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A resident-led project to improve documentation of overweight and obesity in a primary care clinic

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ABSTRACT

Background: Although the prevalence of overweight and obesity (OW/OB) has increased in the last three decades, studies show that these conditions are sub-optimally documented by physicians. Health information technology tools have varying effects on improving documentation of OW/OB but often have to be complemented with other interventions to be effective.
Objective: Upon identifying low rates of documentation of diagnoses of overweight and obesity by resident and attending physicians, despite the use of an electronic health record (EHR) with automated BMI calculations, we performed a quality improvement (QI) project to improve documentation of these diagnoses for patients in our community hospital primary care clinic.
Methods: The EHR was reviewed to determine documentation rates by resident and attending physicians between 1 March 2018 and 31 September 2018. We collected pre-intervention data, developed interventions, and implemented tests of change using Plan-Do-Study-Act (PDSA) cycles to improve documentation of OW/OB.
Results: Documentation of overweight and obesity diagnoses increased from a baseline of 46% to 79% over a 20-week period after initiation of our project.
Conclusion: We demonstrate the successful implementation of resident-led, multi-faceted interventions in a team-based QI project to optimize documentation of OW/OB in the EHR.

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Obesity; overweight; quality improvement; clinical documentation; health information technology; resident education

1. Introduction

Although overweight and obesity (OW/OB) are highly prevalent in the USA [1–3] with rates of obesity of 26% in 2–5-year olds and 39.6% in adults [1,2], patients with OW/OB are often underdiagnosed by both resident physicians and attending physicians [4–12]. Accurately diagnosing OW/OB is becoming increasingly important as Medicare increasingly ties reimbursement to the complexity of patients and meaningful use criteria [10]. Further, incorporating OW/OB into the problem list can be an important first step to tracking OW/OB over time and addressing this issue with patients [4,7,8].

Electronic health records (EHRs) can be harnessed to improve documentation of OW/OB [13,14]. However, despite increased use of problem-list documentation and use of health information technology (IT) tools such as automated calculation of BMI, BMI displays, and highlighting of abnormal BMI in EHRs which are compliant with federal meaningful use regulation [15] under-documentation of OW/OB still persists [16,17]. Some health IT strategies have been shown to improve obesity documentation but not overweight documentation [17]. Adjunctive strategies including education [13] have been found to bolster the benefits of EHRs in improving documentation of OW/OB but studies on optimizing EHR use to improve OW/OB documentation in both adults and children are limited.

Practice-based quality improvement (QI) projects complying with the Accreditation Council for Graduate Medical Education (ACGME) core competencies have the potential to support resident education in health-system benchmark metrics, including documentation, while improving practice. Yet, despite numerous studies characterizing low documentation rates or screening of OW/OB among resident physicians [5,12,18,19], there are few QI initiatives involving, or led by, residents [5,20] demonstrating successful implementation of QI strategies to tackle this under-documentation problem. The only previously published report chronicling a resident-led effort in improving BMI-based diagnoses focused on BMI screening for obesity, did not address overweight, focused only on adult patients, was performed in a setting with low rates of screening for obesity where BMIs were documented at a very low rate, and did not focus on documentation in an EHR. Therefore, our resident-led study which addresses documentation of OW/OB in

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both pediatric patients and adults, in a setting with low OW/OB diagnosis documentation rates despite high rates of screening for OW/OB and an EHR with automated BMI calculations and display is unique.

Incorporating known drivers of resident involvement in QI initiatives including practice-based learning and resident-initiated projects [21–24], we designed and implemented a resident-led QI project to improve documentation of OW/OB among physicians in our clinic.

2. Methods

2.1. Setting

2.1.1. Clinic setting and EHR

Patients who are cared for in our community-hospital-based primary clinic are from minority communities, with 60% identifying as Latino and 24% African American [25]. Patients are seen either by resident physicians with a supervising attending physician acting as the preceptor or by an attending physician working independently. All clinical documentation is done electronically in a commercial EHR (Epic® Systems Corporation, Verona, Wisconsin), which was implemented 10 months prior to the beginning of our study. In this EHR, patient BMIs and BMI percentiles (age and gender-corrected) are automatically calculated based on height and weight entered in vitals section and displayed at the top of every patient's record. Additionally, BMI in the obese range is automatically highlighted in yellow.

