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Research paper

Effectiveness of an intervention to improve the documentation required for diagnosis of metabolic syndrome in clinics serving African-American patients

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ABSTRACT

Background and aims The metabolic syndrome (MetS) is a clustering of cardio-metabolic risk factors for cardiovascular disease. It is important to identify individuals with the MetS early and initiate interventions long before adverse conditions occur. Our previous studies found that missing or incomplete data that should be entered into the electronic health record (EHR) by nursing staff could lead to the under-diagnosis of the MetS. This study aimed to determine whether a five-component intervention to improve EHR data entry would increase the completeness of data, particularly height, weight, and blood pressure, needed to diagnose the MetS.
Design Quasi-experimental design with pre-test, intervention, and post-test sessions.
Setting Two family medicine residency training clinics serving mainly African-American patients in Atlanta, Georgia, United States.
Subjects and methods Four nurses and four certified medical assistants attended pre-test, intervention, and post-test sessions. Data of 279 patients at pre-test and 246 patients at post-test were collected and analysed. The pre-test and post-test data completion rates of data entry were compared using rates and Wald χ^2-test.
Main outcome measures Rate of patients with information documented in the EHR on blood pressure, weight, and height at pre-test and post-test.
Results There was a statistically significant increase in the recording of height from pre-test to post-test (46.6% versus 96.7%, $P < 0.001$) and the recording of blood pressure from pre-test to post-test (96.8% versus 99.2%, $P < 0.05$).
Conclusions The intervention led to an improvement in the entry of pertinent EHR data among nurses and medical assistants in this primary care setting. This increase improved the ability to identify patients who met the criteria for the MetS.

Keywords: data entry intervention, electronic health records (EHR), feedback, metabolic syndrome

How this fits in with quality in primary care

What do we know?
Missing or incomplete clinical data that should be entered into a patient's electronic health record (EHR) by nursing staff could lead to the under-diagnosis of the metabolic syndrome.

What does this paper add?
Our five-component intervention demonstrated improved clinical data entry in the EHR by nurses and medical assistants in this primary care setting.

Introduction

The metabolic syndrome (MetS) is a clustering of cardio-metabolic risk factors associated with increased risk of type 2 diabetes, coronary heart disease and stroke. Its prevalence has reached epidemic levels worldwide.[1,2] The definition of the MetS as recommended by a variety of scientific, policy-making, and clinical groups includes central obesity, elevated blood pressure, dyslipidaemia, and impaired glucose metabolism or insulin resistance.[3] According to the criteria of the National Cholesterol Education Program (NCEP), the most popular criteria used in the Unites States, individuals need to have at least three of the five components: central obesity, elevated blood pressure, increased triglycerides, decreased high-density lipoprotein cholesterol, and increased fasting glucose to establish a diagnosis of the MetS.

According to the National Health and Nutrition Examination Surveys data, the prevalence of the MetS based on the NCEP definition in the US increased from 28.0% during 1988–1994 to 34.5% during 1999–2002, affecting approximately 60 million American adults in 2000.[4,5] African-Americans, particularly African-American women, have a high prevalence of the MetS, and high blood pressure, obesity, and abnormal glucose levels are major contributors to the high prevalence of the MetS in African-Americans.[6] Little is known, however, about the prevalence of the MetS among patients visiting primary care settings, especially at the primary care clinics that mainly serve African-Americans. To prevent and/or delay the adverse health outcomes of type 2 diabetes, cardiovascular disease, and other related complications in such groups, it is critical to recognise and diagnose the MetS early and to initiate recommended interventions in primary care settings.

The electronic health record (EHR) may be an efficient and useful tool to identify individuals with the MetS in primary care settings and initiate early interventions that reduce the incidence of adverse cardio-metabolic diseases.[7] In order to use the EHR, three parameters – blood pressure, height and weight – should be routinely entered into patients' EHRs during each visit.

