

Integrating Social Determinants of Health into the Electronic Health Records of a Large Health System: A Qualitative Perspective

by Ana M. Palacio, MD, MPH; Maritza Suarez, MD; Yanisa del Toro, MD; David Seo, MD, PhD; Desiree Garay, MD, MSPH; Denisse Pareja, MD, MSPH; and Leonardo Tamariz, MD, MPH

Abstract

Social determinants of health (SDH) influence clinical outcomes. Our study explores barriers and facilitators for the integration of SDH into the electronic health record (EHR) system of a large diverse healthcare system in South Florida. We conducted key informant interviews of stakeholders at our institution. We evaluated the strengths, weaknesses, opportunities, and threats of the transformation and used the Consolidated Framework for Implementation Research to analyze the process. We interviewed 37 stakeholders, including seven in key leadership positions, four information technology personnel, five physicians, two researchers, four staff, three management/administrators, 10 patients, one in a regulatory role, and one in a privacy role. All agreed that the process of collecting and including data on SDH in the EHR should not affect healthcare delivery and highlighted the importance of linking the SDH survey with clinical outcomes and of having resources and processes in place to address social risks. Collection of social risk factors and integration with the EHR within a large health systems are feasible if there is buy-in from the health system leadership.

Keywords: social determinants of health; electronic health record; qualitative methods; data integration

Background

Social factors significantly affect health behaviors, healthcare utilization, and outcomes throughout the life span of populations and may influence the persistence of health disparities.¹⁻³ *Healthy People 2020* defined these factors as social determinants of health (SDH) and established the goal of creating environments that promote good health for all.⁴ Policies such as meaningful use, pay for performance, and value-based purchasing⁵ responded to this mandate and encouraged health systems to collect SDH.

The Department of Health and Human Services warned that the performance of a health system is affected by the social characteristics of the population it serves⁶ and that safety-net hospitals may fare poorly under Medicare's value-based purchasing.^{7, 8} HHS also offered concrete recommendations to incentivize the collection of SDH and to reward health systems that improve outcomes among patients with social risk factors.^{9, 10}

In turn, systemwide interventions addressing SDH could help reduce health disparities.¹¹⁻¹³ The integration of SDH data with clinical and genomic data could advance the field of precision medicine and

help to individualize healthcare.¹⁴ However, health systems and providers are not equipped with the resources and infrastructure to collect data on these SDH or to systematically address them.^{15–17}

The University of Miami Health System (UHealth), a large academic center serving a very diverse community, prioritized addressing SDH in the system's long-term goal of improving quality of care and reducing health disparities. A mandatory initial step is the collection and integration of validated SDH measures into the electronic health record (EHR) throughout the entire health system.¹⁸ To facilitate the buy-in of stakeholders and the sustainability of this transformation, we decided to conduct a qualitative study to guide our implementation process. The aim of this qualitative study is to explore barriers and facilitators for integrating SDH into the EHR system of a large, diverse healthcare system in South Florida.

Methods

Study Design

We conducted a qualitative study to evaluate the integration of SDH into the EHR. We used key informant interviews of stakeholders as our qualitative method.

Setting

UHealth includes three hospitals and more than 30 outpatient facilities. The main hospital has 560 private beds, and the specialty hospitals together account for approximately 100 additional beds. The system has more than 1,200 physicians with multiple specialties. In 2016, approximately 270,000 patients were seen in outpatient visits, and more than 44,000 patients were admitted to the UHealth hospitals.

Proposed Innovation

The proposed innovation was intended collect SDH data and integrate SDH into the Epic EHR for the entire UHealth system. The purpose of this innovation was threefold:

1. Integrate SDH and quality-of-care metrics to identify patients with social risk factors and engage in evidence-based care.
2. Develop systemwide and clinic-specific strategies to address determinants of poor outcomes.
3. Merge SDH with a biobank, a data registry, or research participant data to expand the knowledge of the impact of SDH on a variety of experimental outcomes.

Evaluation Frameworks

We employed two evaluation frameworks, as follows.

SWOT Analysis

We conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis¹⁹ to identify key stakeholders, themes, and questions for the meetings and interviews (see Appendix A). We used SWOT data to develop a comprehensive list of stakeholders who could address the identified themes and an interview guide that would capture data to inform the content and process of the innovation.