2.1.2. Residency program and QI curriculum

In our combined medicine and pediatrics (Med-Peds) four-year residency program, resident-led QI initiatives are undertaken as part of a required QI curriculum in which residents in their third year of residency (PGY 3) implement a Plan-Do-Study-Act (PDSA) cycle to improve an aspect of their practice. In the preceding years of residency, residents learn key concepts of improvement science through a written quality curriculum, didactic sessions led by faculty and self-directed learning.

2.2. QI team and study participants

After a preliminary data collection study revealing suboptimal documentation of OW/OB in a small sample of clinic patients, the lead author, a PGY-3 resident at the time, assembled and led a QI team comprising of all four PGY-3 residents in the program and two attending physicians, including the program director, to improve documentation of overweight and obesity in our clinic. Formal QI team meetings, held via conference call, were scheduled ahead of time to plan interventions, to discuss unexpected observations and problems encountered, study data and decide on improvements to be achieved. A total of 24 physicians (5 attending physicians and 19 resident physicians) received targeted interventions at various time-points during the duration of the study.

2.3. Interventions

To enable rational design of interventions, the QI team identified factors that drive the diagnosis of overweight or obesity would require providers to correctly interpret calculated BMIs as abnormal or within range for OW or OB. Primary drivers included correct interpretation of calculated BMI as abnormal and secondary drivers included measurement of height and weight by clinic staff (Figure 1).

Interventions were designed to target all physicians, both resident and attending physicians with a specific, measurable, achievable, relevant, and time-bound (SMART) aim [26] of increasing documentation of OW/OB to 80% within 7 months. Three PDSA cycles were performed, the first occurred prior to the 10th week of the project, the second prior to 19th week, and the third prior to the 27th week of the project. Interventions were implemented, within 2 weeks of each QI team meeting (Figure 2).

Given the success of using combinations of interventions in a previous quality improvement project in a resident clinic setting [27], we implemented sets of intervention rather than single interventions for every PDSA cycle. We paired educational tools with the provision of data-based feedback on provider documentation practices in each set of interventions given the success of these tools in other settings [28].

Intervention set 1 was comprised of pocket-size, laminated informational cards, visual aids attached to computers, and feedback on individual documentation rates provided to physicians via email. Criteria for overweight and obesity for pediatric and adult patients were outlined in informational cards and in miniature cards attached to computers used for clinical documentation in the EHR at the clinic. An electronic copy of informational cards was sent to newly recruited intern physicians when they joined our residency training program.

Intervention set 2 was comprised of a tutorial on access to BMI data and appropriate use of the problem list and encounter diagnosis sections of the EHR for documentation of diagnoses and display of individual provider diagnoses rates at the clinic. The tutorial, designed by QI team members, initially occurred as a 5-min session with an attending physician during pre-clinic conferences. Due to the difficulty of consistently providing in-person, face-to-face diagnosis tutorials given variations in arrival time of providers at the clinic and hectic schedules during clinic days, QI team members designed a step-by-step guide which was electronically distributed via email to all attending and resident physician.

Intervention set 3 was comprised of didactics and weekly reminders sent via email in a targeted manner to

