Original Paper

Electronic Health Record–Embedded Workflow to Operationalize Whole-Person Screening in Safety-Net Primary Care: Observational Implementation Evaluation Study

Dhruv Khurana[1,2,3], MA, MCom, PhD; Shunling Tsang[4], MPH, MD; Geoffrey Leung[4,5], EdM, MD; Bijan Sasaninia[4], BS; Edward Bacho[4], MD; Mahbuba Khan[4], MD; Anthony Firek[2,6,7], MS, MD

[1]Department of Health Policy & Management, Fielding School of Public Health, University of California, Los Angeles, Los Angeles, CA, United States

[2]Comparative Effectiveness and Clinical Outcomes Research Center, Riverside University Health System - Medical Center, Moreno Valley, CA, United States

[3]Department of Population Health Sciences, Weill Cornell Medicine, New York, NY, United States

[4]Riverside University Health System - Medical Center, Moreno Valley, CA, United States

[5]Department of Family Medicine, School of Medicine, University of California, Riverside, Riverside, CA, United States

[6]School of Medicine, University of California, Riverside, Riverside, CA, United States

[7]Loma Linda University Medical Center, Loma Linda, CA, United States

Corresponding Author:
Dhruv Khurana, MA, MCom, PhD
Department of Population Health Sciences
Weill Cornell Medicine
575 Lexington Ave
New York, NY, 10022
United States
Phone: 1 646 493 7373
Email: dhruvkhurana@g.ucla.edu

Abstract

Background: Health systems increasingly screen patients for social and whole-person needs. Yet, electronic health record data often remain passive when no workflow translates identified needs into structured action during routine care. In safety-net and federally qualified health center (FQHC) settings, this gap is especially consequential because clinicians must address multidomain needs within time-constrained encounters while meeting documentation, coding, and referral requirements.

Objective: This study evaluated the implementation and recorded use of an Epic-based digital workflow that links a Whole PERSON Health Score (WPHS) assessment to a Best Practice Advisory (BPA) and SmartSet, along with a separate Power BI accountability dashboard, in a safety-net FQHC network.

Methods: We conducted an observational implementation evaluation of the WPHS BPA-SmartSet workflow at Riverside University Health System using the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework. We analyzed encounter-level WPHS assessments and BPA presentation records from January 2023 through July 2026. We examined screening reach, temporal correspondence between BPA presentations and preceding qualifying WPHS assessments, recorded downstream workflow activity, variation across clinics, and trends over time using descriptive statistics. As a sensitivity analysis, we estimated logistic regression models with clinic fixed effects and 2-way patient- and provider-clustered robust SEs to evaluate temporal patterns in SmartSet opening and downstream workflow activity.

Results: During the study period, 177,821 WPHS assessments were completed among 115,022 unique patients; 173,763/177,821 (97.7%) identified at least one qualifying yellow or red domain. Among 107,010 BPA presentations involving 101,297 unique patients, 104,049 (97.2%) were linked to a uniquely identifiable most-recent qualifying WPHS assessment; among these, 99.1% (103,122/104,049) occurred within 7 days. The SmartSet was opened in 82.9% (88,736/107,010) of BPA presentations, and broad structured downstream workflow activity was documented in 82.4% (88,160/107,010); Z-code documentation in 42.6% (45,632/107,010), and referrals in 23.4% (25,061/107,010). SmartSet opening increased from 41.3% (262/634) in January 2023 to 94.3% (4262/4520) in July 2026.

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Conclusions: In this safety-net FQHC setting, whole-person need was common and often multidomain, and an Epic BPA-SmartSet workflow was associated with high rates of SmartSet opening and documented downstream workflow activity across observed BPA presentations. BPA presentations were highly concordant with preceding qualifying WPHS assessments, and workflow activity increased substantially over the implementation period. For digital health leaders seeking to operationalize whole-person care, the findings support electronic health record–based decision support that surfaces identified need, bundles documentation and referral tasks, and pairs point-of-care workflow with visible implementation monitoring, rather than relying on screening alone.

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KEYWORDS

electronic health records; clinical decision support; SmartSet; digital health; health IT

Introduction

Background

Health systems increasingly collect information on patients' social and whole-person needs, yet many still lack reliable mechanisms to translate those findings into action during routine care [1]. Screening may identify needs, but identification alone does not ensure that clinicians can efficiently review results, document them in structured form, select diagnosis codes, place referrals, or complete related tasks within the time constraints of ambulatory care. Clinical decision support (CDS) is more likely to change practice when it is automatically integrated into clinician workflow and delivered at the time and location of decision-making [1,2]. As a result, screening initiatives can generate large amounts of clinically relevant information while leaving frontline teams without a practical workflow for response [1,3]. At the same time, most electronic health record (EHR)–based social and whole-person needs initiatives still rely on passive data display rather than digitally enabled decision support that routes screening results into structured, auditable action during the visit.

This problem is especially important in safety-net systems and federally qualified health center (FQHC) settings, where multidomain needs are common, visit time is limited, and staffing and documentation burdens are substantial [4,5]. In these environments, the key implementation question is not only whether screening occurs but also whether screening results are surfaced in a form that supports action at the point of care and whether workflow performance is visible enough to be monitored, governed, and improved over time [3,5]. For operational leaders, screening without response capacity creates a familiar failure mode: data are captured but remain clinically passive rather than actionable [1,3].

CDS tools embedded in EHRs can improve care quality when they are actionable, patient-specific, and delivered at the point of decision-making [2,6]. However, CDS success depends heavily on design: poorly timed or overused alerts contribute to fatigue and reduced responsiveness, even to clinically important prompts [6]. Therefore, thoughtful CDS design is a behavioral and operational issue [2,6]. EHR design can also shape clinician behavior through choice architecture. Default options, salience, and reduced effort to complete preferred actions can influence clinical decisions while preserving clinicians' ability to choose otherwise; EHR-based nudges increasingly incorporate these approaches [7-9].

