


BMJ Open Quality Improving food insecurity screening across a health system throughout the COVID-19 pandemic

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ABSTRACT

Background Food insecurity has direct and indirect negative outcomes on the physical and mental health of children, with impacts throughout adult life. Rates of food insecurity have increased dramatically since the start of the COVID-19 pandemic. The American Academy of Pediatrics recommends paediatricians screen and intervene to address food insecurity. We aimed to increase the percentage of patient encounters with food insecurity screening completion at the paediatric medical home from 0% to 85% by July 2020 with extension to the paediatric emergency department (ED) and paediatric specialty clinic in the following year.

Methods This multicentre project occurred in three sites within our health system: a teaching safety-net, paediatric medical home; a paediatric ED; and five divisions within paediatric specialty medical clinics. A screening tool was created using the validated Hunger Vital Sign Questionnaire. A standard screening, documentation and referral process was developed. The Model for Improvement was used testing changes via Plan-Do-Study-Act cycles.

Results The percentage of households screened for food insecurity increased from a median of 0% to 30% for all sites combined. There was significant variability in screening with the ED screening a median of 24% and the medical home screening 80% by the end of the study period. A total of 9842 households (20.9%) screened were food insecure. During the study period, 895 families with 3925 household members received 69791 pounds of food from our primary community resource using our clinic's food prescription. Of these families, 44% (398) also qualified for the US Department of Agriculture programme ensuring ongoing food distribution up to twice a month.

Discussion Using quality improvement methodology to address a critical community need, we implemented food insecurity screening across a hospital system including multiple sites and specialties and provided critical resources to households in need.

INTRODUCTION

Through a 2019 quality improvement initiative to screen for adverse childhood events (ACE) at our paediatric safety-net clinic, we recognised that 70% of patients had at least one positive ACE, with food insecurity accounting for nearly three-fourths (74%)

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Food insecurity is prevalent and impacts one in seven US children. Due to the direct and indirect negative impacts of food insecurity on a child's health, physicians should screen and intervene to address this critical social driver of health.

WHAT THIS STUDY ADDS

⇒ This is the largest reported multispecialty initiative to increase food insecurity screening in paediatric patients. Partnership with community resources and using quality improvement methodology can support system-wide initiatives to address social drivers of health.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This article explores the challenges and necessary flexibility when adapting a screening process within a large health network, which is important for future projects addressing community-level health disparities.

of all positive screens. This finding spurred efforts among various departments in our institution to address food insecurity within the community we serve.

Food insecurity is the lack of access to enough food to meet basic nutritional needs due to insufficient resources.¹⁻⁵ It has negative impacts on childhood emotional and physical well-being and forces families to make difficult decisions about meeting nutritional versus other essential needs.⁶⁻⁹ In a 2015 policy statement, the American Academy of Pediatrics recommended that paediatricians screen for food insecurity and provide resources.¹⁰ Our institution, however, did not have a standard process to identify and provide resources for food insecurity.

Food insecurity became increasingly relevant on a national scale at the start of the COVID-19 pandemic. The US Department of Agriculture (USDA) reported a significant increase in food insecurity in households with

children from 13.6% in 2019 to 14.8% in 2020.¹¹ In addition, the rates of food insecurity were significantly higher in households with a black, non-Hispanic (21.7%) or Hispanic (17.2%) person of reference than the national average.¹¹ Although our local region of Northern Virginia has a reputation for being one of the wealthiest areas in the nation, four of the five US localities with the greatest expected increase in child food insecurity in 2020 were in our hospital's catchment area.¹² Notably, almost half (43%) of food insecure people in our county were above the 200% poverty threshold for Supplemental Nutrition Assistance Program (SNAP) and other nutrition assistance programmes.¹³

The Patient Protection and Affordable Care Act mandates that non-profit hospitals conduct community health needs assessments every 3 years to identify and meet community health needs.¹⁴ Our healthcare system made a targeted effort of using the electronic medical record (EMR) to record and screen for social drivers of health (SDoH), including food insecurity. Food insecurity remains a vital concern in the postpandemic landscape as inflation and supply chain issues increase food costs. A 2019 scoping review concluded that 'despite growing interest in and support for identifying [food insecurity] in health care settings, there is little guidance on screening implementation strategies...[and] no studies evaluated the optimal workforce for administering [food insecurity] screening tools in distinct clinical settings and patient populations'.¹⁵