Consolidated Framework for Implementation Research

We used the Consolidated Framework for Implementation Research (CFIR)²⁰ to evaluate barriers and facilitators for the innovations as perceived by key stakeholders across UHealth. CFIR is an implementation framework that pulls from existing models to provide a comprehensive menu of constructs and domains for the systematic identification of potential explanatory themes. The CFIR is composed of 39 constructs across five major domains: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and the process of implementation.²¹ It can be used

before, during, or after the implementation process. During the preimplementation phase, it is a valuable tool to identify potential barriers and facilitators of a planned intervention.²²

Interviews

We used semistructured or informal interviews to engage a variety of stakeholders. The interviews were conducted with informants in key roles for the implementation in UHealth. For the interviews, we used a semistructured interview guide that was developed by the authors. We used open-ended questions, eliciting descriptions of factors that might help or hinder the implementation, as well as each respondent's role and perspectives about the process of integration and use of the SDH data. We also prompted stakeholders to comment on strengths and weaknesses of the planned intervention and of the health system related to the effort to integrate SDH data. We asked them to propose ideal processes for collecting and using SDH data. Initial responses generated new questions that could be tested with subsequent respondents. We conducted additional follow-up individual and group interviews with a number of key stakeholders to fine-tune the processes and steps for implementation.

The interviews were carried out by three interviewers (A.M.P., M.S., D.G.) and lasted one hour, with the exception of patient interviews, which were carried out by only one interviewer (D.G.) and lasted approximately 15 minutes. Notes were taken during the interviews and transcribed into Microsoft Word.

Analysis

The qualitative analysis consisted of content analysis of the interview data guided by the grounded theory research approach.²³ The interviewers presented the collected data to the other authors for the generation of follow-up questions. The authors collaboratively identified common influential domains in the implementation process. We defined core factors as those reported to be the most helpful or detrimental in the process of implementation and peripheral factors as those considered relevant but not pivotal for diffusion of the innovation.

Results

We met with 37 stakeholders in total. Of those, seven were in key leadership positions, four were information technology (IT) personnel in charge of the development of the innovation, five were physicians, two were researchers, four were staff, three were management/administrators, 10 were patients, one was in a regulatory role, and one was in a privacy role. Two of the stakeholders were national leaders in the field of health disparities. The characteristics of the interviews are depicted in App 1. We spent most of the time with leadership stakeholders (in particular the administrative executive officer and clinical operations and IT personnel).

We met with all stakeholders at least once. On the basis of the results of the first round of meetings, we developed a core group of stakeholders that were organized into two groups: a leadership/administrative group and an IT group. We used the described methodology to identify and discuss the factors that would influence the implementation and use of the innovation and classified these factors as core or peripheral.

Strengths, Weaknesses, Opportunities, and Threats

The SWOT analysis revealed important themes, such as the objective and vision for the innovation as well as operational, legal, privacy, regulatory, clinical, and IT concerns that needed to be addressed before deployment. Table 2 summarizes the initial SWOT analysis. On the basis of the identified themes, we selected key stakeholders to interview: academic and administrative leaders (see Table 1), health system and clinic administrators, IT and clinic staff, patients, and SDH champions.

Consolidated Framework for Research Implementation (CFIR)

The themes and constructs were classified into the major domains of the CFIR framework (see Table 3).

Intervention Characteristics

A common core facilitator of the integration of SDH into the EHR was an electronic collection process that did not interfere with the regular operations of the health system. All stakeholders expressed concerns about generating delays in workflow. Interfering with the registration or check-in process was a key concern because of the mandate to decrease wait time. This feedback led us to plan the collection of SDH data via the MyChart patient portal and potentially via phone interviews or voice-activated technology. Interestingly, in follow-up meetings, as the impact of SDH on relevant outcomes became clearer, several stakeholders began to reconsider feasible strategies to collect the SDH data on site. Quality improvement teams and the administrative executive officer recommended several strategies to expedite the collection of SDH data for certain patient populations for whom the health system reports quality metrics. This recommendation led to the identification of another key intervention characteristic: the collection of SDH data must be part of a systemwide strategy to improve the quality and processes of care. In practical terms, the stakeholders described this strategy as the development of a population health team responsible for integrating SDH into clinical and quality metrics and for reporting the analysis to individual practices and to leadership.

