Improving Provider Documentation Compliance in Adult BMI Screening and Follow-up at a Federally Qualified Health Center

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Abstract

The rising obesity rates in the United States (U.S.) highlight the need for a standardized obesity screening and intervention plan in primary care. Adult Body Mass Index (BMI) screening and follow-up is a Uniformed Data System (UDS) quality metric for Federally Qualified Health Centers (FQHCs), requiring consistent documentation for compliance and funding. A literature review identified an electronic health record (EHR) support tool as an effective method to standardized BMI screening and improve provider documentation. This quality improvement (QI) project implemented an EHR support tool to improve BMI screening compliance among primary care providers (PCPs). Institutional review board (IRB) approval and written informed consent were obtained, and educational in-services were conducted. Guided by the Diffusion of Innovation theory, weekly participant checks assessed acceptance and adoption of the intervention. A chart audit of 843 eligible patient records showed the EHR support tool was utilized in 191 charts (22.66%), while a BMI diagnosis code was recorded in 235 charts (27.88%). Findings indicated that the standardized BMI screening process did not significantly improve provider documentation compliance, with short appointment times and multiple patient complaints cited as barriers. Despite these challenges, implementing a structured BMI screening process remains critical for securing FQHC federal funding and early obesity intervention.

Keywords: obesity, adult BMI screening, follow-up plan, primary care provider, federally qualified health center, electronic health record support tool, preventive care

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Obesity in the United States (U.S.) is increasing at an alarming rate. Characterized by abnormally high and increasing body mass index (BMI) levels among adults, obesity leads to significant health risks and a substantial burden on the U.S. healthcare system. The U.S. Preventive Services Task Force (USPSTF) has identified that obesity screening and treatment should be conducted at every healthcare visit because of the high prevalence and significant health risks associated with it. Adult BMI screening and the development of a follow-up treatment plan is a Uniformed Data System (UDS) quality measure for Federally Qualified Health Centers (FQHCs). Primary care providers (PCPs) are responsible for completing preventive care measures for each patient, including BMI screening. PCP compliance barriers to adult BMI screening and follow-up documentation are accessibility, time, and lack of knowledge, which can negatively impact patient health and system outcomes.

Problem Statement

Rising rates of obesity in the U.S. are a public health concern with profound implications for morbidity and mortality. Despite the well-known link between elevated BMI and chronic health conditions, there remains a gap in routine BMI screening and follow-up practices. The Centers for Disease Control and Prevention (CDC) defines a healthy BMI as 18.5 to 24.9, while a BMI of 25 to 29.9 is overweight and a BMI of greater than 30 is obese (CDC, 2022). Since 2000, adult BMIs have increased nationally by more than 10%, with 42% of adults meeting the definition of overweight with a BMI greater than 25. Additionally, more than a third of adults in the U.S. now have a BMI greater than 30 (CDC, 2022; Centers for Medicare & Medicaid Services [CMS], 2023). Obesity increases the risk of diabetes, cardiovascular disease, and pulmonary complications

and has an annual economic impact of 170 billion dollars (CDC, 2022). While treatment options for obesity are slowly expanding, the lack of systematic BMI screening prevents early detection and delays diagnosis and management of obesity-related health risks.

Studies have shown that individuals from low socioeconomic backgrounds are more likely to become overweight or obese (Rural Health Information Hub [RHIH], 2021). FQHCs, which are community health centers that qualify for reimbursements from Medicare and Medicaid, are therefore integral settings for detection and treatment of obesity. As such, the adult BMI screening and follow-up measure is a UDS quality preventive screening metric for FQHCs (RHIH, 2021; CMS, 2023). The UDS manual defines the BMI screening measure as providers assessing BMI for patients 18 years and older with BMIs under 18.5 and higher than 25 and documenting a follow-up plan within one encounter per 12-month period, such as lifestyle modification counseling (CMS, 2023). Lawyer and Snow (2022) noted that the National criteria for obtaining the UDS quality measure is 83.1%, but as of 2022, the UDS reporting National average for completing the measure was 61%. FQHC PCPs must complete and document the BMI screening measure, as this will allow for systematic monitoring of BMI trends and likely reduce the economic impact of obesity.

Purpose and Rationale

High BMIs are associated with chronic diseases that hinder quality of life and increase healthcare costs nationally. The adult BMI screening and follow-up measure has a low FQHC PCP compliance rate, negatively affecting the UDS quality metrics and federal funding. This project aims to identify an evidence-based intervention to improve FQHC PCP compliance in completing the UDS quality measure: Adult BMI screening and follow-up. By identifying a

proper BMI screening and documentation method for PCPs, obesity may be detected earlier, improving subsequent monitoring and management.

Background and Significance

Obesity in the adult population must be appropriately screened and addressed by healthcare providers. The adult BMI screening and follow-up measure is a required electronic-specified clinical quality measure (eCQM) documented within the patient's electronic health record (EHR) by providers and monitored electronically by the CMS (Lawyer & Snow, 2022). Though Healthy People 2030 maintains a current national initiative to reduce the proportion of adults with obesity from 42% to a goal of 36% and increase healthcare visits by adults with obesity, barriers to standardized BMI screening and follow-up documentation remain (Office of Disease Prevention and Health Promotion [ODPHP], 2020). In a systematic review, Menezes et al. (2020) concluded that BMI screening measures are unmet nationally due to insufficient provider time and resources, resulting in prioritization of care and short-handing of preventive care services. Many studies have found that the complexity of BMI screening documentation in the EHR system negatively impacts provider compliance (Peikes et al., 2018; Cross-Barnet et al., 2019; Huang et al., 2022). Implementation of standardized BMI screening and follow-up plan documentation will improve real-time BMI monitoring, encourage earlier intervention, and aim to achieve the Healthy People 2030 obesity management goals.

Low PCP BMI screening documentation

For this discussion, a PCP is a nurse practitioner, medical doctor, or physician's assistant who works at an FQHC facility and treats patients for common medical illnesses, chronic diseases, and preventive care (American Academy of Family Physicians [AAFP], 2024). CMS (2023) detailed that PCPs at FQHCs predominantly care for people who are medically

underserved and exhibit more susceptibility to elevated BMIs. This demographic trend contributes to increased healthcare expenditures for FQHCs (CMS, 2023). Therefore, it is essential to standardize BMI screening documentation and improve PCP compliance at FQHCs. In multiple studies, PCP compliance in adult BMI screening is substandard due to barriers including complicated EHR systems and several preventive measures to complete, resulting in PCPs not being aware of the current preventive measure standards (Peikes et al., 2018; Cross-Barnet et al., 2019; Levine et al., 2019; Saleh, 2019).

Implementation of an EHR Support Tool

The literature suggests that an EHR support tool is an effective intervention to remind and assist PCPs to document the quality measure, BMI screening and follow-up, reducing the complexity of EHR systems. The EHR support tool can be adjusted to the targeted screening metrics for BMI screening. EHR support tools can include an automated, hard-stop, passive, or best advisory alert (Triantafyllidis et al., 2020). Two qualitative studies found that most providers agree that the EHR systems are not user-friendly and take multiple steps to complete preventive screening documentation (Peikes et al., 2018; Cross-Barnet et al., 2019). Several studies have identified that implementing an EHR system reminder for required preventive screenings would optimize the preventive services offered (Bednarczyk et al., 2018; Kahan, 2018; Cross-Barnet et al., 2019). Triantafyllidis et al. (2020) conducted a systematic review that uncovered the necessity and accuracy of EHR support tools, along with provider education of the tool, for standardized BMI screening and obesity intervention treatment plans. The evidence shows that an EHR support tool paired with provider education would likely improve provider compliance in BMI screening and follow-up documentation.