Throughout the course of the COVID-19 pandemic, food insecurity has exacerbated health disparities within our community. Through use of a quality improvement framework, we aimed to identify food insecurity and provide resources to paediatric patients in need. Our goal was to identify food insecurity when present within our community, and to provide resources in real time to households in need. Our specific aim was to increase the percentage of patient encounters with food insecurity screening completion at our paediatric medical home from 0% to 85% by July 2020 and then expand screening to the paediatric emergency department (PED) and paediatric specialty clinic within the following year.

METHODS

Context

This project was initiated by a team of resident physicians in a teaching, safety-net, paediatric medical home for children of low-income families, predominantly serving patients of Hispanic ethnicity. In addition to resident physicians, the team included physician champions from each site (one per division), a nurse champion from the PED, a quality improvement expert and a community food pantry liaison/director. This multicentre project occurred in three sites within our health system: a teaching safety-net, paediatric medical home for children of low-income families; a PED within a tertiary care hospital with a level 1 trauma centre; and five divisions within a

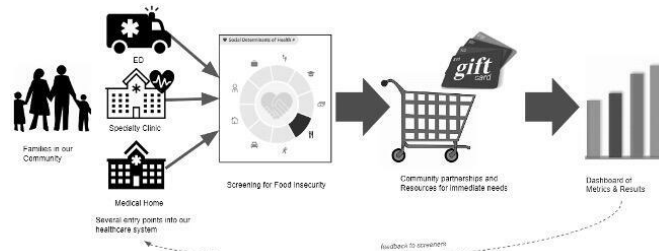


Figure 1 Screening process for food insecurity. ED, emergency department.

paediatric specialty medical group. The project included patients seen during well-child visits at the primary care office and all visits to the PED and participating divisions of the multispecialty office.

Patient and public involvement

Patients and the public were not involved in the design, conduct, reporting or dissemination of our study.

Interventions

We used the Model for Improvement framework and tested changes for improvement using Plan-Do-Study-Act (PDSA) cycles. Interventions included screening process development, process refinement and optimisation using EMR integration, and targeted communication of site-specific results to motivate staff. Patients were screened using a validated two-question Hunger Vital Sign Questionnaire^{16 17} that was ultimately integrated into the EMR (EMR; Epic Systems, Verona, Wisconsin). Those screening positively were provided a food prescription referral to our partnered food bank and a list of other community food resources. This screening process was adapted and implemented in the PED and participating paediatric specialty clinics within our institution (figure 1).

Screening process development

This quality improvement project was initiated in January 2020. The necessary steps included screening for food insecurity, documentation of the screening results and referral for appropriate food-based resources.

All three sites developed screening tools using the same validated two-question Hunger Vital Sign Questionnaire.^{16 17} We then partnered with a local food bank and created a referral process initially using paper prescriptions, along with a handout listing additional food resources within the community. Using process mapping and informal team member interviews, each site determined the responsibility for screening was best assigned to different care team member roles. In the paediatric medical home, medical assistants (MA) and nurses were overburdened with tasks, hence screening was taken on by physicians. Conversely, screening was felt to best fit within the workflow of bedside nurses in the PED and MAs in the specialty clinics. Tools used to support screening also differed across sites. For instance, physicians at the paediatric medical home were prompted to screen patients by integrating smart phrases into the existing well-child note

templates within the EMR. The template additionally prompted physicians to enter the relevant International Classification of Diseases 10th Revision (ICD-10) codes as a means of tracking the screening process. Screening was initiated in March 2020. Patients who screened positively were referred to the local food bank with a paper food prescription. The paediatric specialty clinic built the screening questions into the EMR, and the PED initially used paper forms.