That distinction matters, especially in whole-person and social needs screening [1]. Although health systems increasingly use surveys and assessments to identify nonmedical needs, current care pathways rarely link those needs directly to accessible, guideline-informed recommendations and referral resources [1,10]. Providers often lack clear guidance on what to recommend once a need is identified, a well-documented gap that creates an "unmet need" at the point of care. The critical implementation challenge is to build a structured pathway from an identified need to a guideline-driven recommendation, then to a tracked referral and follow-through [10]. As Glied and D'Aunno [10] have argued, health systems face substantial structural risks when attempting to bridge health care and social services without appropriate implementation infrastructure and workflow. This challenge is especially salient in FQHCs, where the mission of care extends beyond traditional disease management and the burden of social and structural disadvantage is high [4,11]. Nationwide, health centers served more than 32.4 million patients in 2024, with 9 in 10 patients living in low-income households and more than 6 in 10 identifying as patients of color [12,13]. In the first national examination of barriers to standardized social risk screening in FQHCs, the most commonly cited obstacles included a lack of staff training, an inability to incorporate screening into existing workflows, and insufficient resources to address identified needs [14]. These findings underscore that deploying a valid screening tool within the EHR is not enough if the resulting information cannot be translated into a usable pathway for action.

At the federal level, *ICD-10-CM* (*International Statistical Classification of Diseases, Tenth Revision, Clinical Modification*) guidance permits assigning social determinants of health (SDOH) codes in categories Z55-Z65 based on qualifying documentation from care team members, including social workers, community health workers, case managers, and nurses, reinforcing the value of structured EHR documentation of social needs. California's policy environment has similarly emphasized infrastructure to respond to health-related social needs. Under California Advancing and Innovating Medi-Cal, Enhanced Care Management is a statewide Medi-Cal benefit for eligible members with complex needs, while Community Supports provide services that address health-related needs. Together, these initiatives increase the operational relevance of workflows that can identify multidomain needs, document them in structured form, and connect patients to appropriate care-management and community-resource pathways [15].

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At the national quality-measurement level, the NCQA (National Committee for Quality Assurance) introduced the Healthcare Effectiveness Data and Information Set Social Need Screening and Intervention (SNS-E) measure in measurement year 2023 to address unmet food, housing, and transportation needs. NCQA has emphasized that reporting social-needs quality measures depends on how screening and intervention data are collected, coded, stored, and exchanged, and that existing infrastructure may capture screening more effectively than linking positive screens to documented interventions [16]. This measurement environment further increases the operational relevance of EHR workflows that connect identified needs with structured, reportable follow-up activity.

A small but growing body of work has examined the use of CDS tools to support social needs screening and follow-up workflows. In 2022, Rogers et al [17] described an Epic-based workflow at Hackensack University Medical Center that used Best Practice Advisories to prompt staff to screen for health-related social needs and to support referral workflows. Over 3 years, 111,486 Medicare and Medicaid beneficiaries were screened, 7878 social needs were identified, and 6103 beneficiaries were referred [17]. Although that model is not directly comparable to the present study, it helps clarify an important implementation distinction: the Hackensack workflow primarily supported screening, whereas the Riverside University Health System (RUHS) workflow was designed for the next step in the pathway, namely, prompting a structured, clinician-directed response after risk had already been identified [17]. In that sense, the contribution of the RUHS model is not simply embedding a Best Practice Advisory (BPA) in the EHR but linking identified whole-person needs to structured documentation, diagnosis coding, referral ordering, and visible accountability during routine care [17].

This distinction is also consistent with broader evidence that operationally integrated EHR-based SDOH workflows remain uncommon in the published literature [18]. A 2025 scoping review of hospital and health system initiatives addressing SDOH found that fewer than one-quarter of initiatives used EHRs to collect and organize SDOH data and that EHR-based automated triggers, referral-tracking tools, and integrated community resource functionality were uncommon. These findings suggest that the literature still contains more examples of screening activity than of fully governed screening-to-action workflows [18].

At RUHS, the Whole Person Health Score (WPHS) had been in active use since 2020 as a patient-completed assessment of holistic health across 6 PERSON (Physical Health, Emotional Health, Resource Utilization, Socioeconomics, Ownership, and Nutrition and Lifestyle) domains [19]. The next challenge was not whether multidomain need could be measured, but how to translate those results into a workflow that made documentation, diagnosis coding, referral activity, and other structured follow-up feasible during routine care. To address this challenge, RUHS implemented an Epic-based workflow that linked at-risk WPHS findings to a BPA and a SmartSet, paired with a separate Power BI accountability dashboard. The goal was not simply to notify clinicians that a need had been identified but to create a practical pathway to review, document, code, act on, and monitor screening results at scale.

This paper adds to the literature by describing not only a screening initiative but also a governed workflow for converting whole-person screening results into structured action across a safety-net system. The distinctive contribution of the RUHS model is that it combines 3 functions often treated separately: identifying multidomain need, point-of-care decision support for documentation and referral action, and a dashboard-based accountability structure that lets leaders monitor workflow use across clinics and over time. In that sense, the intervention is not simply a BPA embedded in the EHR. It is an operational model for moving from passive identification of need to an auditable, actively managed response process. From a digital health perspective, the intervention functioned as an EHR-embedded CDS pathway that surfaced whole-person risk at the point of care, bundled documentation and referral tasks into a single SmartSet, and was paired with a system-level dashboard for implementation monitoring.

To our knowledge, no published study has described a BPA-SmartSet-SmartPhrase build designed to operationalize a holistic, multidomain whole-person assessment such as the WPHS in an FQHC. This paper describes the design, implementation, and system-level performance of the RUHS workflow using the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework [20,21]. For health systems that have adopted screening tools but still struggle with what happens after screening, the practical question is no longer whether need can be measured, but how to translate identified need into timely, visible, and sustainable action during routine care.

Operational Model

The intervention was designed as an operational response pathway rather than a stand-alone screening program. Its purpose was to shorten the time between identifying whole-person need and completing a clinically and operationally meaningful response during the visit. The model included 3 linked elements: a patient-completed WPHS assessment, an Epic-based point-of-care workflow anchored by a BPA (recently renamed Our Practice Advisory in Epic) and SmartSet, and a Power BI dashboard that enabled leaders and implementation teams to monitor workflow performance over time. Table 1 and Figure 1 summarize the major workflow components and their operational functions. The BPA-SmartSet workflow was configured as a point-of-care CDS tool within Epic, with alert logic tied to at-risk WPHS results and visit context, and with workflow events captured in EHR logs for implementation monitoring.

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Table 1. Operational components of the RUHS[a] whole-person care workflow and their intended functions.