Issues and Gaps with Current Screening Method

Current literature describes PCPs as primarily responsible for all preventive screenings, including BMI screening and follow-up (Bednarczyk et al., 2018; Cross-Barnet et al., 2019). The CMS explained that after each patient visit, PCPs are expected to document the patient's BMI with the proper ICD-10 code and follow-up treatment plan discussed during the visit in the EHR (CMS, 2023). Cross-Barnet et al. (2019) described that PCPs see multiple patients daily and must maintain over ten preventive care measures within the EHR for each patient while addressing the patient's main complaint. As a result, verbal BMI lifestyle education is primarily the standard practice, if completed at all (Levine et al., 2019). The USPSTF recommends that all PCPs screen adults for obesity and provide interventions, but barriers to standardized documentation persist, including complicated EHR systems, time, and lack of provider knowledge (Levine et al., 2019; Wadden et al., 2020). A change is needed to assist PCPs in completing the adult BMI screening and follow-up documentation to adhere to the USPSTF obesity screening recommendation properly.

Improved PCP Compliance in BMI Screening Documentation

Improved PCP compliance in documenting the UDS quality metric: Adult BMI screening and follow-up after implementing a standardized screening method would likely decrease BMIs over 30 (Wadden et al., 2020; CMS, 2023). With improved EHR documentation of BMI screening and follow-up plans, BMIs outside of normal parameters will be easily identified, and interventions for patients with obesity can be more readily implemented. Integrating an EHR support tool for BMI screening and follow-up would allow PCPs to feel less overwhelmed and provide more opportunities for documentation, ultimately standardizing the process. Improving PCP compliance in BMI screening and follow-up at FQHCs through a standardized EHR support

tool would enhance health promotion and secure federal funding to combat obesity related complications.

Internal Data

An FQHC that provides comprehensive services to people in a medically underserved area in North-Central Arizona identified a decrease in the UDS quality measure: Adult BMI screening and follow-up due to inadequate PCP documentation. Currently, there is a passive EHR reminder in the "plan" section of the EPIC charting system. Medical assistants (MAs) are responsible for charting the BMI with the patient's height and weight. The PCP is responsible for reviewing it, implementing a follow-up plan, and adding the BMI smart phrase with a selected follow-up plan and proper ICD-10 code in the patient's note. A smart phrase is a short text segment that the PCP types into the patient note, triggering a dropdown menu with predefined options. While PCPs may verbally address BMI and lifestyle modifications, it is inconsistently documented and most PCPs expressed they did not know about the necessary screening documentation. The PCPs expressed feeling overwhelmed with the charting and responsibilities. Organization board members expressed that implementing a standardized BMI screening and follow-up documentation intervention would ensure real-time monitoring of patients' BMIs, ultimately enhancing the organization's goal of improving health outcomes and securing federal funding for accessible, affordable healthcare.

PICOT Question

The current USPSTF guidelines recommend screening all patients for obesity and the CMS reimburse FQHCs for proper screening documentation; therefore, it is important to determine a standardized documentation method for PCPs. A review of the literature led to the clinically relevant PICOT question: Among PCPs at FQHCs **(P)**, how does an EHR system

reminder **(I)**, compared to current practice **(C)**, affect adult BMI screening and follow-up documentation compliance rates **(O)**?

Search Strategy

A comprehensive review of current evidence was conducted through the following databases: PubMed, ProQuest, and Cumulative Index of Nursing and Allied Health Literature (CINAHL) to answer the PICOT question. These databases are known for their multidisciplinary medical content that provides quality evidence-based research.

Keyword Selection

The databases were searched using combinations of key terms that addressed all components of the PICOT question, including *provider, EHR alert, body mass index screening, preventive care screening,* and *documentation compliance.* These terms were expanded with synonyms combined with Boolean connectors for more results.

Initial and Final Search Yields

The PubMed database was the first search conducted using key terms: *provider, documentation notification OR EHR alert OR best practice alerts, BMI screening OR preventive care screening*, *and compliance* yielded 27,744 results. MESH terms were applied, and more specific terms like *preventive care screening, compliance rates,* and *primary care* were added to limit the search further. All additional searches yielded 100-150 results.

A ProQuest database search was conducted second using key terms: *provider, preventive screening OR preventive care, documentation OR charting OR EHR alert, and body mass index* yielded 1,220 results. MESH terms and more specific terms like *documentation charting, quality measures,* and *documentation compliance* yielded 110-300 results.

The last search was the CINAHL database using key terms: *provider OR physician OR advanced practice provider, preventive care OR preventive screening, and EHR OR electronic health record* yielded 42 results. These terms were expanded to include MESH terms like *body mass index* and *documentation compliance* to yield 42-135 results.

Limitations, Inclusion, and Exclusion Criteria

Filters were applied in all three databases to limit the publication date from 2018 to 2024 and include peer-reviewed journal articles only. For yields of 50-100, each article's title, abstract, and references were assessed for relevance, which yielded 25 articles. The full text of the 25 articles was reviewed, and rapid critical appraisal checklists were utilized to narrow the articles down to the ten most relevant. Studies with higher levels of evidence were selected over qualitative studies. Inclusion criteria included outpatient settings, preventive care services, and an EHR system intervention. The UDS quality measure: Adult BMI screening and follow-up is a newer preventive screening measure with limited evidence-based research; therefore, the search for evidence was expanded to include all preventive screenings. There were no exclusions based on age, sex, or gender; however, adult patients were the primary focus.

Critical Appraisal and Synthesis of Evidence

The exhaustive literature search revealed ten relevant, high-quality studies that were evaluated using a rapid critical appraisal tool by Melynk and Fineout-Overholt (2023). The evaluation of each study included reviewing the methods, assessment tools, results, and application of the study (See Appendix A, Table A1). All of the studies were quantitative studies with levels of evidence ranging from I to III, including five quasi-experimental, two RCTs, two mixed-methods, and one systematic review (See Appendix A, Table A2). The number of subjects varied significantly from over one million to 200. The age range varied widely, from 4 to over 80

years old. Although adults were the primary focus, two studies with adolescents were included because both studies directly addressed BMI screening rates in primary care. All of the studies except for one were located in the U.S. and were conducted in either a primary care or outpatient setting. All of the studies used an EHR intervention tool, and the results showed a positive trend in the usefulness of the EHR tool for improving provider compliance in preventive screening documentation.

The preventive screening measure for BMI and follow-up has not been widely studied; therefore, other EHR interventions for preventive screenings were included to demonstrate how they can be applied to BMI screening and documentation. Most studies revealed improved primary care preventive screening documentation through an EHR automated reminder tool. While the increase in provider documentation was widely varied among the studies, from 3% to 75%, the results detailed the need for more refined EHR interventions, addressing the barriers to completion (See Appendix A, Table A1). All studies utilized the EHR for data collection and analysis, presenting concerns for computer and human error in the results.

The research consensus unveiled the importance of the EHR system in providing clinical decision-making support. All of the studies used a form of an EHR reminder for the provider to tailor their patient care accordingly. The tool ranged from an automated reminder to a health maintenance table, but all of the tools required provider engagement in patient care and resulted in increased preventive screening knowledge. Implementing an EHR support tool for BMI screening and follow-up documentation led to more nutrition referrals, metabolic blood work orders, and overall improved documentation compliance rates (See Appendix A, Tables A1 and A2).

The research concluded that the EHR system is feasible for clinical reminders to improve provider documentation and optimize early detection of clinical conditions that could ultimately reduce poor healthcare outcomes. Improving provider documentation of BMI screening and follow-up through an EHR reminder tool can effectively decrease provider barriers to screening compliance and smooth the transition of care to other providers for future follow-ups. Utilizing the capabilities of the EHR system requires adequate provider and clinic staff education, as well as interprofessional teamwork to integrate the technology into practice smoothly. With an EHR support tool, errors and barriers in screening documentation would be minimal, and quality of care would be systematic for each patient.

Application of the Diffusion of Innovation Theory

To educate providers on an EHR support tool within a healthcare system, understanding how the tool will be perceived, diffused, and adopted is critical to the sustainability of the intervention over time. Everett Rogers' Diffusion of Innovation theory describes the diffusion process of innovation within a social system by analyzing all of the elements of the process, including innovation, communication, and social system, and how they influence the implementation and acceptance of the new change (Dearing & Cox, 2018). The Diffusion of Innovation theory has five stages: knowledge, persuasion, decision, implementation, and confirmation (See Appendix B, Figure B1). Dearing and Cox (2018) explained that the individuals within the social system do not adopt innovation all at once; there are innovators, early adopters, early majority, late majority, and laggards. The factors influencing the acceptance are the innovation's advantage, compatibility, complexity, trialability, and observability (Dearing & Cox, 2018; Silva et al., 2022).