Process refinement using EMR integration

As part of a key performance initiative to address health disparities within our hospital system, an EMR tool was developed to document SDoH. This SDoH Wheel illustrates a composite of nine domains that influence health, including food insecurity, using a graphic interface. This tool was linked to the existing flowsheets used to document food insecurity so that established workflows did not need to change. Importantly, information entered into the SDoH Wheel crosses encounters and is visible to all care providers within the patient's chart. With the implementation of this tool in Fall of 2021, all sites transitioned to using the SDoH Wheel to track food insecurity screening at all participating sites.

Targeted communication, site-specific metrics

The percentage of patient encounters with food insecurity screening completion was tracked monthly to guide PDSA cycles. After implementation of the EMR-based SDoH screening tool, the percentage of patient encounters with screening completion was assessed using a dashboard built into our EMR. In April 2022 monthly newsletters were sent to each site's food champions with screening results to promote accountability and investment in screening, as well as share best practices across sites.

Evolution of interventions over time

We encountered several hurdles during intervention implementation. These included the rise in telemedicine visits during the pandemic, patient barriers to completing referrals and accessing food resources from our primary community food pantry partner, and maintaining staff motivation to screen. Healthcare delivery via telemedicine during the pandemic challenged our providers to develop solutions for providing resources to families with food insecurity. With the addition of telemedicine visits, the clinic-based teams transitioned from a physical paper script to a virtual alternative via an automated fax of the electronic food prescription. The community food pantry resource list was also sent electronically to patients through our patient portal. This required additional effort to ensure that patients receiving care via telemedicine had their patient portal active and accessible. However, once in place, the electronic food prescription and list of community food pantries in the after-visit summary aided further spread of the referral process to sites outside of this project.

Social disparities are known to coexist, and only a subset of referred patients were able to complete the referral process to receive food resources from our primary community partner. When families were interviewed regarding challenges obtaining food resources, we noted that lack of childcare and lack of transportation were frequently encountered barriers. Through advocacy efforts championed at the paediatric medical home, the team received allocations for an on-site food pantry to provide food resources directly to families who have positive screens and immediate food needs. Additionally, when available, grants and donations are used at all sites to provide families who screen positively with gift cards for groceries. To address transportation needs, a partnership was developed with an app-driven food delivery service.

Finally, we noted increased screening for food insecurity when providers had tangible, immediate resources to offer families including gift cards for groceries. Particularly within the PED, there was a decrease in screening after the gift cards were fully distributed. It was challenging to maintain screening as a priority without having direct feedback from the referral process. To address this, by April 2022, champions from screening sites were sent monthly newsletters regarding the percent of patients screened and subsequent food resources received to help illustrate the impact on patients.

Measures

Our main process measure was the percentage of encounters with screening completed for each location and for all sites combined. Our outcome measures were the percentage of encounters identified through screening with food insecurity (number of encounters with positive screens for food insecurity/number of encounters) and the number of families served through our primary community food bank partner. This measure included the number of families and household members receiving food (as determined by families presenting our food prescriptions at the food bank), pounds of food delivered as measured and reported by the food bank and number of families qualifying for ongoing food distribution through the USDA programme (identifying and signing families up for this programme is a service the food bank provides and measures). As a balancing measure we looked at the paediatric medical home staff satisfaction with the screening process and resources provided via 5-point Likert survey.

Analysis

Data were collected monthly starting in January 2020. Collection was extended past July 2021 to December 2022 in an effort to improve screening further. The director of our primary community food bank partner emailed the team quarterly with the number of clinic-specific referrals received by the food pantry each month. We created run charts in Excel to track data. Median line adjustments were made according to accepted run chart rules.

Ethical considerations

This project was a quality improvement activity and exempt from our local institutional review board.

RESULTS

The percentage of encounters with screening completed for all sites combined throughout the intervention period was 26.3% with 47 095 families screened. Notably, within the paediatric medical home, food insecurity screening increased from a baseline median of 0% to 80% with 15 067 families screened (figure 2A). Within the PED, a median of 30% of patient encounters were screened for food insecurity following implementation of the screening process. Screening decreased to 16% when the grant-funded gift cards were no longer available, but increased back to 24% following EMR optimisation with implementation of the SDoH Wheel and result newsletter distribution (figure 2B). Subspecialty clinic screening initially increased to a median of 5% of patient encounters. Following monthly newsletter distribution of results to food champions within each division, screening subsequently increased to a median of 27% (figure 2C).