Component	Function	Operational purpose
WPHS[b] assessment	Patient-completed whole-person assessment	Identifies multidomain whole-person needs
BPA[c]	Surfaces at-risk findings in workflow	Brings results to the point of care
SmartSet	Organizes follow-up tasks	Supports documentation, coding, and referrals in one place
Z-code capture	Structured *ICD-10*[d] documentation of social needs	Standardizes diagnosis coding for identified needs
CPT[e]-related documentation support	Supports CPT-related documentation and charge capture workflows	Facilitates structured documentation for billing and reporting
Connect IE or QR code	Links patients and clinicians to community resources	Supports external resource connection
Power BI dashboard	Tracks workflow performance by date, clinic, and provider	Supports accountability and implementation monitoring

[a]RUHS: Riverside University Health System.

[b]WPHS: Whole PERSON Health Score.

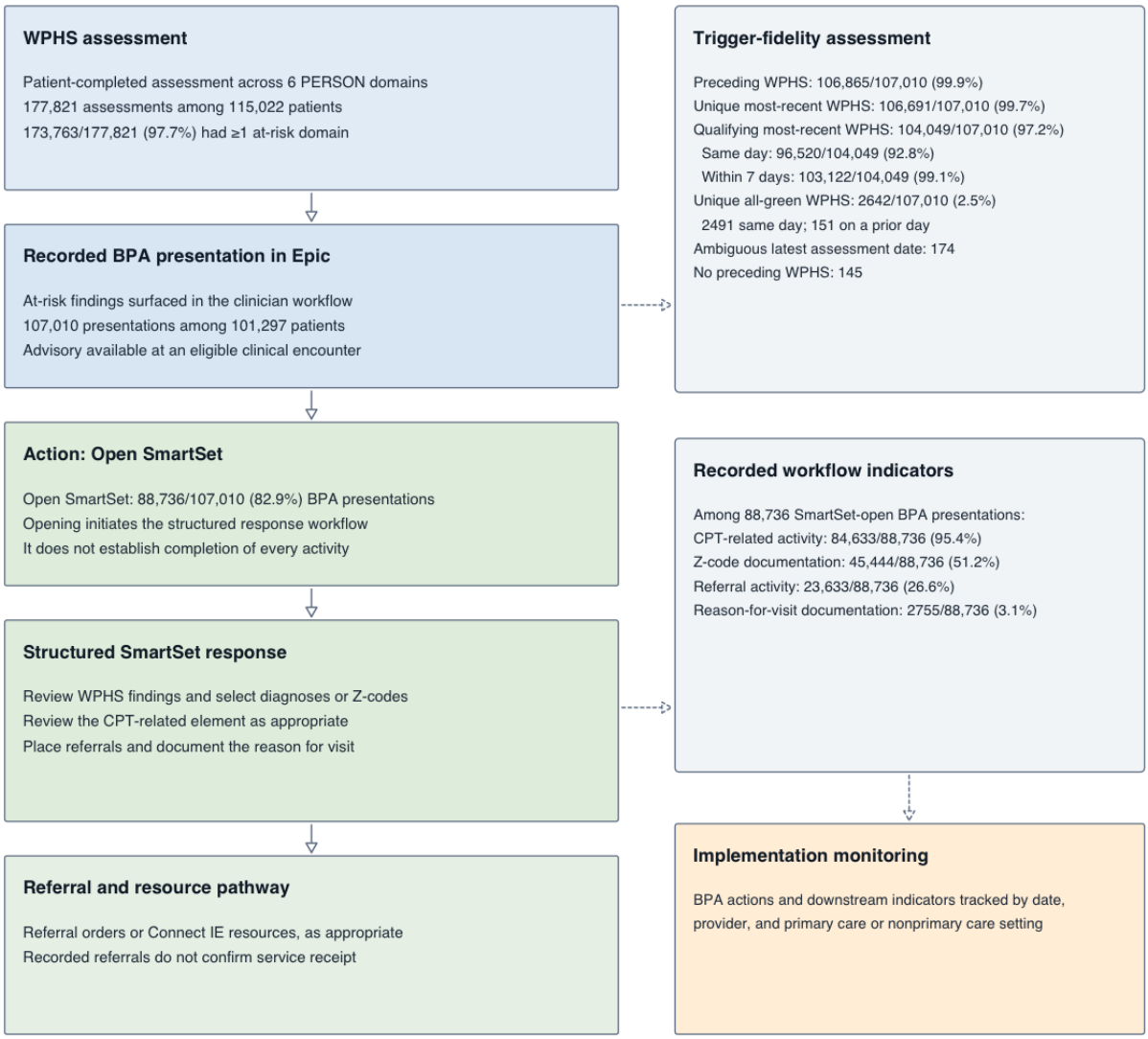
[c]BPA: Best Practice Advisory.

[d]ICD-10: International Statistical Classification of Diseases, Tenth Revision.

[e]CPT: Current Procedural Terminology.

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Figure 1. Operational WPHS screening-to-action workflow and trigger-fidelity assessment of BPA presentations. BPA: Best Practice Advisory; CPT: Current Procedural Terminology; PERSON: Physical Health, Emotional Health, Resource Utilization, Socioeconomics, Ownership, and Nutrition and Lifestyle; WPHS: Whole PERSON Health Score.



The exhibit summarizes the progression from a patient-completed WPHS assessment to a BPA presentation in an activated clinical setting, clinician selection of the Open SmartSet action, structured documentation and referral workflows, and implementation monitoring. For the trigger-fidelity assessment, we linked each BPA presentation retrospectively to the most recent preceding WPHS assessment for the same patient, regardless of whether that assessment was at risk or all green. We classified a uniquely identifiable most-recent WPHS as qualifying when at least one PERSON domain was yellow or red. Because WPHS assessments were available at the calendar-date level, whereas BPA presentations included timestamps, we could not always determine within-day ordering when multiple WPHS assessments occurred on the same date. Opening the SmartSet represents initiation of the structured response workflow but does not indicate completion of every SmartSet activity. Current Procedural Terminology (CPT), Z-code, referral, and note fields represent recorded workflow or documentation indicators rather than patient outcomes; percentages shown for these indicators in the figure are conditional on BPA presentations in which the SmartSet was opened.