Integrating an EHR support tool to improve provider documentation of BMI screening within a clinic can be facilitated by the Diffusion of Innovation theory to understand the process, influences, and barriers. The theory can help the FQHC understand the factors influencing PCPs to document the BMI screening and follow-up measure or not. The theory highlights the importance of an EHR support tool, including its advantages, compatibility, low complexity, and relativity for BMI screening in positive patient outcomes. Understanding how an EHR support tool for improved provider BMI screening documentation is implemented and accepted can help improve standardized care.

Implementation Framework

The Plan-Do-Check-Act (PDCA) cycle can guide the integration of an EHR support tool for provider documentation compliance of BMI screening and follow-up plans within a clinic practice. The Agency for Healthcare Research and Quality (AHRQ) describes the PDCA cycle as a four-step cycle to implement change: creating a change plan, implementing the change, evaluating change outcomes and making process adjustments, and continuing to monitor the change (n.d.) (See Appendix B, Figure B2). The PDCA cycle is a continuous cycle that is essential for quality improvement in healthcare because it facilitates the continuous improvement and management of the intervention.

The PDCA cycle can be applied to the quality improvement initiative of integrating an EHR support tool in an FQHC. The identified opportunity is improving PCP compliance with BMI screening and follow-up documentation. The second step is educating PCPs and clinic staff on the existing EHR support tool and the importance of the quality measure as well as implementing interprofessional teamwork to ensure the documentation is completed. The next step is to evaluate the EHR support tool within the clinic by collecting data and assessing its

effectiveness. The last step is to analyze the results of PCP documentation, make adjustments, and address any barriers hindering the implementation process. The PDCA cycle can sustain the EHR support tool over time and encourage a systematic approach to BMI screening.

Implications for Practice Change

The evidence shows that implementing an EHR support tool to improve provider documentation compliance of the UDS quality metric: Adult BMI screening and follow-up would facilitate early diagnosis and management of obesity. Awareness of the adult BMI screening EHR support tool in the charting system and the link between documentation and federal funding was needed for the PCPs at the FQHC. The PCPs were overwhelmed with the charting and responsibilities for each patient visit. Aligning the work of the MAs and PCPs to collaborate on the completion of BMI screening and documentation would decrease the responsibilities of the PCP.

The project proposal was to integrate an existing EHR support tool for adult BMI screening and follow-up into PCPs daily practice. To properly implement the intervention, information was gathered from the PCPs and MAs on their current knowledge of the existing EHR support tool, which is a smart phase in the patient note. An educational in-service to educate and train the staff on the smart phase for BMI screening and follow-up documentation and the responsibilities of each staff was completed. Participants were provided with informational flyers and reminder cards for their computers. Evaluation of the practice change occurred continuously to determine the factors that facilitated and impeded EHR documentation and promoted adjustments accordingly. To ensure sustainability of the project, an interprofessional process of patient visits with the PCP and the MA was implemented and a project guide was given to the PCPs for future reference of the project.

The benefits to the FQHC included an interprofessional standardized practice for BMI screening documentation and improved knowledge of the necessary screening for PCPs. A standardized BMI screening improves PCP documentation compliance, increases the average completion rate of the UDS quality metric, and results in federal funding for the organization. BMIs outside of normal parameters would be detected more regularly, and follow-up plans for treatment can be addressed at every clinic visit for more patient accountability. In turn, the average BMIs within the clinic will potentially decrease, leading to less risk of comorbidities. Improving PCP documentation compliance of BMI screening and follow-up would improve obesity management and strengthen the clinic's health promotion initiatives.

Methods

This project was approved by the Institutional Review Board (IRB) at Arizona State University (ASU). The project site location was an FQHC primary care clinic. The project participants were five PCPs and seven MAs, who were 18 years or older and employed by the clinic. To ensure the protection of the participants, a signed copy of informed consent was obtained by each participant (See Appendix C, Figure C1).

All patient visits were eligible for the BMI screening if it had not been completed within the year. BMI screenings are an expected process of the clinic. The MAs completed the BMI measurement by measuring the patient’s height and weight for each visit and charted it in the EPIC charting system. If the BMI was not within normal parameters, the MA charted the corresponding BMI ICD-10 code and notified the PCP of the BMI. The PCPs completed a BMI intervention, like lifestyle modification counseling, during the patient visit and documented the BMI follow-up plan in the patient note with the .bmiadult smart phrase. The BMI screening was not completed if the patient was pregnant, receiving palliative care, refused, or it was an

emergency. Weekly check-ins with the participants were conducted to receive feedback on the process throughout the 8-week project.

Data was collected weekly to determine if the desired outcome of increased PCP documentation of adult BMI screening and follow-up was occurring. The data was collected from the EPIC EHR system with a chart audit form explicitly developed for this project by the co-investigator (See Appendix C, Figure C2). The validity and reliability of chart audits are subject to computer and human error, estimated to be about 5-10% (Siems et al., 2020). The data collected was de-identified for each participant and there was no patient information collected. The outcomes measured were the documentation of BMI ICD-10 codes and the .bmiadult smart phrase. The PCPs also completed an anonymous post-survey created by the co-investigator that included demographics and intervention feedback (See Appendix C, Figure C3). The data was then analyzed using descriptive statistics. As seen in the *The Budget Model*, the co-investigator printed and purchased material for the project which totaled $36.12 (See Appendix C, Table C4). There was no funding for this project and no conflicts of interest to disclose.

Results

Intellectus Statistics™ software (2023) was used to store, manage, and analyze data. Demographic information, the number of BMI ICD-10 codes charted, and the number of adult BMI smart phrases charted were analyzed through descriptive statistics. Qualitative data regarding the intervention implementation was also analyzed using descriptive statistics.

Frequencies and Percentages

Intervention data was collected on 843 eligible charts over an 8-week period using a chart audit form at the FQHC (Siems et al., 2020). The chart documentation was completed by PCPs (*n*=5). Four PCPs were either a PA 2 (40%) or MD 2 (40%). One of the PCPs was an NP 1

(20%). The majority of the PCPs worked full-time 4 (80%). The remainder worked part-time 1 (20%). The PCPs average years of experience was 7 (*SD*=3.96). The years ranged from 2 to 12 years of experience. The average hours worked weekly for each PCP were 34.40 (*SD*=12.52). The hours worked per week ranged from 12 to 40 hours.

BMI Screening and Follow-up Plan Completed

It was observed that out of 843 eligible charts for BMI screening, a BMI ICD-10 code was charted in 235 (27.88%) charts and there were 608 (72.12%) charts that did not include a BMI ICD-10 code. The follow-up intervention plan using the .bmiadult smart phrase was documented in 191 (22.66%) charts and it was not documented in 652 (77.34%). The .bmiadult smart phrase and a BMI ICD-10 code were both documented in 187 (79.57%) charts. A BMI ICD-10 code was documented, but the .bmiadult smart phrase was not in 48 (20.43%) charts. The .bmiadult smart phrase was documented in 4 (0.66%) charts, but the BMI ICD-10 code was not. Both the .bmiadult smart phrase and BMI ICD-10 code were not documented in 604 (99.34%) charts (See Appendix D, Table D1).