Physicians raised specific concerns regarding accountability for the data. For example, the survey recommended by the Institute of Medicine (IOM) includes depressive symptoms, alcohol use, and domestic violence. The physicians' concern was that if we collected the survey remotely using mass collection strategies, we could fail to react to positive screenings in a timely manner. After considering a number of scenarios, the stakeholders concluded that it was not possible to standardize reaction mechanisms in all clinics. The requirement that the SDH collection process cannot open the health system to liability was recognized as a core value. This meant that factors that warrant a timely reaction by the health system can be collected only in the context of an encounter and not by a remote survey. Peripheral concerns were to make the survey user friendly, available in Spanish, and inclusive of factors relevant to our diverse immigrant population. Based on these concerns, we added health literacy, country of origin, and language of preference to the IOM-recommended questions. See Appendix B for the final tool.

Regulatory concerns related to the collection of data on SDH among research participants could be mitigated by obtaining the patients' consent beforehand. General access to SDH data was also a peripheral concern, as most stakeholders believed that providers do not have the time to address SDH and that an ancillary team, either at the clinic level or the health system level, should lead the efforts to address them.

We included IT personnel early in the planning phase of the implementation. This allowed us to define the ideal IT requirements for the SDH tool. We decided to build the SDH survey as a smart form that looks similar to a paper form. Each response is tied to a unique identifier in the system. This setup allows us to pull each response at the patient level and to generate reports of selected questions. Although this approach is end-user friendly, it is time consuming to build. A lesson learned was not to develop the smart form until the form has been tested in paper form and all stakeholders have signed off on the content for it, to prevent the need to redo the smart form.

External Environment

For leadership, administrators, and healthcare providers, a core reason facilitating the collection of SDH systematically was the country's overall transition to value-based purchasing models and the system's potential transition to an accountable care organization. All stakeholders welcomed the ability to use SDH data to improve the quality of care and the reportable Healthcare Effectiveness Data and Information Set (HEDIS) metrics. National political uncertainty and its potential health policy implications only accentuated the desire of the health system leadership to be prepared and to gather information that could be shared with policy makers. Stakeholders who were familiar with the impact of SDH on process and clinical outcomes were more likely to encourage our team to use several methods for SDH collection in order to reach most of the high-risk patients.

For the health system administrators, the ability to use SDH data to tailor services to prevent emergency room visits or rehospitalizations was a key motivator. Although the recent calls for addressing

SDH had made many providers aware of the term, this awareness was not a core factor that facilitated implementation. On the other hand, showing evidence on the impact of SDH on outcomes did lead to buy-in. For health system leadership, the potential transition of the system to an accountable care organization was a core factor in deciding to pilot the collection and use of SDH data in developing ancillary services.

Internal Environment

For all stakeholders, a key factor for collecting SDH data was the ability to merge these data with outcome data of relevance for different operational areas of the health system. In their view, this key step allowed each clinic or the health system as a whole to target specific outcomes or at-risk populations. Therefore, a core internal facilitator was having an IT infrastructure that allowed diverse outcome data to be collected, merged with SDH data, and analyzed in a privacy-compliant environment.

The expectations regarding the use and impact of SDH data differed across operational areas of UHealth. Although leadership commitment toward integrating SDH into the EHR was a core factor for implementation, frequent leadership involvement was only a peripheral factor, with the exception of those supervising personnel who were key to the implementation. Protecting the privacy of the data was an important facilitator among clinical leadership and champions of the reduction of health disparities.

Most stakeholders viewed the effort as operational and not research-oriented and agreed that resources should be focused on improving the quality of care. Researchers were concerned about preserving the opportunity to use the data to document mediators of health disparities and to rigorously test strategies to reduce healthcare gaps. To facilitate these analytical efforts, UHealth leadership recommended to have an Institutional Review Board protocol describing the data that would be collected for quality improvement purposes and the creation of a data environment where researchers could analyze de-identified data.

Process of Implementation

The health system leadership played a key role in facilitating the integration of SDH data into the EHR by dedicating a diverse team to the process of implementation. The team included physicians in clinical, administrative, and research roles and several IT clinical analysts.

A core factor was holding weekly meetings with the IT clinical analysts because these meetings allowed the team to identify data that could be captured from other sources in the EHR and to develop strategies to best integrate the SDH tool. These efforts avoided redundancy of data entry by the patient.