RUHS is an integrated safety-net delivery system in Riverside County, California. This paper focuses on the implementation of the WPHS BPA workflow across the RUHS ambulatory network, with initial implementation in FQHC primary care settings and subsequent use in selected specialty clinics. The WPHS is a 28-question, patient-completed assessment designed as a whole-person “vital sign,” with results displayed as 6-letter grades across the PERSON domains—Physical Health, Emotional Health, Resource Utilization, Socioeconomics, Ownership, and Nutrition and Lifestyle—using a traffic-light logic to support rapid interpretation by clinicians and patients [19]. The overall goal of the intervention was to move from passive screening to a structured workflow in which identified

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needs could be reviewed, documented, coded, and acted upon during routine visits.

The BPA was launched in January 2023, following provider training during a regularly scheduled primary care education session, with subsequent activation across additional clinic types as implementation expanded. Medical assistant and community health worker training focused on supporting completion of the WPHS assessment and downstream referral follow-up rather than routine use of the BPA itself. After launch, the system reinforced implementation through system-wide email communications, refresher discussions, tip sheets, direct provider feedback, manager reminders, and dashboard performance reviews during performance-improvement rounding and manager meetings. Operationally, WPHS domain results were categorized as green (A-F), yellow (G-O), or red (P-Z), and a WPHS assessment qualified for the BPA when at least one PERSON domain was yellow or red. When the patient chart opened in Epic, the BPA appeared as a minimized, highlighted alert in the plan section of the clinical workspace and could be expanded by selecting it. All encounter types were eligible once the BPA was activated in a clinical setting; no explicit visit-type suppression rules existed, although activation was introduced at different times across clinic and service types. Once activated, the BPA remained active until an action was recorded, including cancellation; no separate elapsed-time expiration threshold was applied to an unaddressed qualifying WPHS. If another qualifying WPHS was completed before action on the prior assessment, the newer assessment superseded the earlier assessment underlying the active BPA. After an action was recorded, a subsequent qualifying WPHS was required to reactivate the advisory.

The standard BPA workflow was clinician-directed. The advisory was presented to clinicians, including physicians, physician assistants, nurse practitioners, and residents, who were responsible for reviewing the BPA, opening the SmartSet, signing orders, completing clinical documentation, and other actions requiring clinician authorization. Front desk staff administered assessments using EHR-linked tablets, and medical assistants helped patients complete them. Medical assistants and community health workers could technically access the BPA and pend referral orders for clinician review and signature, but this functionality was not part of their standard training or routine workflow. Community health workers and other care teams primarily supported downstream referral follow-up.

Implementation also occurred within a local managed-care quality-incentive environment. Inland Empire Health Plan's Global Quality Pay-for-Performance program included measures related to screening and identification of SDOH during the study period, providing additional organizational context for structured social-needs documentation and screening. The workflow was developed in the context of emerging national social-needs quality measurement. Its design was partially informed by NCQA's Healthcare Effectiveness Data and Information Set SNS-E measure, which links standardized social-needs screening with documentation of the corresponding intervention after an identified need. These national measurement priorities also motivated the development of a structured, auditable screening-to-action pathway; the present study did not evaluate performance of the formal SNS-E measure.

When qualifying WPHS findings were present, the BPA surfaced them directly in the clinical workflow rather than requiring separate chart review or retrospective follow-up. From the advisory, clinicians could open a SmartSet that consolidated key follow-up tasks for whole-person care, including confirming the findings were reviewed, documenting in a structured format, coding diagnoses with relevant Z-codes, and ordering referrals. CPT-related activity was configured as a default-on workflow element when the WPHS was completed and the BPA was acknowledged; clinicians could deselect the element when it was not appropriate.

From a clinician's perspective, this SmartSet was valuable not only for supporting documentation, coding, and referral orders, but also for bringing these tasks together in one place to reduce workflow fragmentation during time-constrained visits [2,6]. This design was especially important because patients frequently had risks across multiple domains at once. In that context, a fragmented workflow would require clinicians to move across multiple parts of the record and could easily increase friction at the point of care [2]. The design goal was to create a more usable pathway from screening result to action during the visit [2,17].

The intervention also supported connections to community resources through Connect IE, including a patient-facing QR code embedded in the after-visit summary. Operationally, the workflow was designed not only to document need but also to facilitate follow-up steps that could connect patients with relevant services beyond the immediate encounter. Because whole-person screening often identifies multidomain need rather than a single isolated issue, the ability to organize several response tasks within a single workflow was central to the model's practical value.

The dashboard served a distinct but equally important implementation function. It enabled review of workflow performance by date, clinic, and provider, including screening activity, recorded BPA completion, SmartSet use, diagnosis coding, and referral activity. Operational leaders and quality-improvement teams reviewed these measures, including during performance-improvement rounding and manager meetings, to identify variation across sites and providers and determine where additional implementation support might be needed.

In that sense, the intervention was not merely an EHR build left to operate passively. It was a deliberately governed implementation model in which point-of-care decision support was paired with ongoing performance visibility [21,22]. The accountability structure enabled operational leaders and quality-improvement teams to track adoption over time, identify variation across sites, and determine where additional support might be needed [21,22]. That combination of workflow design and performance monitoring is important for understanding the intervention as a whole, because the model was intended not only to prompt action during individual visits but also to create a system-level process that could be observed, managed, and improved over time.

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Another design consideration is that the workflow was built to be expandable and adjustable as health systems and health plans expand coverage for social determinants. For example, by adding community health worker services or expanding referral networks, the team can incorporate new resources into the existing advisory framework without redesigning the underlying workflow [23]. The structure also supports team-based care by linking clinician-directed documentation and referral actions to downstream follow-up by community health workers and care team members [5,23]. This modularity supports long-term sustainability because the workflow can evolve with system capacity rather than requiring a new build each time a service is added [22].

Methods

Study Design

We conducted an observational operational evaluation of the RUHS whole-person screening-to-action workflow using the RE-AIM framework [20,24]. The analysis did not aim to estimate the causal effect of the intervention on patient-level clinical or social outcomes but to characterize how the workflow functioned in routine care at scale. Specifically, we examined whether whole-person screening reached a large patient population; how BPA presentations aligned temporally with preceding qualifying WPHS assessments; what structured workflow activity was documented with BPA presentations; how performance varied across clinical settings; and whether workflow use was sustained over time.