Of the families screened, 9842 (20.9%) were found to have food insecurity and provided with resources—5057 (33.6%) in the paediatric medical home, 4220 (15.6%) in the PED and 565 (11.4%) in the specialty offices. Across all sites, 895 (9%) families with 3925 total household members received food through our primary community food pantry partner with 69 791 pounds of food distributed. Three hundred and ninety-eight (44%) families also qualified for and were enrolled in the USDA programme to receive food every 2 weeks. Results by measure are summarised in table 1.

In addition, \$25 gift cards were distributed to families with immediate food needs. The PED distributed 960 gift cards, totalling \$24 000. Since its inception in October 2020, about 600 cards worth \$15 000 have been distributed in the women's clinic and paediatric medical home. The specialty clinic also distributed gift cards but did not track the total amount given. Finally, the paediatric medical home created an on-site food pantry for patients with emergency food needs in response to feedback from families about transportation barriers to our primary community food bank partners. This pantry is maintained with annual donations from our institution's fund and grants, along with food donations from local drives. Since opening, the food pantry has served 576 household members.

Regarding our balancing measure, 32 (68%) physicians at the paediatric medical home responded to the satisfaction survey, including 27 (82%) resident physicians and 5 (63%) attending physicians. Thirty-two (100%) physicians reported satisfaction (very satisfied or somewhat satisfied) with the process for screening families for food insecurity and 31 (97%) reported satisfaction (very satisfied or somewhat satisfied) with the resources provided to families.

DISCUSSION

This quality improvement project was successful in increasing food insecurity screening across all sites, but overall achievements varied by site. The paediatric medical home exhibited the most robust improvement, nearly meeting the goal of 85% of patient encounters screened. We believe this was in part due to screening being incorporated primarily into the resident physician workflow at this site, rather than nurses or MAs which have higher personnel turnover. Food insecurity screening was also integrated into resident physician orientation, which was not the case at other sites. In addition, there were resources available on-site to distribute including gift cards and emergency food bags, allowing providers to immediately address food insecurity needs.

There were many project strengths. First, we were able to engage existing community resources and partnered with a local food bank to mitigate food insecurity in our community. Our referral process allowed tracking of resource utilisation with 54 289 pounds of food distributed to date. Second, we were flexible in allowing and promoting local adaptations to the screening process. We allowed care sites to assign the screening task in a way that most easily integrated into existing workflows. Third, we were able to seize opportunities when interests aligned. During our study period, the institution implemented a new EMR tool to document SDoH that included food insecurity screening. Our team pivoted from tracking ICD-10 codes to directly monitoring the screening results entered in the new streamlined EMR tool.

Our study adds to the literature on addressing food insecurity. Many paediatric food insecurity screening projects focus specifically on primary care clinics^{18–22} or individual specialty clinics.^{23–25} Our study includes a much larger population (>1 70 000 encounters) than the limited number of published multispecialty and multisite projects addressing food insecurity in paediatrics,²⁶ and spans an entire 3-year study period. Palakshappa *et al* reported postintervention screening rates from 68.4% to 90.1% across six primary care practices and from 14.2% to 93.6% across individual clinicians.¹⁸ Site-specific screening rates were more variable in our project at 24–80%. This may be due to Palakshappa *et al* limiting screening to certain well visits, while our study included well visits of all ages. Additionally, Burkhardt *et al* estimated that they were identifying approximately half of the expected food insecurity rate in their clinic.¹⁹ Our medical home site was able to identify higher rates of food insecurity than those reported among the Hispanic population (median of 30% vs an average of 17.2% nationally¹¹ and 12% in our state²⁷). The rate of qualification for USDA services was equal to those listed for our county (47% in our patients vs 43% in our county¹³). Given the high screening rate at the paediatric medical home, these similar findings increased the confidence that we were accurately identifying food insecurity. Our other sites also exceeded the rate of child food insecurity reported for our state (11.7% in the PED and 12.5% in the specialty clinics vs