Regular meetings with the leadership in charge of implementation resources (IT, health system, and primary care administrative officers) were key to deploy a road map for implementation. Our health system leadership agreed that piloting the collection of SDH data among Medicare Advantage populations had the advantage of involving a population with low attrition rates and with longitudinal clinical data that could be merged with the SDH information. This population would help identify services that could be put in place to address SDH.

For clinic personnel, their accountability for the data collected and the clinic flow were two core concerns.

The challenge associated with having significant stakeholder involvement was receiving various opinions regarding what SDH data to collect and how and when to collect them.

Discussion

Our qualitative study of the integration of SDH into the EHR revealed important core factors that needed to be considered to facilitate the transformation. Our results led to following key implementation decisions:

1. The Epic-based patient portal would be used as the main SDH collection tool.

2. No data would be collected remotely on topics that need timely reactions, including depression, domestic abuse, or alcohol abuse.
3. A defined team would be responsible for summarizing, reporting, and reacting to the data.
4. Liability issues need to be evaluated before the innovation is deployed.
5. The workflow must be discussed with clinic staff to define how on-site data collection could be implemented.

Core factors that facilitated the collection and use of SDH data to improve process and clinical outcomes and the performance of a health system included clarity of expectations for the use of the data; complete buy-in from leadership, administrators, and clinical personnel; a financial model of care that favors prevention; identification of viable, nondisruptive alternatives for the SDH data collection process; and devoting multidisciplinary personnel to the innovation. Our team learned key lessons that could further facilitate the implementation: the need to bring together groups of stakeholders early on to clarify the expectations for the use of the data and the preferred processes and workflows. In addition, we found that circulating and testing the data collection instrument on paper at multiple clinics will reduce revisions to the smart form. A key issue for the health system is to identify resources that could be drawn upon to address identified social risk factors.

In accordance with the Health and Human Services report to Congress,²⁴ the UHealth leadership, when presented with preliminary data, understood the impact that SDH have on the performance of a large, diverse academic health center, and they engaged in implementing a process to address SDH.

Growing evidence suggests that the accuracy of predictive models improves when SDH are added to clinical or claim variables.²⁵ Hence, the systematic collection of SDH data would facilitate the paradigm shift toward population health and precision medicine approaches for improving the quality of care and reducing health disparities within a health system.^{26–28}

However, very limited data are available on how best to adjust for social risk factors and health status when evaluating quality-of-care metrics.²⁹ Future research is needed to determine the ideal analytical models for the systematic use of SDH data by health systems to develop predictive models and evaluate performance. Health systems need to find ideal processes to obtain the consent of their patient population for the use of their de-identified and/or identified data for these purposes.³⁰ The recently funded large precision medicine initiatives will be instrumental in the development of patient-centered modes of data collection and of predictive models for a variety of diseases or conditions.³¹

Another important topic for health systems to consider is accountability for the data. Once a health system decides to collect data on social risk factors, it must put in place ways to analyze and react to the data at a provider, clinic, and/or system level depending on the vision of how best to use the data. Because of liability concerns, our stakeholders preferred to have a dedicated team take on this responsibility, but that strategy requires the commitment of additional resources that not all health systems may have available. Others have also reported lack of time and infrastructure as barriers to the collection of SDH data.^{32,33} Health systems should define goals for the collection of SDH data and evaluate whether the available resources are sufficient to achieve them. Health systems must also consider privacy and regulatory issues to ensure that the data are used according to HIPAA regulations.³⁴

In summary, health systems must engage key stakeholders early on, and collaboratively clarify goals and resources before an implementation plan is developed. A multidisciplinary team with strong leadership support is needed to implement SDH data collection. A financial model that benefits from preventive strategies is key for the sustainability of the innovation.

The systematic collection of data on social risk factors within a large number of health systems is key to produce data that can improve our understanding of SDH as they relate to quality of care and best strategies to modify or mitigate contextual factors that drive health disparities.

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Ana M. Palacio, MD, MPH, is a Professor of Clinical Medicine in the Division of Population Health and Computational Medicine, Department of Medicine at the University of Miami Miller School of Medicine in Miami, FL.

Maritza Suarez, MD, is an Assistant Professor of Clinical Medicine in the Division of General Medicine, Department of Medicine at the University of Miami Miller School of Medicine in Miami, FL.

