toolkit. Retrieve from: http://www.nachc.org/research-and-data/prapare/toolkit/

Marmot, M. (2005). Social determinants of health inequalities. *The Lancet*, 365(9464), 1099-1104.

Myrick, K. L., Ogburn, D. F., & Ward, B. W. (2019). Table. Percentage of office-based physicians using any electronic health record (EHR)/electronic medical record (EMR) system and physicians that have a certified EHR/EMR system, by U.S. state: National Electronic Health Records Survey, 2017. National Center for Health Statistics. January 2019.

Stanhope, V., Videka, L., Thorning, H., & McKay, M. (2015) Moving toward integrated health: An opportunity for social work. *Social Work and Health Care*, 54, 383–407. https://doi.org/10.1080/00981389.2015.1025122.

World Health Organization (2018). Key learning on Health in All Policies implementation from around the world. Geneva, Switzerland: World Health Organization.

Appendix A

Food Insecurity Terms	n
Food Stamps	32
Food Pantry	23
Food Insecurity	22
Meals on Wheels	14
Food Bank	10
Food (Availability, Resources, Emergency, Event, Card)	9
Food Assistance	4
WIC	4
Grocery Assistance	3
Nutrition	2
Meal	2
Not Eaten	1
Soup Kitchen	1

Housing Insecurity Terms	n
Homeless/Homelessness	38
Housing insecurity, security, assistance, resources, unstable, application, temporary, traditional	18
Emergency/Homeless Shelter	14
Housing	10
Shelter	10
Emergency Housing	9
Living in car/streets/hotel/tent/woods	8
Kicked out	2
Couch surfing/staying on couch	2
Living Situation	1
Rescue Mission	1

Appendix B

Example Note Text Related to Food Insecurity	
Food insecurity coordination	"Pt reports his food stamps have been cut from $73 to $44 without an explanation. SW contacted patient's DSS regarding this and left voice mail requesting call back."
Resource provision/identification	"Pt was provided with food resources and information regarding [NAME OF SERVICE]."
Referral	"Gave patient food pantry list, provided direct referral to Catholic Charities food bank, provided list of financial resources. "Pt understands to contact SW if future needs arise."
Sharing of contact info and message of personal support	"Care manager reintroduced self and role at [CLINIC NAME]. CM provided CM direct office number should additional needs arise."
Education	"Nutrition education, nutrition counseling. Provided with "Myplate materials."
Follow up appointment	"Discussed follow up in 3 weeks' time."
Referred to social worker/dietitian	"Discussed setting up appt. for our RN CM or LCSW to help with resources for food and cost."
Food Given	"Pt provided w/bag of food during the visit. Pt reports awareness of food pantry options in her area."

Example Note Text Related to Housing Insecurity	
Homeless/Food Coordination	"LCSW called Pt. discussed options for proof of income for patient assistance applications. Pt reported she and her partner are homeless and live in a tent camp in the woods. They are not connected with homelessness outreach or any agency which could vouch for their living situation. LCSW will meet with Pt (and possibly with Pt's partner) at 10am Weds 9/26 to provide HCV psychoeducation and to assist with patient assistance applications."
Resource Provision/Identification	"Contacted the patient, per provider request, to provide and discuss housing resources. Provided the following resources: Partners Ending Homelessness, Greensboro location; Greensboro Urban Ministry; Salvation Army. Patient requested that the information is sent in the mail."
Referral	"SW let her know that she had made this referral to get more immediate help for pt related to his green card, losing disability, and potential homelessness."
I am a resource for you	"I advised pt I would check on her next week to see if she had success calling these places."
Education	"Social Worker will advise him to contact his parole/probation officer if he has one and/or the local homeless shelters. Homeless shelters in area listed as: Open Door Ministries, Second Chance Mission of Hope, and Onslow Community Outreach."
Follow up appointment	"Pt seeing clinic LCSW weekly due to housing instability and other issues."
Referred to Social Worker/Dietitian	"MD made referral to MSW to contact patient via telephone regarding housing resources."
Therapeutic Support/Counseling	"Patient is homeless." "Social worker actively listened, validated client's feelings and provided resources regarding emergency housing as well as rapid rehousing in his area." "Patient is going to contact resources provided and f/u with SW if needed."

Funding for What EHRs Tell Us about How We Deploy Health Professionals to Address the Social Determinants of Health

This project was supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under Cooperative Agreement U81HP26495-04-00, Health Workforce Research Centers Program. The information, content and conclusions are those of the authors and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.