The analysis used 2 related but distinct EHR-derived data streams. The WPHS analytic file contained encounter-level assessments completed between January 1, 2023, and July 31, 2026. For temporal linkage analyses, we also retained available WPHS assessments preceding January 1, 2023, to identify the most recent assessment before each BPA presentation. We excluded WPHS records lacking a valid assessment date or patient identifier. We obtained BPA data from Epic operational reporting covering the same analytic period. After restricting to records with a valid alert date and patient identifier, the BPA analytic dataset contained 107,010 BPA presentations among 101,297 patients. The patient identifier and exact BPA timestamp uniquely identified all 107,010 presentations; we identified no duplicate patient-timestamp records.

For each BPA presentation, we identified the most recent WPHS assessment for the same patient on or before the BPA date, regardless of whether that assessment was at risk or all green. We defined a WPHS as qualifying if at least one PERSON domain was yellow or red. When a single WPHS assessment occurred on the most recent assessment date, we classified the presentation as qualifying or all green. When more than one WPHS assessment occurred for the same patient on the most-recent assessment date, we retained the match but classified it as temporally ambiguous because assessment timestamps were unavailable. We characterized the proportion of BPA presentations with a preceding WPHS and, among presentations with a uniquely identifiable most-recent qualifying WPHS, the proportion occurring on the same calendar day and within 7, 30, and 90 days.

WPHS assessments and BPA presentations were related but distinct analytic units. WPHS-based measures described screening activity and identified need, whereas BPA-based measures described advisory presentations and recorded workflow activity after the advisory appeared. Patients could contribute more than one WPHS assessment and more than one BPA presentation over time.

RE-AIM was selected because the central question concerned implementation performance rather than efficacy. In this setting, the framework provided a practical way to distinguish among reach, temporal correspondence between qualifying WPHS assessments and BPA presentations, structured workflow activity associated with BPA records, uptake across clinics, and maintenance over time. That structure was especially useful for an intervention that combined point-of-care decision support with a dashboard-based accountability strategy rather than a single, isolated technical tool.

For reach, we assessed the total number of WPHS assessments, the number of unique patients assessed, the proportion of assessments with at least one at-risk domain, and the distribution of need across the 6 PERSON domains. For implementation, we examined the temporal linkage between BPA presentations and preceding qualifying WPHS assessments and characterized the interval between the qualifying assessment and the BPA record. For effectiveness, we evaluated recorded workflow activity associated with BPA presentations. We defined broad structured downstream workflow activity as the presence of at least one Z-code documentation, referral, CPT-related activity, or reason-for-visit documentation field in the operational data. Z-code activity reflected structured diagnosis documentation captured by the workflow and was not automatically added to the longitudinal problem list. Recorded referral activity indicated a referral order or documented referral event, not confirmed receipt of the referred service. CPT-related activity was configured as a default-on workflow element when the WPHS was completed, and the BPA was acknowledged; clinicians could deselect the element when it was not appropriate. Because this component could dominate the broader measure, we also examined a more restrictive downstream, non-CPT measure defined as the presence of Z-code documentation, referral activity, or reason-for-visit documentation. For adoption, we examined variation in observed workflow activity across clinics, with particular attention to higher-volume ambulatory sites. For maintenance, we assessed monthly trends in WPHS volume, at-risk assessments, SmartSet opening, and documented downstream workflow activity over time.

Statistical Analysis

Primary analyses were descriptive. We summarized categorical measures with counts and percentages and temporal linkage intervals. As an additional sensitivity analysis to address nonindependence of repeated BPA presentations within patients and clinicians, we estimated logistic regression models with clinic fixed effects. Implementation time was defined as the number of months since the first observed BPA presentation at each clinic and categorized as 0-2, 3-5, 6-11, 12-23, or ≥24 months with 0-2 months as the reference period. We calculated 2-way cluster-robust SEs at the patient and provider levels to

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account for repeated observations from the same patient and the same clinician. Seventeen BPA presentations associated with generic, nonindividual provider labels were excluded from provider-clustered analyses. We estimated separate models for SmartSet opening and broadly structured downstream workflow activity. We also applied the same specification to the non-CPT downstream measure as a sensitivity analysis. We used these models to assess the robustness of the observed temporal patterns, not to estimate a causal effect of implementation duration.

External examples provide implementation context rather than direct benchmarking because workflow purpose, patient populations, and analytic denominators vary across health systems. This analytic approach was intended to evaluate the workflow as it functioned in routine care rather than under controlled conditions. In an implementation-focused report in an FQHC setting, these dimensions were more informative than a narrower before-and-after usage summary alone, as they allowed us to examine not only exposure to screening but also workflow fidelity, downstream action, site-level uptake, and sustainability over time.

Ethical Considerations

This evaluation was conducted as an operational quality-improvement analysis of a health system workflow in routine care and was determined by the Riverside University Health System-Medical Center not to require institutional review board review. Because the evaluation used routinely collected operational and EHR data and was conducted as a quality-improvement activity, individual informed consent was not required. Data were handled in accordance with institutional privacy and confidentiality requirements, and results are reported in aggregate. Participants did not receive compensation for inclusion in this evaluation.

Results

Overview

Across RE-AIM domains, whole-person needs were widespread and often multidomain. Documented workflow use improved over time, and BPA presentations were temporally closely associated with preceding qualifying WPHS assessments. SmartSet opening and recorded structured downstream workflow activity were common among BPA presentations, though performance varied across clinical settings. System-level performance across RE-AIM domains is

summarized in Table 2. See Table 3 for further details on Table 2.

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Table 2. System-level performance of the RUHS[a] whole-person screening-to-action workflow across RE-AIM[b] domainsc.