Yanisa del Toro, MD, is an Assistant Professor of Clinical Medicine in the Division of General Medicine, Department of Medicine at the University of Miami Miller School of Medicine in Miami, FL.

David Seo, MD, PhD, is an Associate professor of Clinical Medicine, Chief of the Division of Population Health and Computational Medicine and Chief Medical Information Officer at the University of Miami Miller School of Medicine in Miami, FL.

Desiree Garay, MD, MSPH, is an assistant scientist in the Division of Population Health and Computational Medicine at the University of Miami Miller School of Medicine in Miami, FL.

Denisse Pareja, MD, MSPH, is a research associate in the Geriatric Research Education and Clinical Center at the Miami Veterans Affairs Medical Center in Miami, FL.

Leonardo Tamariz, MD, MPH, is an assistant professor of medicine in the Division of Population Health and Computational Medicine at the University of Miami Miller School of Medicine in Miami, FL.

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Table 1

Characteristics of the Interviews

Stakeholders	Interview Duration and Number of Meetings Per Person	Source Site and Role in SDH Data Collection	Characteristics	Major Themes Identified in Interviews
Patients (<i>n</i> = 10)	15 minutes; one meeting	Primary care practice; recipient user of the collection tool	Elderly Medicare 60 percent male 60 percent Hispanic 30 percent African American 10 percent non-Hispanic white	Trust in the organization Ease of the tool Privacy
Staff (<i>n</i> = 4)	1 hour; two meetings	Primary care practice; assist in collection and use of SDH to improve care	Medical assistants, nurse, and personal navigator 3 females, 1 male Age <40 years	Timing of SDH collection Use of tablets during nurse intake. Navigator: have protocols and processes to refer patients to appropriate services, develop a team approach
Physician (<i>n</i> = 5)	1 hour; three or four meetings	Primary care practice or ENT practice; users of SDH data	3 males, 2 females 4 board-certified internists	Accountability for the data Separate team (including data evaluators and patient services) to address SDH data or to inform physicians when attention is needed
Leadership (<i>n</i> = 7)	1.5 hours; one to four meetings	Central; implementers or users of SDH data	Administrative executive officer Division chiefs of population health and General Internal Medicine Information technology officer Chief medical officer for the cancer center Chair of family medicine Chief operating officer of health system Dean of medical school	Need to merge SDH data with other outcome data to understand relationships with performance metrics How to use data to improve relevant process and clinical and utilization outcomes Need to use the SDH data to inform the makeup of innovative care teams, partnerships, and team-based approaches SDH collection does not interfere with operations Inform funders of resources needed to improve outcomes among patients with social risks
Institutional review board (<i>n</i> = 1)	45 minutes; two meetings	Central; regulatory issues	Chairperson	Need for general consent to use data and to contact again for research opportunities

Management (n = 3)	1 hour; two meetings	Central and primary care practice; implementation and maintenance operations	Primary care practice administrators Health benefits administrators Epic administrators	Do not affect workflow Inform of results that could facilitate implementation of SDH collection strategies
Information technology (n = 4)	1 hour; 10 meetings	Central; development of SDH data collection, implementation of collection processes, integration into the EHR and maintenance operations	IT personnel who developed platforms for SDH collection and integration	Linkage of data from different sources
Privacy office (n = 1)	1 hour; two meetings	Central; implementation	Privacy officer	Need to have Institutional Review Board approval Clear protocols to access data in compliance with regulations
Researchers (n = 2)	1 hour; two meetings	Central; use of data	Full-time faculty with grant funding in areas of health disparities, health services, and precision medicine	Determine most discriminatory SDH variables Merge SDH data to clinical and research databases including genomic Evaluate best statistical approaches to create multivariable models for performance and disparities
Champions of attention to health disparities (n = 2)	1 hour; two meetings	Central; use of data	Full-time faculty with grant funding in areas of health disparities	Use data to understand better mediators of disparities and reduce disparities in process of care Community partnerships to improve social contexts Create firewall for the data to avoid any concern regarding discrimination

Abbreviation: SDH, social determinants of health.