Post-Survey

The PCPs (*n*=5) completed a post-survey after the intervention. The majority of the PCPs 3 (60%) stated they screen for BMI as needed based on clinical judgment. The other PCPs 2 (40%) stated they screen for BMI at every visit. The majority of the PCPs 3 (60%) stated the .bmiadult smart phrase was very user friendly, while the other PCPs stated neutral 1 (20%) and somewhat user friendly 1 (20%). The barriers to BMI screening noted by the PCPs were that it is hard to remember 1 (20%), there are multiple patient complaints 1 (20%), there are short visit times 2 (40%), and no time to complete charting 1 (20%). The majority of PCPs stated that they often 2 (40%) or sometimes 2 (40%) documented the .bmiadult smart phrase and one PCP 1

(20%) stated never. The PCPs noted that the guidelines for BMI screening and follow-up were very clear 2 (40%) somewhat clear 1 (20%) and neutral 2 (40%). The majority of the PCPs 3 (60%) documented all of the listed BMI follow-up interventions with the .bmiadult smart phrase: Referral to a dietitian, dietary counseling, exercise recommendations, follow-up appointment, medication adjustment. The remaining PCPs documented referral to a dietitian, dietary counseling, exercise recommendations 1 (20%) and dietary counseling, exercise recommendations 1 (20%). The majority of the PCPs were very satisfied 2 (40%) and satisfied 2 (40%), however the remaining PCP was neutral 1 (20%) with the EHR support tool. All of the PCPs confirmed they received training on the BMI screening documentation with the .bmiadult smart phrase. The majority of the PCPs noted the training was very adequate 3 (60%) and the remaining PCPs noted the training was either adequate 1 (20%) or neutral 1 (20%) (See Appendix D, Table D2).

Clinical Significance

While there was no statistical significance after the implementation of the EHR support tool, the project is clinically significant to the FQHC, PCPs, and patients. The .bmiadult smart phrase was charted in about 80% of the charts that included a BMI ICD-10 code. This indicates that follow-up intervention plans were completed for patients with BMIs outside of normal parameters, which directly correlates with the USPSTF clinical guideline. The majority of the PCPs indicated a positive experience with the EHR support tool, but recognize there are still barriers. The EHR smart phrase standardizes the BMI screening documentation process for PCPs and initiates BMI interventions earlier for patients, encouraging open conversations about weight and lifestyle changes.

Impact & Sustainability of Project

By tracking the implementation of the EHR support tool at the FQHC, it revealed the impact that not documenting the adult BMI screening and follow-up measure had on the practice. It demonstrated that the FQHC continues to not qualify for the full federal reimbursement potential. While lack of federal reimbursements may not directly affect the PCPs' income, with continued failure to meet UDS quality metrics, the PCPs' income could be impacted drastically. Reassessing the implementation of the EHR support tool into routine clinical practice should be completed using the PDCA cycle and the Diffusion of Innovation theory can help gain more screening awareness from PCPs. As PCPs continue to screen for BMI and provide a follow-up plan at every clinic visit, patients will associate the screening with routine health management. Integrating an EHR support tool that automatically populates can ensure the sustainability of the intervention at the FQHC.

Discussion

The results of this quality improvement project indicate that the integration of an existing EHR support tool through interprofessional collaboration has a marginal impact on provider compliance with the UDS quality metric for adult BMI screening and follow-up. While the intervention did not achieve full compliance, the increase in BMI screening documentation suggests that the structured approach helped to standardize the process and reduce barriers to documentation. PCPs at FQHCs are required to document UDS quality care measures for practice compliance and federal reimbursements. Standardized BMI screening and follow-up in primary care is critical to preventing and managing obesity comorbidities. A PCP plays an essential role in addressing a patient's BMI and properly documenting it for quality compliance and continued monitoring of patient. When a PCP consistently provides BMI screening and intervention with appropriate documentation, patients will expect routine screening and actively

engage in their personal health. Just verbally addressing BMI intervention during a patient visit hinders the continued care and accountability of the patient. An EHR support tool to standardize BMI screening and documentation can assist a PCP in clinical practice.

The findings of this project align with the existing literature, which shows an EHR support tool can facilitate increased early detection and intervention for UDS quality care measures, but there are barriers to adoption in practice (Pierce et al., 2025). Multiple studies have recently revealed that patient and provider motivation, high patient loads, and complex EHR systems impact a provider's compliance with preventive screenings; however, optimizing the EHR and education in a multicomponent strategy has the potential to increase screening rates (Braddock et al., 2024; Buzancic et al., 2024; Groner et al., 2025). Prior to the project, PCPs expressed being unaware of the specific documentation requirements for BMI screening, leading to inconsistent charting. The post-intervention results showed notable improvement in BMI ICD-10 code and follow-up plan documentation. This demonstrates that the .bmiadult smart phrase facilitated PCP compliance. One of the key observations from the project was the discrepancy between BMI ICD-10 code (27.88%) and .bmiadult smart phrase documentation (22.66%). While there was an increase in both measures post-intervention, the gap suggests that some PCPs ensured documentation of a BMI diagnosis but did not consistently use the smart phrase in the patient note. Despite the improvements, the overall documentation rate remained suboptimal and inconsistent, indicating that additional strategies may be necessary to improve compliance further.

Limitations

While all of the PCPs at the FQHC received education throughout the project on the EHR support tool, some eligible charts did not have the smart phrase documented as directed. This

lack of consistency was sighted in the post-survey by the PCPs as there being limited time and too many patient diagnoses to address. Some of the PCPs described that the EHR support tool was still difficult to remember to use and an automated one that they did not need to search for would optimize BMI screening documentation compliance (See Appendix D, Table D2). Also, the reliance on the MAs to input the BMI values and notify the PCPs may have contributed to inconsistencies in follow-up documentation. Data analysis also did not include MAs, which provides a limited perspective. Regarding federal reimbursement, there was no specific dollar amount for PCPs to visualize how it affected their individual pay, making the incentive to participate in the project less appealing. Future improvements could involve creating an automated EHR support tool, refining the workflow, and developing more incentive to guarantee all necessary steps are completed systematically.

Recommendations for Further Study

Exploring how to improve PCP engagement should be the focus of future studies. Gaining support from the FQHC administration to analyze trends in federal reimbursements based on BMI screening documentation and the direct impact is prevalent to PCP engagement. To further encourage PCP engagement, an automated EHR support tool for adding ICD-10 codes based on BMI values would reduce the documentation burden of PCPs. Continuing to reassess staff morale periodically of BMI screening documentation and implementing their feedback can aid in the full adoption of the quality initiative.

Conclusion

Obesity rates continue to rise and there is low BMI screening compliance in the primary care setting. FQHCs are required to screen for BMI and document follow-up intervention annually to qualify for federal reimbursements and adhere to the national recommendations.

Implementing a standardized screening process through an EHR support tool, along with provider education, is an effective strategy for improving PCP compliance with adult BMI screening and follow-up documentation at an FQHC. While the project led to improved documentation rates, challenges such as PCP time constraints, EHR complexity, and workflow inefficiencies persist. Addressing these barriers through continued education, an automated EHR support tool, and sustained quality improvement efforts will be essential for sustainability of BMI screening and follow-up documentation by PCPs. By improving documentation compliance, FQHCs can enhance early obesity diagnosis and intervention, reduce obesity-related comorbidities, and secure critical federal funding for preventive care.

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Appendix A

Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Lee et al., (2023), An electronic medical record (EMR) prompt improves screening rates for metabolic conditions among children with obesity **Country:** United States **Funding:** None disclosed **Bias:** One author received a research	Socio-Technical Theory	**Design:** Quasi-experimental, cohort study **Purpose:** Evaluate an EMR prompt on metabolic screening rates, BMI decrease, and health referrals	**N=** 5,484 total patients, 3,479 before int., 3,439 after int., 1,564 BMI subset cohort **Demographics:** Age 10-18 y/o Mean age 14 y/o BMI > 95th percentile 42% female 56% Hispanic 16% most DN 30% least DN **Setting:** 5 outpatient	**IV1:** EMR automated prompt with a lab panel **DV1:** Decrease in BMI **DV2:** Clinical comorbidities **DV3:** Metabolic lab orders and completion **DV4:** Referrals to and visits with health educators **Definitions: Clinical comorbidities-** HTN, asthma, bullying	**Tools:** EMR prompt & data collection **Validity/ Reliability:** Based on clinical guidelines and standardized EMR prompts, subject to marginal computer and human error, about 5-10%	**Statistical Tests Used:** Summary Statistics- mean, SD, median values Prevalence rates Generalized linear models Normal distribution Binomial distribution	**DV1:** No significant BMI mean change (-0.13 percentile, p = 0.06, mean BMI *z* score -0.004, p =0.44) **DV2:** Similar in pre/post cohorts, except increase in PreDM (0.6% vs 1% p < 0.0001), HbA1c >5.7% (3% vs 6% p < 0.0001), triglycerides (11% vs 20% p < 0.0001), low	**Level of Evidence**: III **Strengths**: Large population, single data set collection, continuity of care **Weakness**: Non-RCT, short F/U period, only 4.1% attended health education referral, BMI *z* scores compressed at higher weight limiting the change seen, no significant change in BMI, localized