Domain or measure	Result
Reach	
WPHS[d] assessments	177,821
Unique patients assessed	115,022
Assessments with ≥1 qualifying domain, n/N (%)	173,763/177,821 (97.7)
Assessments with ≥2 at-risk domains, n/N (%)	162,978/177,821 (91.7)
Implementation	
BPA[e] presentations	107,010
BPA presentations with a preceding WPHS, n/N (%)	106,865/107,010 (99.9)
BPA presentations with a uniquely identifiable most-recent WPHS, n/N (%)	106,691/107,010 (99.7)
BPA presentations linked to a uniquely identifiable most-recent qualifying WPHS, n/N (%)	104,049/107,010 (97.2)
Distinct qualifying WPHS assessments represented among confirmed BPA links	104,048
Same day among confirmed qualifying links, n/N (%)	96,520/104,049 (92.8)
Within 7 days among confirmed qualifying links, n/N (%)	103,122/104,049 (99.1)
Effectiveness	
Unique patients represented in BPA presentations	101,297
SmartSet opened, n/N (%)	88,736/107,010 (82.9)
Broad structured downstream workflow activity, n/N (%)	88,160/107,010 (82.4)
Non-CPT[f] downstream activity, n/N (%)	58,606/107,010 (54.8)
CPT-related activity, n/N (%)	84,670/107,010 (79.1)
Z-code documentation, n/N (%)	45,632 /107,010 (42.6)
Referral activity, n/N (%)	25,061/107,010 (23.4)
Reason-for-visit documentation, n/N (%)	3247/107,010 (3.0)
Non-CPT activity among SmartSet openings, n/N (%)	56,605/88,736 (63.8)
Adoption (Table 3 for more info)	
Higher-volume sites included in descriptive comparison	7 anonymized sites
SmartSet opening across higher-volume sites	74.8%-94.8%[g]
CPT-related activity across higher-volume sites	67.7%-92.0%[g]
Referral activity across higher-volume sites	9.0%-31.7%[g]
Z-code documentation across higher-volume sites	28.4%-51.9%[g]
Maintenance	
SmartSet opening, January 2023 → July 2026, n/N (%)	262/634 (41.3) → 4262/4520 (94.3)
SmartSet opening, 24+ months vs 0-2 months since first observed clinic BPA presentation, aOR[h] (95% CI)	63.88 (37.98-107.45)
Broad downstream workflow activity, 24+ months vs 0-2 months since first observed clinic BPA presentation, aOR (95% CI)	52.8 (33.21-83.96)

[a]RUHS: Riverside University Health System.

[b]RE-AIM: Reach, Effectiveness, Adoption, Implementation, and Maintenance.

[c]Broad structured downstream workflow activity was defined as at least one Current Procedural Terminology–related activity, Z-code documentation, referral activity, or reason-for-visit documentation field. Non–Current Procedural Terminology downstream workflow activity excluded Current Procedural Terminology–related activity. Maintenance models used clinic fixed effects and 2-way patient- and provider-clustered robust SEs; 17 presentations associated with generic, nonindividual provider labels were excluded from provider-clustered analyses.

[d]WPHS: Whole PERSON Health Score.

[e]BPA: Best Practice Advisory.

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[f]CPT: Current Procedural Terminology.

[g]See Table 3 for more details.

[h]aOR: adjusted odds ratio.

Table 3. Clinic-level variation in SmartSet opening and selected recorded workflow indicators across higher-volume anonymized sites[a].

Site	BPA[b] presentations (N)	SmartSet opened, n (%)	CPT[c]-related, n (%)	Referrals, n (%)	Z-codes, n (%)
A	12,906	12,241 (94.8)	11,879 (92.0)	4086 (31.7)	6701 (51.9)
B	10,043	8565 (85.3)	8374 (83.4)	1431 (14.2)	3691 (36.8)
C	9554	7453 (78.0)	7269 (76.1)	2464 (25.8)	2717 (28.4)
D	9327	8431 (90.4)	8285 (88.8)	1884 (20.2)	4695 (50.3)
E	7391	5525 (74.8)	5007 (67.7)	1052 (14.2)	2238 (30.3)
F	7290	6552 (89.9)	6456 (88.6)	1998 (27.4)	3731 (51.2)
G	7153	6064 (84.8)	5948 (83.2)	646 (9.0)	3096 (43.3)

[a]Higher-volume sites were defined as the 7 clinics with the largest numbers of Best Practice Advisory presentations during the study period. Site labels were anonymized for reporting. Percentages were calculated using the number of BPA presentations at each site as the denominator (N).

[b]BPA: Best Practice Advisory.

[c]CPT: Current Procedural Terminology.

Reach

During the study period, 177,821 WPHS assessments were completed among 115,022 unique patients. Of these assessments, 173,763/177,821 (97.7%) identified at least one qualifying yellow or red PERSON domain, and 162,978/177,821 (91.7%) identified at least two at-risk domains. Need was distributed across all 6 PERSON domains: Nutrition and Lifestyle was at risk in 152,794/177,821 (85.9%) assessments; Ownership in 137,652/177,821 (77.4%); Socioeconomics in 127,006/177,821 (71.4%); Emotional Health in 96,533 (54.3%); Physical Health in 87,900/177,821 (49.4%); and Resource Utilization in 71,492/177,821 (40.2%).

In a sensitivity analysis restricted to the first WPHS assessment per patient, results were materially unchanged: 112,340/115,022 (97.7%) had at least one at-risk domain, and 105,278/115,022 (91.5%) had at least two.

Implementation

Among 107,010 BPA presentations, 106,865 (99.9%) had a preceding WPHS assessment identified for the same patient. A uniquely identifiable most recent WPHS was available for 106,691 (99.7%) presentations. Overall, 104,049 (97.2%) BPA presentations were linked to a uniquely identifiable most-recent qualifying WPHS, while 2642 (2.5%) were linked to a uniquely identifiable most-recent all-green WPHS. A total of 174 (0.2%) occurred after the most recent WPHS date with multiple assessments and could not be uniquely attributed, and 145 (0.1%) had no preceding WPHS identified.

Among the 104,049 BPA presentations linked to a uniquely identifiable most-recent qualifying WPHS, 96,520 (92.8%) occurred on the same calendar day, 103,122 (99.1%) within 7 days, 103,870 (99.8%) within 30 days, and 103,977 (99.9%) within 90 days. The 104,049 BPA presentations linked to a uniquely identifiable most-recent qualifying WPHS corresponded to 104,048 distinct WPHS assessments. All but one of these assessments were associated with a single BPA presentation; 1 assessment was associated with 2 presentations.

Effectiveness

Among 107,010 BPA presentations involving 101,297 unique patients, the SmartSet was opened in 88,736 (82.9%) presentations. Broadly structured downstream workflow activity was documented in 88,160 (82.4%) presentations. CPT-related activity was recorded in 84,670 (79.1%) presentations, Z-code documentation in 45,632 (42.6%), referrals in 25,061 (23.4%), and reason-for-visit documentation in 3247 (3%). In the more restrictive sensitivity analysis excluding CPT-related activity, 58,606 (54.8%) BPA presentations contained Z-code documentation, referral activity, or reason-for-visit documentation. Among the 88,736 presentations in which the SmartSet was opened, 56,605 (63.8%) also contained non-CPT downstream activity.