Table 2**Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis of the Project**

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> - Presence of SDH champions - Support of IT officer - Access to IT team developing the EHR - Buy-in from the dean of the medical school - Epic-based MyChart patient portal - Experience collecting SDH among minority populations for research projects - Deployment of registries (e.g., diabetes, heart failure) - An experienced team with electronic patient questionnaire 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> - Complex organizational structure - Mandates to make scheduling, registration, and intake procedures more effective - Limited space for SDH data collection in clinics - Low priority for health system administrators - Alternating clinic leadership decision in participating in the collection of SDH data - Low percentage of patients with active MyChart accounts - Limited experience managing at-risk groups
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> - Expansion of the value-based purchasing portfolio - Existing pay for performance gaps - Desire to prepare for an accountable care organization environment - National attention to the importance of SDH - Define better the relationships between SDH and health outcomes and health system performance 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> - Competing demands for the IT resources - Multiple requests for EHR-based surveys - Overloading the clinic staff - Potential changes in leadership and priorities - Lack of strategies and resources to address SDH - Privacy and legal concerns - Potential for discrimination by social risk

Abbreviations: EHR, electronic health record, IT, information technology; SDH, social determinants of health.

Table 3

Core and Peripheral Factors for the Implementation of Collection of Data on Social Determinants of Health in the Electronic Health Record

Domain	Core Factors	Peripheral Factors
Characteristic of innovation	<p>Use SDH data for population health approaches and improving quality of care</p> <ul style="list-style-type: none"> • Merge SDH data with quality metrics to inform quality improvement programs • Have a defined team summarizing, reporting, and reacting to the data • Improve patient-physician communication during encounters • Include SDH analyses in institutional needs assessments 	<p>Technological infrastructure to allow use of data by clinicians</p> <ul style="list-style-type: none"> • Have platforms that allow physicians to analyze their own panels • Not pivotal for success <p>Collection of data in ways that are relevant/sensitive to the population</p> <ul style="list-style-type: none"> • Have Spanish or Creole versions • Collect data on determinants that are relevant to migrants
	<p>Collect survey without interfering with regular operations</p> <ul style="list-style-type: none"> • Maximize technology-based collection strategies • Do not rely on registration personnel 	<p>Merging data to biobank repositories or other research datasets</p> <ul style="list-style-type: none"> • Although valuable for research community, not pivotal for the implementation of the innovation
External environment	<p>Increase awareness regarding impact of SDH on outcomes and costs</p> <ul style="list-style-type: none"> • Increasing value placed on improving and monitoring outcomes • Importance of patient-physician communication • Increasing healthcare costs • Evidence is a strong driver 	<p>Calls to action for including SDH on EHR</p> <ul style="list-style-type: none"> • Position statements by different organizations contribute to but are not a driver of implementation • Ability to inform policy makers of resources needed to care for patients with social risk factors
	<p>Reimbursement policies</p> <ul style="list-style-type: none"> • Incentives to improve quality of care and reduce costs facilitate diffusion 	<p>Meaningful Use of EHR</p> <ul style="list-style-type: none"> • Data collection capabilities of EHRs facilitate Meaningful Use, but this benefit is not pivotal
Internal environment	<p>Strong leadership commitment with aligned values</p> <ul style="list-style-type: none"> • Preventive culture: interest in use of population health approaches for prevention, clarity of expectations • Champions of SDH data collection with leadership roles, ensuring SDH data firewall • Interest in becoming an accountable care organization • Report of quality metrics 	<p>Highly technological setup</p> <ul style="list-style-type: none"> • The health system's investment in IT resources and personnel significantly facilitates but is not a driver of the innovation
	<p>Healthcare model</p> <ul style="list-style-type: none"> • Capitated model provides incentives to invest in non-health-related services to improve quality and reduce preventable admissions • Incentives for fee-for-service models need to be more clearly described and presented 	<p>Data-oriented institutional culture</p> <ul style="list-style-type: none"> • For a health system used to evaluating quantitative or qualitative data for quality improvement, the use of SDH data would be an easier transition <p>Legal/privacy culture and resources</p> <ul style="list-style-type: none"> • Institutions with a track record of health services research would be familiar with strategies to address privacy or legal concerns of data use for quality improvement • Having buy-in from privacy offices would help find solutions

Process of implementation	Dedication of personnel exclusively to the innovation	Practice-based IT resources <ul style="list-style-type: none"> • Having tablets or kiosks at the practice level may facilitate uptake Structured engagement process (buy-in) <ul style="list-style-type: none"> • Identification of common values and concerns (liability, time or personnel management) • Frequent sharing of implementation information • IT support
	Not collecting data that could require timely reaction, or creating processes to address concerning responses	
	<ul style="list-style-type: none"> • IT support to set up a process that seamlessly integrates the tool into the EHR 	

Abbreviations: EHR, electronic health record, IT, information technology; SDH, social determinants of health.

