

INTEGRATING SOCIAL DETERMINANTS OF HEALTH INTO THE ELECTRONIC HEALTH RECORDS OF A LARGE HEALTH SYSTEM: A QUALITATIVE PERSPECTIVE

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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 [Table 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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