Adoption

Workflow performance varied across clinics. For descriptive comparison, we defined higher-volume sites as the 7 clinics with the most BPA presentations during the study period. Across these sites, SmartSet opening ranged from 74.8% (5525/7391) to 94.8% (12,241/12,906), CPT-related activity from 67.7% (5007/7391) to 92% (11,879/12,906), referral activity from 9% (646/7153) to 31.7% (4086/12,906), and Z-code documentation from 28.4% (2717/9554) to 51.9% (6701/12,906).

Maintenance

BPA workflow use increased substantially during implementation. SmartSet opening increased from 41.3% (262/634) of BPA presentations in January 2023 to 94.3% (4262/4520) in July 2026, with the largest gains occurring earlier in implementation and performance subsequently plateauing at high levels.

The longitudinal pattern remained robust after accounting for repeated BPA presentations within patients and providers. In

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logistic regression models with clinic fixed effects and 2-way patient- and provider-clustered SEs, the adjusted odds of SmartSet opening increased relative to the first 0-2 months after clinic go-live: adjusted odds ratio (aOR) 1.56 (95% CI 1.06-2.29) at 3-5 months, 2.55 (95% CI 1.62-4.00) at 6-11 months, 10.80 (95% CI 6.52-17.87) at 12-23 months, and 63.88 (95% CI 37.98-107.45) at 24 months or more. Corresponding estimates for broad structured downstream workflow activity were 1.47 (95% CI 1.05-2.07), 2.53 (95% CI 1.69-3.79), 9.23 (95% CI 5.87-14.49), and 52.80 (95% CI 33.21-83.96), respectively. Global tests of implementation period were significant for both outcomes (P<.001 for both).

In the sensitivity analysis excluding CPT-related activity, the implementation period remained associated with non-CPT downstream activity overall (global P<.001), although the period-specific pattern was less consistently monotonic than for SmartSet opening and the broader workflow measure.

Discussion

Principal Findings

This evaluation suggests that the gap between whole-person screening and structured response is fundamentally a digital implementation problem: without an EHR-embedded pathway that reliably triggers on at-risk findings and bundles follow-up tasks, screening data remain clinically passive rather than actionable [25,26]. In the RUHS model, screening results were not left passively documented in the record; instead, they were linked to a point-of-care response pathway that made review, documentation, diagnosis coding, referral activity, and monitoring more feasible within routine care. The overall pattern is notable: whole-person need was common and often multidimensional, workflow performance improved over time, and among BPA presentations, SmartSet opening and recorded downstream workflow activity were common.

An important distinction from prior EHR-based social-needs CDS reports is that the RUHS workflow does not primarily prompt screening; it prompts a structured response after screening has already identified risk [6,27]. Rogers et al [17] described an Epic workflow at Hackensack University Medical Center that used BPAs to support health-related social needs screening and referral workflows, whereas the RUHS BPA/Our Practice Advisory was designed to surface already-identified whole-person risk in a form that supports documentation, diagnosis coding, referral action, and monitoring during the visit. Although these models are not directly comparable, the contrast clarifies the implementation gap addressed here: not simply whether patients are screened, but whether positive findings translate into a structured, documented response pathway. Importantly, the more restrictive non-CPT sensitivity measure was present in 54.8% (58,606/107,010) of BPA presentations, indicating that substantial downstream documentation or referral activity remained even when CPT-related activity was excluded. The workflow also incorporated elements of choice architecture: qualifying findings were made salient at the point of care, the SmartSet reduced the effort required to initiate follow-up, and the CPT-related element used a reversible default. These features preserved clinician choice while making the intended workflow easier to follow. Because this study did not experimentally vary these design features, it cannot estimate their independent effects on clinician behavior.

This gap also appears broader than any single institution can address. A 2025 scoping review found that fewer than one-quarter of SDOH initiatives used EHRs to collect and organize social needs data and that automated triggers, referral-tracking tools, and EHR-integrated community resource functions were uncommon. In that context, the RUHS model offers not only an example of screening but also a governed screening-to-action workflow embedded in routine care.

The trigger-fidelity analysis showed close correspondence between BPA presentations and preceding WPHS assessments. A preceding WPHS was identified for 106,865/107,010 (99.9%) of BPA presentations, and 104,049/107,010 (97.2%) were linked to a uniquely identifiable most-recent qualifying WPHS. Among those with confirmed qualifying links, 96,520/104,049 (92.8%) occurred on the same calendar day and 103,122/104,049 (99.1%) within 7 days. A small proportion of BPA presentations followed a uniquely identifiable most-recent all-green WPHS (2642/107,010; 2.5%), while 174/107,010 (0.2%) had an ambiguous most-recent assessment date and 145/107,010 (0.1%) had no preceding WPHS identified. Because WPHS assessments were available only at the calendar-date level, we could not precisely order some same-day sequences. These findings indicate high overall concordance between the implemented trigger logic and recorded WPHS status while also identifying a small set of discordant or temporally ambiguous presentations.

A first lesson from this experience is that health systems seeking to operationalize whole-person care should prioritize task completion over information display alone [28,29]. The RUHS workflow suggests that screening data become more useful when linked to a pathway that reduces the steps required to respond during the encounter. In this model, the BPA served as the trigger that brought relevant findings into view, while the SmartSet consolidated review, coding, referral, and documentation tasks in 1 place. This study did not evaluate whether this design reduced workflow or cognitive burden. The broader lesson is that a screening program should be judged not only by how accurately it identifies need but also by whether it creates a realistic route from identified need to structured action. At the same time, the SmartSet opening is an EHR-recorded process event and should not be interpreted as evidence of high-value care or patient benefit; this evaluation did not measure alert burden, visit time, clinician workload or burnout, or effects on patient-clinician communication.

A second lesson is that governance is not peripheral to implementation; it is integral to the intervention itself [30]. A workflow embedded in the EHR may appear technically complete yet underperform if no mechanism exists to review uptake and assign responsibility for improvement. By pairing the workflow with a dashboard that displays performance by clinic and provider, the RUHS model made implementation visible and supported ongoing accountability. This is especially important in safety-net systems, where turnover, competing

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priorities, and limited implementation resources can erode initial gains without sustained oversight.