Appendix A

Interview Guide for Integration of Social Determinants of Health into the UHealth Electronic Health Record

We held meetings with stakeholders and engaged them using the questions below as a roadmap for the conversation. An assistant took detailed notes to document the content of the meetings.

What have you heard regarding the use of social determinants of health for clinical purposes?

Let us share with you some data that you may find interesting...

We shared information in graph form regarding the impact of SDH on outcomes relevant to our health system (diabetes control, Congestive Heart Failure readmission, costs) and a summary of the article “Patients in context—EHR capture of social and behavioral determinants of health” (Adler, N. E., and W. W. Stead, New England Journal of Medicine 372, no. 8 [2015]: 698–701). We also shared the Institute of Medicine (IOM) proposed tool.

After sharing the data, we asked:

Are you surprised by the data?

What role do you think SDH play on outcomes at our health system?

If we were planning to collect SDH across UHealth to improve quality metrics and outcomes, what would be your reaction?

What benefits do you see to integrating SDH data (from the IOM tool) into the electronic health record?

What risks do you see?

Do you think the benefits outweigh the risks?

What steps could we take that would make the benefits of the intervention outweigh the risks?

What key barriers do you see for the collection of SDH data?

Can you give concrete examples of your concerns for the xx barrier (*based on the prior answer, e.g., regulatory, legal, workflow, lack of resources to collect data or address SDH, etc.*)?

What key barriers or facilitators do you think are intrinsic to the intervention characteristics (examples are potential impact on outcomes, complexity, costs, how easy to test or adapt innovation, risk/benefit ratio, etc.)?

Do you have recommendations to minimize those intervention-based barriers?

What barriers or facilitators do you think are intrinsic to the state of our health system or the individuals that constitute it (e.g., organizational structure, culture, readiness for the innovation, resources, time, knowing how to use the data, etc.)?

How could we minimize health system barriers?

How do you think external factors affect the implementation of this innovation (e.g., Affordable Care Act incentives, Medicare mandates or penalization, competitors, expectations from patients, etc.)?

How do you think the processes we choose to implement the collection and use of SDH data could hinder or facilitate success?

What would be an ideal process to collect and to react to the data to improve our outcomes?

How can you or your office facilitate that process?

Depending on responses and the role of the interviewee in the health system, we would ask questions in reference to the threats we identified in our team's SWOT analysis. Examples are the following:

What are your perspectives regarding privacy issues

What are your perspectives on best strategies to collect SDH data?

Where would you pilot test this innovation first?

Who do you think should have access to the data and be responsible for reacting to the data (*if not mentioned before*)?

Should we focus only on selected populations or target the entire health system?

What resources do you think are lacking to facilitate the effective use of the SDH data? How could we secure those resources?

Appendix B

Social Determinants of Health Survey at UHealth

1.	How long have you lived in the USA?					
<input type="checkbox"/>	< 1 Year	<input type="checkbox"/>	1-5 Years			
<input type="checkbox"/>	5-10 Years	<input type="checkbox"/>	11-20 Years			
<input type="checkbox"/>	>20 Years					
<input type="checkbox"/>	Born in the U.S.					
<input type="checkbox"/>	Do not live in the U.S.					
2.	What is the highest level of school you have completed?					
<input type="checkbox"/>	Elementary/Primary (1-5)	<input type="checkbox"/>	Middle School (6-8)			
<input type="checkbox"/>	High School (9-12)	<input type="checkbox"/>	College (13-16)			
<input type="checkbox"/>	Graduate (17-22)	<input type="checkbox"/>	Post-Graduate (23+)			
3.	What is the highest degree you earned?					
<input type="checkbox"/>	High school diploma	<input type="checkbox"/>	GED			
<input type="checkbox"/>	Vocational certificate (post high school or GED)	<input type="checkbox"/>	Associate degree (junior college)			
<input type="checkbox"/>	Bachelor's degree	<input type="checkbox"/>	Master's degree			
<input type="checkbox"/>	Doctorate	<input type="checkbox"/>	None			
		Not at all confident	A little confident	Somewhat confident	Quite confident	Extremely confident
4.	If you need to go to the doctor, clinic or hospital, how confident are you in filling out the medical forms by yourself?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	How hard is it for you to pay for the very basics like food, housing, medical care, and heating? Would you say it is ...					
<input type="checkbox"/>	Very hard					
<input type="checkbox"/>	Somewhat hard					
<input type="checkbox"/>	Not hard at all					