Key: **ALT** Alanine Transaminase, **AOR** Adjusted Odds Ratio, **ASD** Autism Spectrum Disorder, **BPA** Best Practice Advisory, **BMI** Body Mass Index, **CDS** Clinical Decision Support, **CG** Control Group, **CHB** Chronic Hepatitis B, **CI** Confidence Interval, **CMS** Centers for Medicare and Medicaid Services, **CRT** Cluster Randomized Trial, **DM** Diabetes Mellitus, **DN** Deprived Neighborhood, **DV** Dependent Variable**, EHR** Electronic Health Record, **EMR** Electronic Medical Records, **F/U** Follow-up, **Int** Intervention, **HbA1c** Hemoglobin A1c, **HBsAg** Hepatitis B Surface Antigen, **HC** Healthcare, **HCV** Hepatitis C Virus**, HDL** high-density lipoprotein, **HIV** Human Immunodeficiency Virus, **HLD** Hyperlipidemia, **HMT** Health Maintenance Table, **HPV** Human papillomavirus, **HTN** Hypertension, **IG** Intervention Group, **Int**. Intervention, **IV** Independent Variable**, KPNC** Kaiser Permanente Northern California, **LDCT** Low-Dose Computed Tomography, **OR** Unadjusted Odds Ratios, **PC** Primary Care, **RCT** Randomized-Controlled Trial, **SD** Standard Deviation, **UFCOM** University of Florida College of Medicine, **USPSTF** U.S. Preventive Services Task Force

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
grant from Dexcom, Inc. Research project manager of KPNC family medical program guided the study, predominately Hispanic population			pediatric and family medicine clinics in the KPNC regions **Exclusion:** Patients with DM, labs within 3 years, extremely high or low BMI **Attrition:** Not reported	victims, DM, PreDM, fatty liver, HLD, ASD, depression **Metabolic labs-**ALT, HbA1c, Lipid panel		Sensitivity analysis	HDL (7% vs 13% p < 0.0001) **DV3:** Lab orders increased (2% vs 52% p<0.0001) Lab completion no change (53% vs 51% p = 0.81) **DV4**: Referrals increased (0.4% vs 7% p<0.0001) Visits to health educators increased not significantly (38% vs 56% p = 0.22)	to one region, variation in the implementation of workflow **Feasibility**: Generalizability of EHRs prompts for many health conditions **Application**: Implementation of EMR prompt for large HC system, may be some provider apprehension
Steinberg et al., (2023), Electronic health record prompt to improve lung cancer screening in primary care	Socio-Technical Theory	**Design:** Quasi-experimental **Purpose:** Evaluate EHR prompt on lung cancer screening rates	**N=** 48,704 patient visits, 24,348 before int., 24,356 after int. **Demographics:** 55-80 y/o Average age 64	**IV1:** 2 EHR automated prompt for tobacco use and LDCT eligibility **DV1:** Data completeness for LDCT eligibility	**Tools:** EHR prompt & data collection Augmented tobacco risk assessment tool integrated into EHR	**Statistical Tests Used:** Logistic regression models Prevalence rates	**DV1:** EHR prompt was significantly associated with complete data (AOR=1.19, 95% CI=1.15, 1.23, p<0.05), % of patient visits with complete data	**Level of Evidence**: III **Strengths**: Large sample, simplified lung cancer screening, decision-making support

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Country: United States **Funding:** No outside funding source **Bias:** No conflict of interest disclosed			60% female 43% White 45% Medicaid 30% Uninsured 10% Current smoker 30% Former smoker 60% Never smoked 4.1% 30+ pack years 65% <30 pack years 16% Not quit within 15 years 10% Quit within 15 years **Setting:** Rutgers Robert Wood Johnson Medical Group PC clinics **Exclusion:** Limited life expectancy, not a	**DV2:** LDCT eligibility **DV3:** LDCT order **Definitions: Data completeness-** smoking status, year started, cigarettes/day, calculated park-years. Counseled to stop, patient characteristics **LDCT eligibility-** USPSTF guideline current smoker or former smoker quit past 15 years or less, aged 55-80, with 30+ pack-years	**Validity/ Reliability:** Based on clinical guidelines and standardized EHR prompts & assessment tools, subject to marginal computer and human error, about 5-10%	Adjusted odds ratio Confidence interval Generalized estimated equations	increased (63% to 68%) EHR prompt effectiveness did not vary among patient demographics **DV2:** Higher odds of identifying patients eligible for LDCT after the prompt (1.6% to 2.6%, AOR=1.59, 95% CI=1.38, 1.82, p<0.05) **DV3:** LDCT orders increased (14.6% to 36.6%, AOR=1.04, 95% CI=1.01, 1.07, p<0.05).	**Weakness**: Non-RCT, smoking status could have changed, could be inaccuracies in smoking data, unclear if LDCTs completed, 2013 USPSTF guidelines, did not address shared decision making **Feasibility**: Generalizability of EHRs prompts for many health conditions **Application**: Implementation of EHR prompt for large HC system, may be some provider apprehension

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
			candidate for lung cancer treatment **Attrition:** Not reported					
Tapp et al., (2020), Electronic medical record alert activation increase hepatitis C and HIV screening rates in primary care practices within a large healthcare system **Country:** United States **Funding:** FOCUS Program **Bias:** No conflict of interest disclosed	Diffusions of Innovation Theory	**Design:** Quasi-experimental **Purpose:** Evaluate EMR alerts on HCV and HIV screening rates	**N=** 60,422 HCV 109,173 HIV **Demographics:** Mostly Caucasian 60% female **HCV:** Born 1945-1965 **HIV:** 18-64 y/o **Setting:** 12 PC offices in Charlotte, NC. **Exclusion:** Hospice care diagnosis No HIV diagnosis or test No HCV diagnosis or antibody testing	**IV1:** 2 EMR automated prompts for HCV and HIV screening **DV1:** HCV screening documented **DV2:** HIV screening documented **Definitions:** none	**Tools:** EMR prompt & data collection **Validity/ Reliability:** Based on clinical guidelines and standardized EMR prompts, subject to marginal computer and human error, about 5-10%.	**Statistical Tests Used:** Chi-square tests	**DV1:** HCV screening increased 19.5% ($p<0.001$) **DV2:** HIV screening increased 5.1% ($p<0.001$)	**Level of Evidence**: III **Strengths**: Large population, decision-making support **Weakness**: Non-RCT, small percentage eligible population, screening outside 12 offices excluded, small region **Feasibility**: Generalizability of EMRs prompts for many health conditions

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
			Attrition: Not reported					**Application**: Implementation of EMR alerts for large HC system, may be some provider apprehension
Romero de Mello Sa et al., (2020), Improving preventive care for women through a provider reminder tool **Country:** United States **Funding:** UFCOM Medical Student Research Program **Bias:** No conflict of interest	Socio-Technical Theory	**Design:** Quasi-experimental **Purpose:** Evaluate an HMT as an EMR provider reminder tool for breast and cervical cancer screenings and HPV vaccination	**N=** 620 women **Demographics:** Female 18-74 y/o **Setting:** Internal Medicine Clinic at UFCOM **Exclusion:** History of breast cancer or abnormalities, cervical cancer or abnormalities, positive HPV testing, total hysterectomy	**IV1:** HMT EMR provider reminder tool **DV1:** Breast cancer screening **DV2:** Cervical cancer screening **DV3:** HPV vaccination **Definitions:** **HMT-**Health maintenance table auto-populates for providers to fill out/update for each patient	**Tools:** HMT & EMR data collection **Validity/ Reliability:** Based on USPSTF guidelines, subject to marginal computer and human error, about 5-10%	**Statistical Tests Used:** Two-Tailed X^2 Analyses Binomial logistic regression analyses OR & CI	**DV1**: increased 4x (OR 4.008, 95% CI 2.086–7.701, P= 0.000) **DV2**: increased 3.3x (OR 3.295, 95% CI 1.583–6.861, P= 0.001) **DV3**: increased 4.3x (OR 4.321, 95% CI 1.790–10.430, P=0.001)	**Level of Evidence**: III **Strengths**: decision making support, 3 preventive services evaluated **Weakness**: Non-RCT, one clinic, providers have to update the HMT actively **Feasibility**: Generalizability of EMRs prompts for many health conditions