A third lesson is that monitoring should distinguish among screening activity, advisory presentation, and downstream recorded workflow activity [31,32]. These stages represent distinct operational processes and may require different data sources for valid measurement. For digital health and EHR optimization efforts, this distinction underscores the importance of monitoring the full pathway from data capture through advisory presentation to documented response.

The clinic-level findings reinforce that implementation is partly a question of context [26,33]. Workflow performance varied across higher-volume clinics. These site-level comparisons were intended to describe heterogeneity in implementation rather than to identify causal clinic-level determinants of adoption. Determining whether staffing composition, behavioral-health integration, patient-panel complexity, provider turnover, or other organizational characteristics explain between-clinic variation would require a separate clinic-level organizational analysis beyond the scope of the present implementation evaluation.

For health system leaders, the significance of this model extends beyond screening performance [34,35]. Structured advisory workflows can make social-needs responses more visible and auditable within routine care, while dashboard-based monitoring can align workflow implementation with organizational quality priorities. More broadly, policy initiatives such as California Advancing and Innovating Medi-Cal illustrate that health-system infrastructure linking documented health-related social needs to care-management and community-resource pathways may become increasingly relevant. These policy and payment environments should be viewed as the implementation context rather than as explanations for the observed uptake.

The model may be particularly relevant for FQHC and safety-net settings because it addresses a structural gap between screening capacity and response infrastructure. In these settings, multidomain needs are common, but follow-up workflows are often fragmented. A structured advisory bundles documentation, coding, and referral tasks into a single pathway.

This paper contributes to the literature by describing a governed workflow rather than a stand-alone technical build [36,37]. Much of the existing CDS literature evaluates alert-level acceptance without examining the full pathway from screening through documented action to accountability. The RE-AIM framework helped us distinguish these stages and identify where improvement efforts would have the greatest impact.

Replication would require more than adopting a screening instrument. Other systems would need to build analogous point-of-care advisories, configure bundled order sets, and implement performance dashboards, each adapted to local EHR environments and clinical workflows. The underlying logic of linking identified needs to a guideline-driven advisory with tracked referral activity is not platform-specific, but successful implementation depends on local governance, leadership support, and sustained operational attention.

Limitations

Several limitations should be acknowledged. First, this was an observational implementation evaluation rather than a causal study, so improvements in workflow activity cannot be attributed solely to the BPA-SmartSet build. Other influences, including leadership attention, dashboard review, pilot-site experience, local workflow adaptation, and payer or organizational incentives, may also have contributed to the observed performance. Second, the intervention was implemented within Epic, and the specific build components may not translate directly to other EHR environments, even though the underlying implementation logic likely extends beyond any single platform. Third, while the workflow supported referral documentation and connection to community resources, the available data infrastructure did not yet provide complete closed-loop confirmation that patients successfully connected to external services after referral placement. Fourth, the present analysis focused on EHR-recorded workflow activity rather than longitudinal patient-level changes in whole-person health status, service use, or clinical outcomes. The recorded workflow indicators also capture process documentation rather than confirmation that each downstream service was delivered or completed. Finally, although the dashboard architecture included equity monitoring, the present study did not include subgroup analyses by race, ethnicity, sexual orientation, gender identity, or other priority populations. Prior work in safety-net populations has documented variation in whole-person health across patient subgroups and highlighted the role of demographic data in equity monitoring [38,39]. Examining whether workflow uptake and downstream response similarly vary across patient populations is an important next step. The study also did not include clinician-reported usability, alert burden, workload, visit time, or patient-communication measures, so it could not assess the potential administrative costs of bundling documentation, coding, and referral tasks into the advisory workflow.

Conclusions

The gap between whole-person screening and documented response is not simply a documentation or technology problem; it is an implementation challenge that requires deliberate workflow design. At RUHS, linking WPHS findings to a BPA and SmartSet and pairing the workflow with a separate accountability dashboard created a practical infrastructure for moving from identified need to documented response within routine care. In this safety-net setting, the workflow reached a large patient population, identified substantial multidomain need, and was associated with frequent SmartSet openings and recorded downstream workflow activity among BPA presentations. Performance also improved over time during ongoing operational monitoring. The central lesson is that health systems may gain more by building reliable screening-to-action pathways than by expanding screening alone. For systems caring for similar populations, referral activity may be an especially useful process indicator because it represents movement from identified need toward an attempted connection with services. The advisory-based framework described here is designed to be sustainable and expandable: as referral resources grow and pay-for-performance incentives increasingly reward documented

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social needs activity, the same workflow infrastructure can accommodate new services and reporting requirements. Moreover, as EHR and care management functionalities improve, the existing framework provides a foundation for closing the loop on social referrals, tracking not only whether a referral was placed but also whether the patient successfully connected with the recommended service. For leaders, the key implementation question is not only whether patients are screened but also whether eligible findings consistently translate into actionable workflow opportunities and whether the resulting responses can be seen, managed, and improved over time. Future work should test whether workflow improvements translate into more equitable follow-through, stronger connection to services, and measurable gains in whole-person health over time.

Data Availability

The data analyzed in this study are not publicly available because they were derived from electronic health records and health system operational data and may contain sensitive patient information. Access to de-identified data may be considered upon reasonable request to the corresponding author and is subject to applicable institutional approvals and data-use requirements.

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Authors' Contributions

Conceptualization: DK, ST, GL, AF
Data curation: DK, BS
Formal analysis: DK
Methodology: DK
Project administration: DK, ST, GL, BS, AF
Supervision: DK, ST
Visualization: DK
Writing – original draft: DK, ST, BS
Writing – review & editing: DK, ST, GL, BS, MK, EB, AF

Conflicts of Interest

None declared.

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Abbreviations

aOR: adjusted odds ratio
BPA: Best Practice Advisory
CDS: clinical decision support
CPT: Current Procedural Terminology
EHR: electronic health record
FQHC: federally qualified health center
ICD-10-CM: International Statistical Classification of Diseases, Tenth Revision, Clinical Modification
NCQA: National Committee for Quality Assurance
PERSON: Physical Health, Emotional Health, Resource Utilization, Socioeconomics, Ownership, and Nutrition and Lifestyle
RE-AIM: Reach, Effectiveness, Adoption, Implementation, and Maintenance
RUHS: Riverside University Health System
SDOH: social determinants of health
SNS-E: Social Need Screening and Intervention
WPHS: Whole PERSON Health Score

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