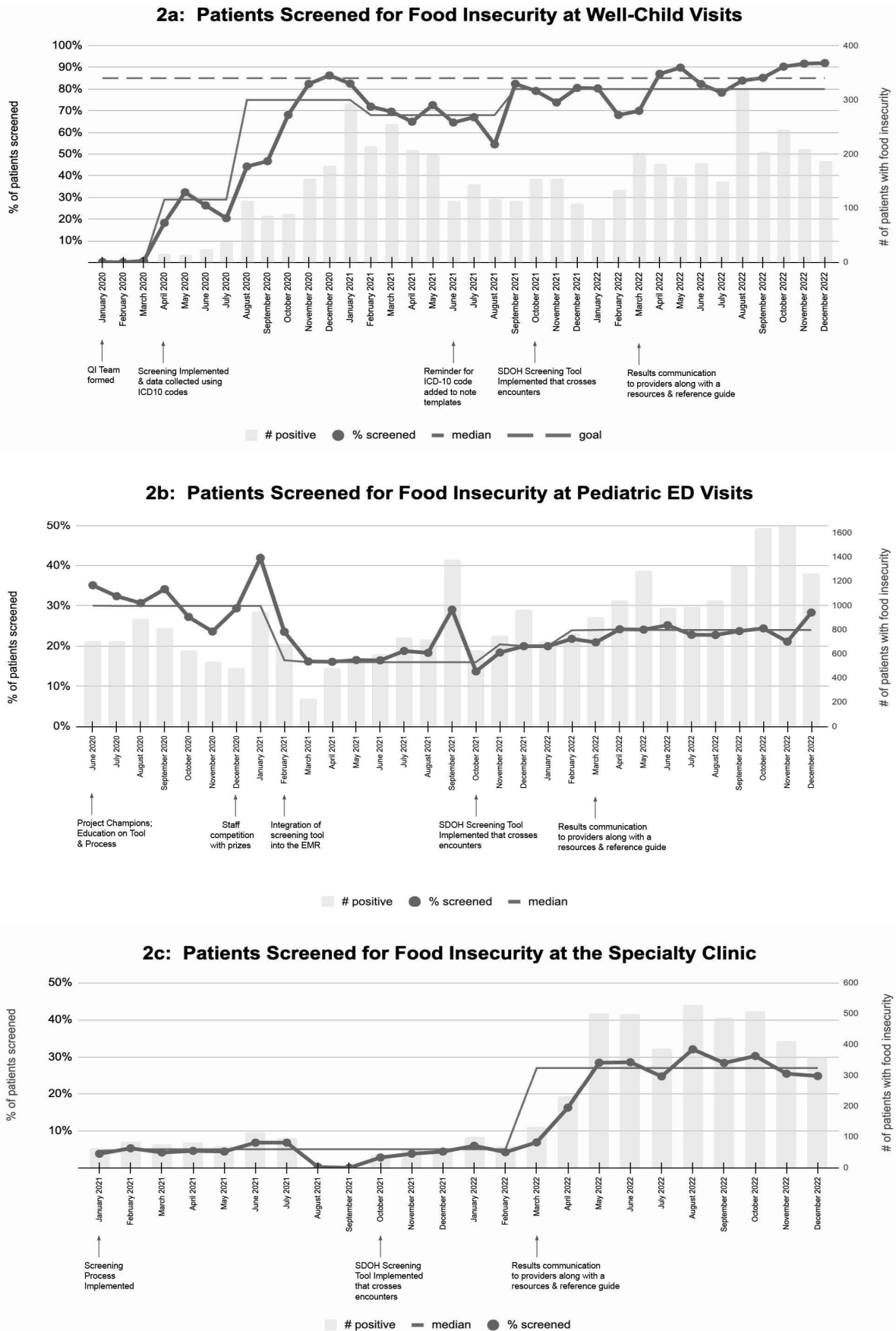


Figure 2 (A) Patients screened for food insecurity at well-child visits. (B) Patients screened for food insecurity at paediatric ED visits. (C) Patients screened for food insecurity at the specialty clinic. ED, emergency department; EMR, electronic medical record; ICD-10, International Classification of Diseases 10th Revision; QI, quality improvement; SDOH, social drivers of health.