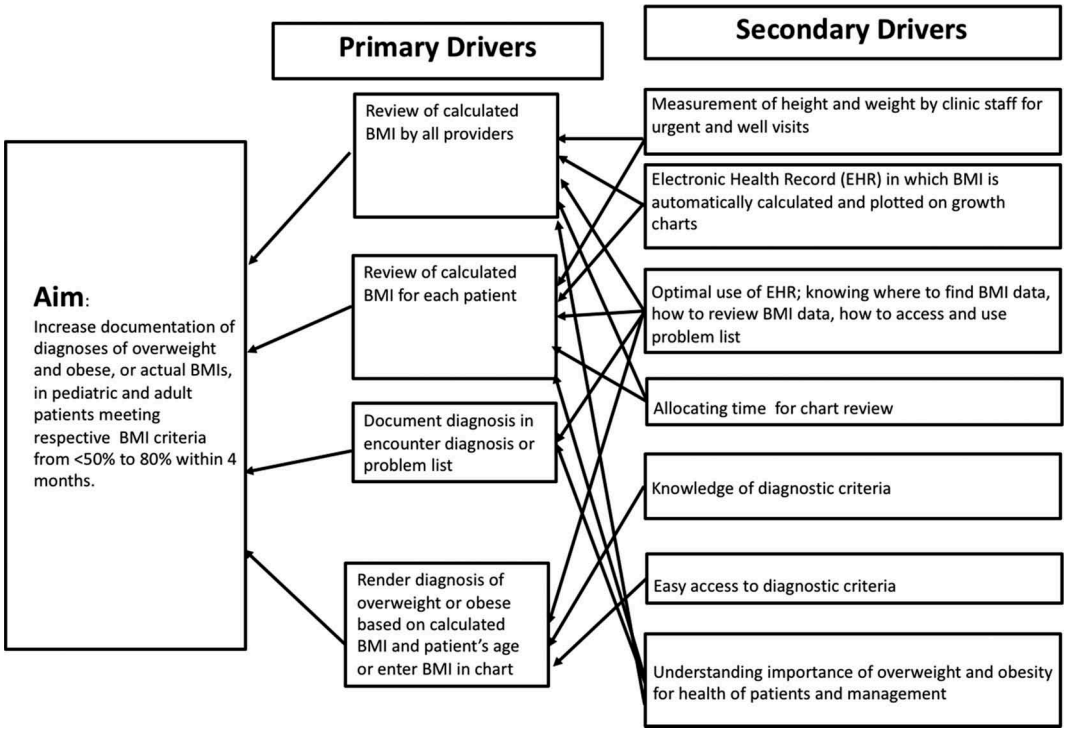

Figure 1. Driver diagram showing primary drivers that contribute directly to achieving the aim of our study and secondary drivers that are components of the primary drivers.

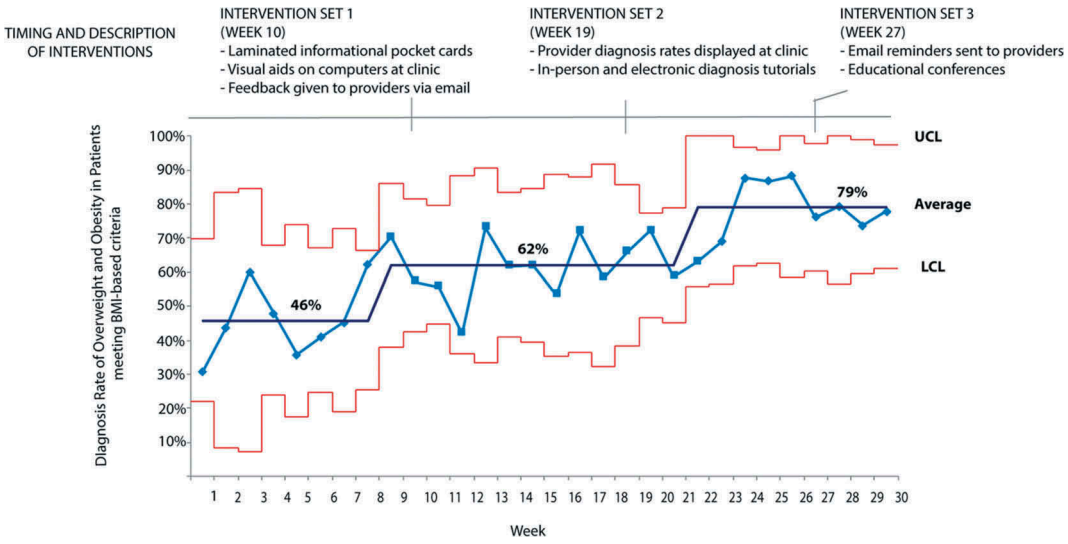

Figure 2. Control chart showing average weekly diagnosis rates of all patients with OW and OB.

resident and attending physicians scheduled to see patients at the clinic. Educational talks were led by faculty with expertise in OW/OB. The educational sessions addressed diabetes and metabolic syndrome in pediatric patients, bariatric surgery as an option for weight management in adult and pediatric patients and weight stigma in patients with obesity.