6.	Stress means a situation in which a person feels tense, restless, nervous, or anxious, or is unable to sleep at night because his or her mind is troubled all the time. Do you feel this kind of stress these days?			
<input type="checkbox"/>	Not at all	<input type="checkbox"/>	A little bit	
<input type="checkbox"/>	Somewhat	<input type="checkbox"/>	Quite a bit	
<input type="checkbox"/>	Very much			

7.	Are you physically active?			
<input type="checkbox"/>	Yes			
<input type="checkbox"/>	No			

8.	On average, how many days per week do you engage in moderate to strenuous exercise (like walking fast, running, jogging, dancing, swimming, biking, or other activities that cause a light or heavy sweat)?				
<input type="checkbox"/>	None	<input type="checkbox"/>	1 time/week	<input type="checkbox"/>	2 times/week
<input type="checkbox"/>	3 times/week	<input type="checkbox"/>	4 times/week	<input type="checkbox"/>	5 times/week
<input type="checkbox"/>	6 times/week	<input type="checkbox"/>	7 times/week		

9.	On average, how many minutes do you engage in exercise at this level?						
<input type="checkbox"/>	0 minutes	<input type="checkbox"/>	10 minutes	<input type="checkbox"/>	20 minutes	<input type="checkbox"/>	30 minutes
<input type="checkbox"/>	40 minutes	<input type="checkbox"/>	50 minutes	<input type="checkbox"/>	60 minutes	<input type="checkbox"/>	90 minutes
<input type="checkbox"/>	120 minutes	<input type="checkbox"/>	150 minutes or more				

10.	What are your current living arrangements?			
<input type="checkbox"/>	Alone in house/apartment	<input type="checkbox"/>	Spouse or domestic partner	
<input type="checkbox"/>	With other family members	<input type="checkbox"/>	With friends	
<input type="checkbox"/>	Nursing home	<input type="checkbox"/>	Assisted living	
<input type="checkbox"/>	Homeless			

11.	In a typical week, how many times do you talk on the telephone with family, friends, or neighbors?				
<input type="checkbox"/>	Never/No telephone	<input type="checkbox"/>	Less than once a week	<input type="checkbox"/>	Once a week
<input type="checkbox"/>	2 times a week	<input type="checkbox"/>	3 or more times a week		

12.	How often do you get together with friends or relatives?				
<input type="checkbox"/>	Never	<input type="checkbox"/>	Less than once a week	<input type="checkbox"/>	Once a week

<input type="checkbox"/>	2 times a week	<input type="checkbox"/>	3 or more times a week
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13.	How often do you attend church or religious services?				
<input type="checkbox"/>	Never/Does not belong	<input type="checkbox"/>	Once a year	<input type="checkbox"/>	2 times a year
<input type="checkbox"/>	3 times a year	<input type="checkbox"/>	4 or more times a year	<input type="checkbox"/>	Refuse to answer

14.	How often do you attend meetings of the clubs or organizations you belong to?				
<input type="checkbox"/>	Never/Does not belong	<input type="checkbox"/>	Once a year	<input type="checkbox"/>	2 times a year
<input type="checkbox"/>	3 times a year	<input type="checkbox"/>	4 or more times a year		

15.	Have you delayed getting needed medical care for any of the following reasons in the past 12 months? Select the most frequent reason (you can select more than one reason).
<input type="checkbox"/>	You couldn't get through the telephone
<input type="checkbox"/>	You couldn't get an appointment soon enough
<input type="checkbox"/>	Once you get there, you had to wait too long to see the doctor
<input type="checkbox"/>	The clinic wasn't open when you could get there
<input type="checkbox"/>	You didn't have transportation
<input type="checkbox"/>	No, I did not delay getting medical care/did not need medical care