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
			Attrition: Not reported					**Application**: Implementation of EMR reminder tool for providers to actively engage in preventative care services, may be some provider apprehension
Chak et al., (2018), Electronic medical alerts increase screening for chronic hepatitis b: A randomized, double-blind, controlled trial. **Country:** United States **Funding:** Centers for Disease Control and Prevention, National Institutes	Technology Acceptance Model	**Design:** RCT-Double Blinded **Purpose:** Measure the effect of EHR alert on CHB screening	**N=** 2,987 IG=1,484 CG=1,503 **Demographics:** 18 & older Foreign-born Asian and Pacific Islander 45% male **Setting:** UC Davis Health System-Outpatient **Exclusion:**	**IV1:** EHR alert **Control:** No EHR alert **DV1:** HBsAg blood test completion **DV2:** Difference in HBsAg positivity **Definitions:** **HBsAg positivity**-CHB	**Tools:** EHR alert & data collection **Validity/ Reliability:** Alert based on USPSTF guidelines, automated alert, but subject to marginal computer and human error, about 5-10%	**Statistical Tests Used:** Fisher's exact test Wilcoxon rank-sum test Multivariable logistic regression	**DV1:** IG-8% completion CG-3.2% completion (OR 2.64, 1.88-3.73, p<0.001) **DV2:** IG-3.4% HBsAg positive CG-10.4% HBsAg positive (OR 0.30, 0.08-1.17, p=0.12)	**Level of Evidence**: II **Strengths**: RCT, clinical decision support **Weakness**: No CMS patients, primarily younger population, may have misclassification of ethnicity in system, other risk groups were not screened, low completion rate,

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
of Health, & National Center for Advancing Translational Sciences **Bias:** One author received speaker's bureau honoraria from Gilead Science			CMS insurance Previous CHB screening in system **Attrition:** Not reported					HBsAg positivity increased in CG **Feasibility**: Generalizability of EHRs prompts for many health conditions **Application**: Implementation of EHR alert for providers to order preventative care services, may be some provider apprehension
Wray et al., (2018), Improving documentation of pediatric height, weight, and body mass index by primary care providers **Country:** Canada	Social Cognitive Theory	**Design:** Mixed-methods: Pre-post study & qualitative exploratory **Purpose:** **Quantitative:** Measure the effect of EMR reminder on the	**N=** 432,450 children examined 13 providers **Demographics:** Children 4-7 y/o Family practice medical doctors or nurse practitioners	**IV1:** EMR alert for BMI not recorded in over 1 year **DV1:** Provider documentation rate of BMI in EMR system **Definitions:** None **Qualitative Themes:**	**Tools:** EMR alert & data collection **Validity/ Reliability:** Alert based on Canadian guidelines, automated alert, but subject to marginal computer and	**Statistical Tests Used:** X^2 analyses z-tests analyses **Qualitative Data Analysis**:	**DV1**: 9% increase in documentation rate ($p<0.01$) **Qualitative Findings:** 1. EMR system should calculate and plot BMI	**Level of Evidence**: III **Strengths**: Mixed-methods, explored barriers & generated interest in EMR alert prior to implementation **Weakness**: limited provider

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Funding: Central Michigan University Global Campus Graduate Studies Student Research and Creative Endeavor grant **Bias:** Authors declared no conflict of interest		rate of provider recording BMI for 4–7-year-old patients 6 months before and after EMR reminder alert. **Qualitative:** Understand the barriers to the EMR system and improvement needed for provider health management of children with obesity	**Setting:** Southwestern Ontario family practice clinics **Exclusion:** Non-provider staff **Attrition:** Not reported	**RQ1**: Clinician satisfaction with current EMR system **RQ2:** provider health care practices relating to weight management, health eating, and physical activity for children 2 to 17 years old	human error, about 5-10% **Qualitative Data Collection**: two online surveys	Themes in textual data	directly into growth chart. 37% providers are dissatisfied with current EMR 2. Height and weight were most likely to be recorded at well child visit. Top barrier to health management is time. Top improvement for health management is easy to understand patient management guidelines	approval, not an RCT, varying attitudes towards obesity, did not include providers in EMR decision. **Feasibility**: Generalizability of EMRs alerts for many health conditions **Application**: Implementation of EMR alert for providers to document BMI for children gives opportunity for early obesity intervention

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Ramirez et al., (2018), Primary care provider adherence to an alert for intensification of diabetes blood pressure medications before and after the addition of a "chart closure" hard stop **Country:** United States **Funding:** Grants from the Agency for Healthcare Research and Quality, the National Center for Advanced Translational Science, & California Medicare/Medicaid Science System	Technology Acceptance Model	**Design:** Quasi-experimental, pre-post study **Purpose:** Evaluate provider responses to BPA alert with chart closure- hard stop for BP medications for persons with DM	**N=** 284 alerts for 89 providers 219 patients **Demographics:** Patients with DM & high BP 140/90, no BP medication, 18-75 y/o, not pregnant **Setting:** 8 UCLA PC clinics **Exclusion:** Isolated high BP event, inappropriate BPA **Attrition:** 107 inappropriate BPA alerts (37.7%)	**IV1:** BPA alert chart closure hard stop **DV1:** Provider response to BPA alert chart closure hard stop **DV2:** Provider order BP medication **Definitions: BPA alert**- a clinical decision support tool for real-time guidance for providers in EHR system	**Tools:** BPA alert & EHR data collection **Validity/ Reliability:** Alert based on clinical guidelines, automated alert, but subject to marginal computer and human error, about 5-10%	**Statistical Tests Used:** Descriptive statistics Fisher's exact tests	**DV1:** about 75% increase in response ($p<.001$) **DV2:** increased 41.2% to 75% ($p=.001$)	**Level of Evidence**: III **Strengths**: recognized specificity of BPA alert, practical implications, relance to chronic disease management **Weakness**: single-arm, time series study, small sample size, short study period, no qualitative data of provider response insight **Feasibility**: Generalizability of EHRs alerts for many health conditions **Application**: Implementation of

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reform Incentive Program **Bias:** Authors declared no conflict of interest								hard stop alerts for providers to improve medication prescribing, enhance clinical decision support, and reduce medication errors
Chen et al., (2023), Monitoring the implementation of tobacco cessation support tools: Using novel electronic health record activity metrics **Country:** United States **Funding:** US National Institute of Health	Diffusions of Innovation Theory	**Design:** Mixed-methods: Quasi-experimental & qualitative exploratory **Purpose:** **Quantitative:** Monitor the implementation of two CDS tools over 12 months: screening alert to complete smoking assessment & support alert for treatment options	**N=** 180,647 patient encounters **Demographics:** Most white, 59-67 y/o, smoking rate 9-18% **Setting:** 7 cancer out-patient clinics **Exclusion:** Non-cancer clinic	**IV1:** Two BPA alerts **DV1:** Provider completion rate of screening alert to complete smoking assessment **DV2:** Provider completion rate of support alert for treatment options **Definitions: Treatment-** discussion or referral **Qualitative Themes: RQ1**: Did the alert completion rate	**Tools:** EHR alert & EHR data collection metrics **Validity/ Reliability:** Alert based on clinical guidelines, automated alert, but subject to marginal computer and human error, about 5-10% **Qualitative Data Collection**: EHR data collection	**Statistical Tests Used:** Statistical software package: STATA/MP 15.1 **Qualitative Data Analysis**: Themes in EHR data collection	**DV1**: Provider acknowledged the alert 55% and completed the alert 32% **DV2:** Provider discussed treatment options 60% and referred 2%. **Qualitative Findings:** **1.** Completion rate varied across clinics &	**Level of Evidence**: III **Strengths**: Automatic metrics for monitoring EHR activity, quality improvement intervention **Weakness**: Limitation to EHR data collection **Feasibility**: Implementation of EHR monitoring metrics for EHR alerts is not