2.4. Data collection and analysis

Standardized definitions for OW and OB in children and adults were used [29]. Electronic health records (EHRs) of patients (between age 2–65 years) seen by a resident physician or attending physician were reviewed. Documentation rates of OW and OB, averaged over a 7-day period, from 1 March 2018 to 31 September 2018 (Week 1 to Week 30), were obtained by determining the proportion of patients with BMI in OW and OB ranges with appropriate documentation in the problem list or encounter diagnosis sections of the EHR at different time points.

Weekly documentation rates were plotted on a run chart during the study phase of each PDSA cycle to identify non-random signals of change in documentation rates. For statistical process control, a p-control chart was used to detect special cause variation. Both the run chart

and p-control chart were generated with Microsoft Excel QI Macros. For process measures an online survey, designed and distributed using Qualtrics (Provo, Utah), was sent to project participants, after interventions were executed, to determine the uptake of interventions. Through the survey, physicians were asked whether they recalled participating in, or using, specific interventions.

Diagnosis rates averaged over a monthly period were used to determine pre- and post-intervention differences for selected physicians. Unpaired t-tests were performed to determine the statistical significance of differences in average rates of diagnosis of overweight and obesity after.

2.5. Ethics

This QI study was exempt from a full review by the university's Institutional Review Board which oversees research by members of the university, including all authors. The Institutional Review Board for the medical group in which our clinic belongs fully reviewed and approved this quality improvement project.

3. Results

3.1. Prevalence of OW/OB

For the duration of the project, 1706 patients between the ages of 2 and 65 were seen by resident and attending physicians at our clinic. Of these patients, 561 were pediatric patients (age 2–19 years). Based on age-and sex-adjusted BMI percentiles for pediatric patients, 72 (12.8%) of pediatric patients met criteria for OW and 163 (29%) for OB. Of 1145 adult patients, 298 (26%) had BMIs in the OW range and 607 (53%) had BMIs in the OB range.

3.2. Improvement in documentation of OW/OB

A p-control chart displaying weekly documentation rates of overweight and obesity, averaged over a 7-day period, from 1 March 2018 (beginning of first week) to 31 September 2018 (end of 30th week) demonstrated the improvement of the average rates of documentation of overweight and obesity for patients meeting BMI criteria (Figure 2). Average rates of documentation of diagnoses of overweight and obesity increased from a baseline of 46% to 62% after the first set of interventions (Figure 2). After the second set of interventions, the average documentation rates increased to 79%, nearly achieving our desired goal rate of 80% within 4 months of the initiation of our first set of interventions.

To further evaluate the impact of our interventions, we used unpaired t-test to compare average rates of diagnosis of overweight and obesity after each set of interventions, relative to the baseline rate prior to the first PDSA cycle. Based on run chart data, we observed that it took approximately 4 weeks for interventions to have an impact on documentation practices, therefore we compared average documentation rates for the last 4 weeks of each intervention period to the average documentation rate (54.6%) 4 weeks prior to the first set of interventions ('referent,' i.e., pre-intervention). Documentation rates of OW and OB increased after each set of interventions. The increase in the average rate of documentation 4 weeks after our first set of interventions was not statistically significant (54.6% to 62.2%, $p = 0.38$). Conversely, the increase in average rates of documentation of OW and OB after our second set of interventions was statistically significant (54.6% to 82.9%, $p = 0.02$; Table 1). Of note, there was no statistical difference between resident and attending physicians. Nor was there a difference between the documentation rates of adult and pediatric patients.

To evaluate the perceived impact of interventions, physicians were invited, via email, to complete an anonymous, informal, non-validated, online survey via Qualtrics (Provo, Utah). The survey was sent to physicians 2 weeks after the conclusion of the project and completed by 20 physicians (77% completion rate). Furthermore, the survey explored the perceived impact of various interventions. Most respondents, between 85% and 95%, strongly agreed or agreed that provider feedback, email reminders, and visual aids on computers were helpful interventions in improving documentation of OW and OB (Table 2).