**Table 1** Metrics and results

| | Emergency department | Specialty clinics | Medical home | All sites combined |
|---|----------------------|-------------------|--------------|--------------------|
| Process measure | | | | |
| Percentage (%) of encounters with food insecurity screening complete (median) | 24 | 27 | 80 | 30 |
| Outcome measures | | | | |
| Percentage (%) of households who screened positively for food insecurity (median) | 15.6 | 13 | 32 | 20.6 |
| Number of household members who received food resources from our primary food bank partner using our food prescriptions | 1078 | 356 | 2491 | 3925 |
| Number of households who were enrolled in the USDA programme for ongoing food distribution | 130 | 47 | 559 | 398 |
| USDA, US Department of Agriculture. | | | | |

8.8% in our state²⁸). Given the lower screening rates at these sites (24% in the PED and 27% in the specialty clinics), however, it is possible that a concern for food insecurity may have prompted providers to complete the screening. The paediatric specialty clinic, which has a different socioeconomic and payor mix than the paediatric medical home, still had a significant proportion of children with food insecurity. Others have demonstrated that certain subspecialty populations, such as children with end-stage kidney disease, have food insecurity rates that exceed general populations.²⁹ Future studies could involve subcategorising patients by diagnosis to identify groups at higher risk for food insecurity.

In a recent systematic review on the effectiveness of social needs screening, Yan *et al* described that programmes providing handouts or referrals to community resources usually had limited follow-up or process evaluation to determine whether patients received the resources they needed.³⁰ Our project, in comparison, collected data from our primary community food bank to determine the utilisation of food resources as well as assess and address barriers to utilisation where possible. Our rates of community food resource utilisation were comparable to those of Fritz *et al* (9% in our study vs 10%).³¹ More research is needed to understand why only a small proportion of families with food insecurity identified in a medical setting are ultimately connected to intended food resources.

Our project has several limitations. Given that this project occurred within a single institution, results may not be generalisable. In addition, our data included a cross-sectional analysis of population-based statistics over time but did not track changes to an individual family's food insecurity status over time. Measuring the impact of

quality improvement initiatives to address food insecurity on health outcomes and utilisation is an area of focus for future research.

CONCLUSIONS

Our quality improvement intervention explores the challenges and necessary flexibility when adapting a screening process across a spectrum of care sites within a large health system, which is important for addressing community-level health disparities. This project was successful in achieving the preintervention goal of increasing food insecurity screening at all sites by 20% in 6 months.

This work also aligned with a system-wide key performance initiative to increase screening related to SDoH. Our approach has served as a model for other departments to structure screening and resource allocation in our health system. Moving forward, we are planning to expand SDoH screening to include two other categories (transportation and financial strain) at the paediatric medical home with a financial incentive tied to physician bonuses.

This initiative was rooted in the desire by frontline staff to quickly address an identified community need using quality improvement methods. It involved engaging with and formalising partnerships with community resources, and ultimately identifying champions in each paediatric care setting to expand the screening process. This work was accomplished within the existing quality improvement training for paediatric resident physicians led by clinical preceptors with vested interest. This work also benefited from an alignment with strategic goals within our hospital system, which subsequently allowed for EMR integration of our screening tool and development of a dashboard for

tracking results. For health systems looking to start similar initiatives across multiple sites, we recommend engaging community partners, recruiting screening champions to assist in local process adaptation, automating and integrating the process into your EMR and facilitating regular communication of results and patient impact.

Contributors LK and KL contributed equally to this paper as cofirst authors. LK drafted the manuscript and assisted with result analysis. KL, MMe, JT, MMA and CP assisted with project planning, measures development, intervention development and implementation, data collection, analysing results and manuscript edits. RA assisted with project planning, intervention development and implementation, data collection, and analysing results for the emergency department, and provided manuscript edits. HQ, BA-S and AB assisted with project planning, intervention development and implementation, and analysing results for the medical home, as well as providing manuscript edits. PS-M and KM assisted with project planning, intervention development and implementation, and analysing results for the specialty clinics, and provided manuscript edits. CP accepts full responsibility for the work and/or the conduct of the quality improvement project, had access to the data, and controlled the decision to publish. All authors read and approved the final manuscript.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

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