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Bias: One author is an EHR consultant		**Qualitative:** Monitor the variation, burden, and factors associated in alert completion for tobacco cessation	**Attrition:** Not reported	change over time or vary across clinics **RQ2:** What was the burden introduced by the alerts **RQ3:** What factors were associated with variation in alert completed			was higher for relevant perceived encounters compared to routine by providers **2.** Postponing the alert did not save provider time compared to completing it **3.** Patient's readiness to quit	feasible for this project, but and EHR alert is still applicable **Application**: The EHR metrics are scalable and adaptable to other settings that use EHR alerts to promote adherence to health care guidelines
Ose et al., (2023), Electronic health record-driven approaches in primary care to strengthen hypertension management among racial and ethnic minoritized	Intervention Review	**Design:** Systematic review **Purpose:** Examine EHR in supporting PC interventions for hypertension management of racial and ethnic	**N=** 29 studies with a total of 73,039 patients **Study characteristics:** 18 y/o or older 90% African American patients	**IV1:** EHR system **DV1:** Identifying eligible patients **DV2:** Driving interventions, including EHR alerts **DV3**: Monitoring results, including BP	**Tools:** Manually screened by 3 authors **Validity/ Reliability:** Subject to human error about 5-10%	**Statistical Tests Used:** Risk of bias assessment performed manually	**DV1:** 86% of studies used EHR to identify eligible patients **DV2:** 72% of studies used EHR for BP interventions. 6 studies reported	**Level of Evidence**: I **Strengths**: Revealed the EHR system can serve multiple roles for health care management

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
groups in the united states: Systematic review **Country:** United States **Funding:** Utah Department of Health and Human Services **Bias:** None declared		minoritized groups	18 RCT 8 CRT 8 Non-RCT All studies tested EHR intervention for BP management in PC	changes, medications, labs **Definitions: Interventions**-EHR change to improve BP			EHR alerts for BP managements, all reported significant increase in BP management outcomes **DV3**: 59% of studies used EHR to monitor results	**Weakness**: only 6 studies focused on EHR alerts, analysis performed manually **Feasibility**: Implementation of EHR interventions is applicable to many health care conditions **Application**: EHR alerts for better health care outcomes can be used for early identification and patient-tailored treatment
Gangadhar et al., (2018), Effectiveness of a cloud-based EHR clinical decision support program	Technology Acceptance Model	**Design:** RCT **Purpose:** Measure effectiveness of CDS programs	**N=** 39,761 providers IG= 4,987 practices, 33,445 providers	**IV1:** CDS system **Control**: No CDS system	**Tools:** EHR alert & data collection **Validity/ Reliability:**	**Statistical Tests Used:** Mann-Whitney tests	**DV1:** Recorded BMI in IG 28% Vs CG 12.1% ($p<0.01$)	**Level of Evidence**: II **Strengths**: RCT, large sample size, improve obesity

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
for body mass index (BMI) screening and follow-up **Country:** United States **Funding:** A manufacturer of a chronic weight management treatment **Bias:** None declared		and discover improvements in patient outcomes associated with CDS programs	CG= 881 clinics, 6,316 providers 1,154,304 total patients **Demographics:** Outpatient clinics with patients 18 years & older meeting CDS alert criteria of obesity and BMI recorded previously **Setting:** outpatient clinic **Exclusion:** Pregnant women, palliative care, refused BMI measurement, urgent or emergent situation	**DV1:** BMI not recorded alert completion rate **DV2:** Overweight, document follow-up plan alert completion rate **DV3**: Underweight document follow-up plan alert completion rate **Definitions:** **CDS system-** 3 computer-based alerts **Overweight**-BMI over 25 **Underweight-** BMI less than 18.5	Alert based on USPSTF guidelines, automated alert, but subject to marginal computer and human error, about 5-10%	Chi-squared tests	**DV2:** 9.8% IG Vs no change in CG ($p<0.01$) **DV3**: 7.7% IG Vs no change in CG ($p<0.01$)	identification and interventions **Weakness**: Increase in BMI recorded, short follow-up period, test & control groups not selected based on patient demographics **Feasibility**: EHR is widely used in PC & EHR alerts can be applied to weight management practices for clinical support & better patient outcomes **Application**: CDS systems can be effective tools to increase provider compliance with

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			Attrition: Not reported					preventive care guidelines

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Table A2

Synthesis Table

Study (Author, year)	Lee et al., 2023	Steinberg et al., 2023	Tapp et al., 2020	Romero de Mello Sa et al., 2020	Chak et al., 2018	Wray et al., 2018	Ramirez et al., 2018	Chen et al., 2023	Ose et al., 2023	Gangadhar et al., 2018
Design LOE	Quasi-experimental, cohort; III	Quasi-experimental; III	Quasi-experimental; III	Quasi-experimental; III	RCT-Double Blinded; II	Mixed-Methods; III	Quasi-experimental; III	Mixed-Methods; III	Systematic Review; I	RCT; II
Sample										
n subjects	5,484	48,704	169,595	620	2,987	432,450	219	180,647	73,039	1,154,304
Age Group (yrs)	10-18	55-80	18-64	18-74	18 & older	4-7	18-75	59-67	18 & older	18 & older
Country	US	US	US	US	US	Canada	US	US	US	US
Setting										
PC		X	X			X	X		X	
OP	X			X	X			X		X
Interventions										
Multiple EHR Support Tools		X	X					X	X	X
Automated EHR Alert	X	X	X		X	X	X	X	X	X
Hard Stop Alert							X			
Passive Reminder Tool				X						
Use of EHR	X	X	X	X	X	X	X	X	X	X
Outcomes/ Themes										
Increased Provider Documentation	X	X	X	X	X	X	X	X	X	X
Increased BMI Screening Rates	X					X				X
Increased PCS Rates		X	X	X	X			X	X	
Increased Treatment/FU plan	X	X					X	X	X	X
Barriers to Documentation							X	X	X	

Key: **BMI** Body Mass Index, **EHR** Electronic Health Record, **FU** Follow-up, **LOE** Level of Evidence, **OP** Outpatient, **PC** Primary Care, **PCS** Preventive Care Screening, **RCT** Randomized-Controlled Trial, **US** United States

Study (Author, year)	Lee et al., 2023	Steinberg et al., 2023	Tapp et al., 2020	Romero de Mello Sa et al., 2020	Chak et al., 2018	Wray et al., 2018	Ramirez et al., 2018	Chen et al., 2023	Ose et al., 2023	Gangadhar et al., 2018
Improve Provider PCS Knowledge	X	X	X	X	X	X	X	X	X	X