4. Discussion

Our multi-faceted interventions invoked a significant change in clinical practice. Similar to previous studies,

Table 1. Pre- and post-intervention diagnosis rates for patients with overweight and obesity.

Time Period	N	Average rates of documentation of diagnoses of overweight and obesity	P Value (compared to baseline)
Week 6 – Week 9 **(last 4 weeks prior to Intervention Set 1)**	147	54.6%	referent
Week 14 – Week 17 **(4 weeks after Intervention Set 1)**	270	62.2%	$P > 0.05$
Week 23 – Week 26 **(4 weeks after Intervention Set 2)**	185	82.9%	$P < 0.05$

N: Number of patients between 2 and 65 years of age with BMIs in overweight or obese range.

Table 2. Perceived impact of interventions recalled by most providers.

Intervention	Perceived impact statements	Percent of survey respondents who strongly agree or agree with statement (N = 20)
Provider Feedback	I gained a lot of knowledge from this intervention of the QI project	85%
	I often use the knowledge that I gained from this intervention in my practice at clinic	85%
	The provider feedback I received motivated me to improve my documentation rates of overweight and obesity	90%
Email reminders	I found email reminders helpful in improving my documentation rate of overweight and obesity	85%
Visual aids on computers	The visual-cue cards are a helpful reminder of criteria for overweight and obesity	95%

we found low, baseline, rates of documentation of OW/OB, by both resident physicians and attending physicians, in our community-hospital-based primary clinic [4,5,8]. This was despite the use of an EHR with automated BMI calculation and BMI displays in the chart. As we implemented educational interventions addressing criteria for BMI diagnosis and tutorials on using the problem list and finding BMI in the chart, we saw significant increases in the documentation rates. This finding is consistent with previous studies showing that passive EHR features such as color-coding of BMIs associated with obesity need to be accompanied by complementary strategies like education to improve documentation [13,30].

Regular reports about individual performance, benchmarked against prior performance and other providers, helped motivate physicians to improve the documentation practices and were positively received by the majority of participants. Although further studies are needed to establish the benefit of performance feedback in improving documentation of OW/OB, our findings support previous studies showing the positive impact of giving trainees feedback on improving clinical documentation and other hospital benchmark metrics [31,32].

Our project-incorporated factors hypothesized to positively influence resident involvement in QI initiatives [24]. These factors included a QI curriculum within the program, resident-initiation of the project, faculty involvement, and alignment with health-system improvement. Because all these components were built into our residency program's culture, we were able to set an achievable goal and proceed to achieve our goal of increasing documentation rates from 46% to 79% within 7 months.

There are some limitations to this project. First, we focused on one aspect of clinical care in a specific setting. Our target intervention group comprised of a small provider team where personal relationships were easy to establish. Second, we measured change over a 20-week period and reviewed data for 9 weeks prior to our interventions. Studying pre-intervention data over a longer-time course would have helped delineate temporal variation and a longer time-frame of studying would further address the sustainability of the changes in our practice. Third, our interventions were geared toward optimizing documentation in problem lists and encounter diagnosis which are specific components of our EHR and may not be reproducible in other practices that do not use a similar EHR. While our survey of providers following the interventions is subject to social desirability bias, these results add the subjective perspectives of participants to our objective EHR data on documentation rates over time. While motivations for not including OW/OB in the problem list were not explored, the positive feedback of frequent reports and reminders demonstrated steady improvement over the 20 weeks of the study. Additionally, our quality improvement efforts could be further strengthened by assessing balancing measures to determine whether there were unintended consequences in other parts of the healthcare system as a result of our project. Lastly, our project did not assess the impact of our documentation efforts on the management of OW/OB. Although this assessment was beyond the scope of our study, previous studies showing that patients for whom overweight or obesity are documented as a diagnosis or in the problem list are more likely to have a management plan in the notes [33,34] or to have obesity addressed in future visits [16] suggest that increased documentation may have desirable downstream effects on improving management.

Our project demonstrates success in resident-led efforts that complement automated tools within the EHR and improve documentation rates of OW/OB in pediatric and adult patients in a community-hospital-based clinic with high rates of OW and OB. We believe that this QI approach may be replicated with similar effects in similar ambulatory settings.

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