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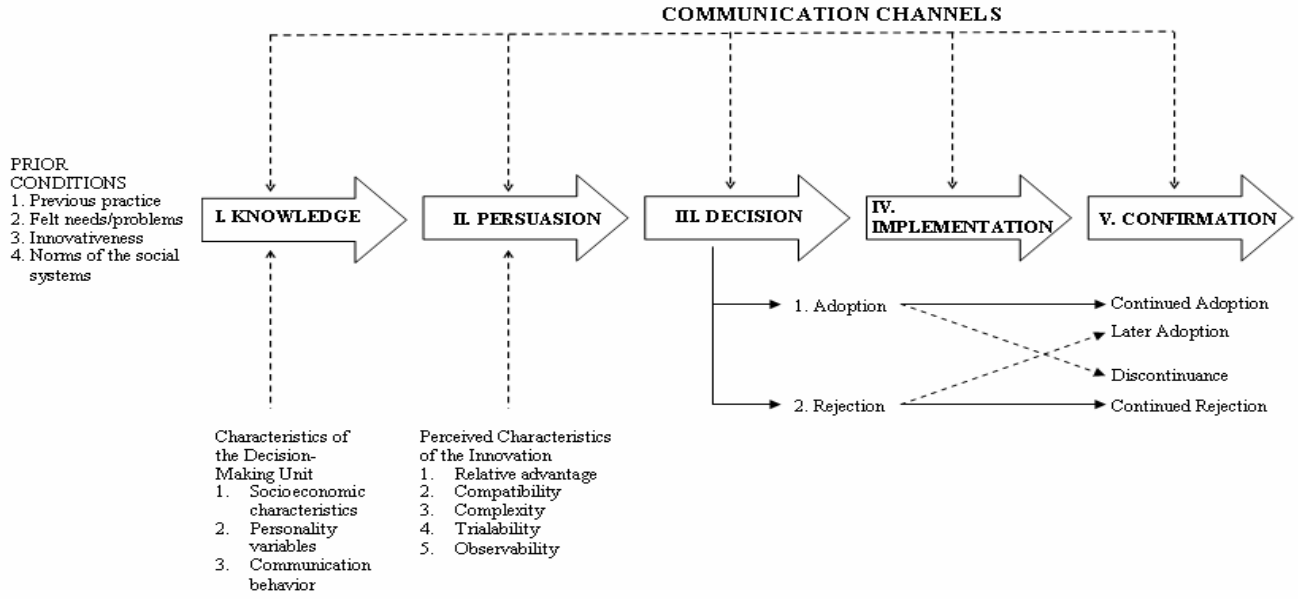
Appendix B

Models and Frameworks

Figure B1

Diffusion of Innovation Theory



(Rogers, 2003)

Figure B2

Plan-Do-Check-Act Cycle

(American Society for Quality, 2024)

Appendix C

Methods Tools

Figure C1

Consent Form

BMI Screening Project Consent Form

I am a doctoral nursing practice student under the direction of Dr. Samantha Rainwater, DNP, FNP-C in the Edson College of Nursing and Health Innovation at Arizona State University. I am conducting a quality improvement project to improve the Uniformed Data System quality metric: Adult BMI screening and follow-up provider documentation rates through integration of an established electronic health record support tool in practice.

I am inviting your participation, which will involve completing BMI screening and documentation during patient visits over eight weeks. There will be a 15-minute educational in-service regarding the project during a scheduled staff meeting. You will be asked to complete a post-survey at the end of the project that will take five minutes to fill out. The expected duration of your participation includes the time spent to complete the BMI screening and documentation during patient visits and the completion of the post-survey to assess the effectiveness and acceptability of the screening and documentation process.

Your participation in this quality improvement project is voluntary. If you choose not to participate or to withdraw from the quality improvement project at any time, there will be no penalty. You must be 18 or older to participate in the quality improvement project.

There are no foreseeable risks or discomforts to your participation. Although there is no direct benefit to you, possible benefits of your participation include contributing to improved BMI screening processes and potentially better health outcomes for patients. Confidentiality will be maintained. Your responses will be anonymous. The results of the quality improvement project may be used in reports, presentations, or publications, but your name will not be used.

If you have any questions concerning the research study, please contact the project team: Heather Halsey, hhalsey@asu.edu or Dr. Rainwater, Samantha.Rainwater@asu.edu.

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. By signing below, you are agreeing to be part of the study.

Name:

Signature: Date:

Figure C2

Chart Audit Form

Adult BMI Screening & Follow-up Documentation in EHR

Subject ID	Subject Role NP, MD, PA, DO	BMI ICD-10 Code Charted Yes or No	Adult BMI Smart Phrase Charted Yes or No

IRB Approval # _____ Date_____

Data Entry_____ Data Validation_____ Data Analysis _____

Figure C3

Project Post-Survey Form

Post-Questionnaire Survey for Providers and Medical Assistants on Adult BMI Screening and Follow-Up Documentation in the EHR System

---

Instructions: Thank you for participating in this survey and project. Your feedback is important for improving our BMI screening and follow-up documentation processes in the Electronic Health Record (EHR) system. Please answer the following questions by circling the answers or filling in the blank based on your experience.

Section 1: Demographic Information

1. **Role:**
    - NP
    - MD
    - PA
    - DO
    - Medical Assistant

2. **Years of Experience: _____ (years, months)**

3. **Hours Worked Weekly: _____**

4. **Are you employed:**
    - Full Time
    - Part Time

Section 2: BMI Screening Process

4. **How often do you perform BMI screening for adult patients?**
    - At every visit
    - At annual wellness visits only
    - As needed based on clinical judgment
    - Rarely or never

5. **How user-friendly do you find the BMI screening feature in the EHR system?**
    - Very user-friendly
    - Somewhat user-friendly
    - Neutral
    - Somewhat difficult
    - Very difficult

6. **Are there any barriers you encounter when performing BMI screenings?**
    - Yes, please explain in the space below
    - No

Section 3: Follow-Up Documentation

7. **How often do you document follow-up actions for patients with abnormal BMI?**
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never

8. **How clear are the guidelines for documenting follow-up actions in the EHR?**
    - Very clear
    - Somewhat clear
    - Neutral
    - Somewhat unclear
    - Very unclear

9. **What types of follow-up actions do you typically document for patients with abnormal BMI?** (Select all that apply)
    - Referral to a dietitian
    - Dietary counseling
    - Exercise recommendations
    - Follow-up appointment
    - Medication adjustment
    - Other, please explain in the space below

Section 4: EHR System Usability

10. **Rate your satisfaction with the EHR system's BMI documentation workflow:**
    - Very satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Very dissatisfied

11. **What improvements would you suggest for the BMI screening and follow-up documentation process in the EHR?**
    - Please explain in the space below

Section 5: Training and Support

12. **Have you received training on how to document BMI screenings and follow-up in the EHR system?**
    - Yes
    - No

13. **How adequate was the training you received?**
    - Very adequate
    - Adequate
    - Neutral

- Inadequate
- Very inadequate

14. **What additional training or resources would help you with BMI screening and follow-up documentation?**
    - Please explain in the space below

Thank you for your participation! Your feedback is essential for improving our EHR processes and enhancing patient care.

Table C4

The Budget Model

Direct Costs	
Printed 5 Project Guides	$5.50
Printed 10 Informational Flyers	$7.50
Printed 12 Consent Forms	$2.64
Printed 10 Reminder Cards Lamination & Velco	$20.48
Total	$36.12

Appendix D

Results

Table D1

Cross Table for BMI ICD-10 Code & Adult BMI Smart Phrase Charted

	BMI ICD-10 Code	
Adult BMI Smart Phrase	YES	NO
YES	187 (79.57%)	4 (0.66%)
NO	48 (20.43%)	604 (99.34%)
Total	235 (100.00%)	608 (100.00%)

Table D2

Frequency Table for Post-Survey Responses

Variable	*n*	*%*
BMI Screening Frequency		
As needed based on clinical judgement	3	60.00
Every visit	2	40.00
EHR BMI Screening Usability		
Very user friendly	3	60.00
Neutral	1	20.00
Somewhat user friendly	1	20.00
Barriers to BMI Screening		
Hard to remember	1	20.00
Multiple patient complaints	1	20.00
Short appointment times	2	40.00
No time to chart	1	20.00
Follow-up Documentation Frequency		
Often	2	40.00
Sometimes	2	40.00
Never	1	20.00
Clarity of Follow-up Guidelines		
Very clear	2	40.00
Somewhat clear	1	20.00
Neutral	2	40.00
Follow-up Plans Documented		
Referral to a dietitian, dietary counseling, exercise recommendations, follow-up appointment, medication adjustments	3	60.00
Referral to a dietitian, dietary counseling, exercise recommendations	1	20.00
Dietary counseling, exercise recommendations	1	20.00
EHR BMI Documentation Satisfaction		
Very satisfied	2	40.00
Satisfied	2	40.00
Neutral	1	20.00
Received Training on BMI Documentation		
Yes	5	100.00
Adequacy of Training		
Very adequate	3	60.00
Adequate	1	20.00
Neutral	1	20.00