In a pilot study, we attempted to estimate the prevalence of the MetS in our clinics by using the modified criteria for obesity component, body mass index (BMI, kg/m^2), with the belief that the measurement of weight and height was a routine and standard practice in our clinics. BMI is automatically calculated once patients' height and weight are entered into the EHR. BMI and waist circumference are highly correlated measures and are equally correlated with insulin sensitivity,[8] so we planned to use BMI as a proxy for waist circumference. However, we found that height was not routinely entered and weight, although entered more frequently, was often missing. A striking finding was that more than 20% of 716 patients audited in the pilot study did not have their height entered at least once in the EHR. Thus, it was difficult to identify reliably the MetS cases and to estimate its prevalence in this clinic population. In the study presented here, we implemented an intervention programme to improve data entry into the EHR by the nursing staff, which would allow us to reliably diagnose the MetS.

Methods

The study sample and data collection

Staff

All staff (four nurses and four certified medical assistants (CMAs)) who were responsible for taking patients' vital signs and entering data, typically including blood pressure, height, and weight, into the EHR participated in the pre-test, intervention and post-test sessions of the study.

Patients

The EHR was audited for all adult patients seen at two primary care clinics during one week in January 2007 before the intervention, and for all patients seen at the same clinics during one week in March 2007, six weeks after the intervention.

Clinics

Two family practice residency training clinics that served mainly African-American patients in Atlanta, Georgia, US served as the site of this project. Both clinics were supported and managed by the Morehouse School of Medicine (MSM) Department of Family Medicine (DFM). Established in 1980, DFM is the oldest clinical department at MSM. The department has 20 board-certified family physicians, one physician assistant, two PhD-level clinical psychologists and 15 family medicine resident physicians. There are approximately 5000 active adult patients using these two clinics and 98% of patients are self-reported African-Americans. Over 95% of patients have some kind of medical insurance, private, Medicare or Medicaid.

Intervention

We first used focus groups to inform our intervention regarding the nurses' understanding of EHR data entry, what should be entered during patient intake, and the barriers that might impede appropriate data entry. Each clinic had two nurses and two certified medical assistants forming a focus group. Barriers to EHR data entry identified by the focus groups included: (a) failure to recognise the importance of measuring and entering height; (b) the assumption that the height was taken during previous visits among established patients and the failure to verify this fact; (c) measuring height was time consuming and could slow down patient flow thus affecting efficiency, and (d) the pressure to get patients to the examination room for physicians to see them created a sense of not enough time to measure patients' height. The nursing staff understood that weight and blood pressure entry into the EHR was expected.

Intervention programme

Based on the information learned from the two focus groups, we implemented a five-component intervention that included motivational feedback, academic detailing, improved efficiency of data entry, pre- and post-test feedback, and awards.

MOTIVATIONAL FEEDBACK

The results of the pre-test audit of data entry which included the rate of height, weight, and blood pressure recording were returned to each nurse or medical assistant. To avoid general knowledge of each nursing staff's pre- and post-test performance, this information was provided individually with the groups' aggregate performance. To encourage competition among the nursing staff, the staff member with the highest data entry completion rate at the end of the intervention would be recognised during a post-intervention staff meeting and receive an award.

ACADEMIC DETAILING

An individualised educational programme was designed to emphasise the definition of the MetS, the importance of recording blood pressure, weight and height, and their relationships to the diagnosis of the MetS, cardiovascular disease, and type 2 diabetes. To fit the staggered schedule of nursing staff members, a trained research assistant (RA) met with each of the nursing staff during their break time to review their rate of data entry of the blood pressure, height and weight, respectively, and compare individual members' data with group's data. During this one-on-one meeting, the importance of measuring and entering the data components (blood pressure, height and weight) was explained. Then, each member of nursing staff was assigned a short review paper (written by the RA and the principal investigator) on the prevalence and clinical significance of the MetS and its relation to type 2 diabetes and cardiovascular disease. The importance of the clinical parameters of height, weight and blood pressure in diagnosing the MetS was stressed. Detailed information on the components of the MetS was discussed among participants.

IMPROVEMENT OF EFFICIENCY

The concern about the time and equipment for measuring the height was discussed with the nurse supervisor. An in-service training was conducted among nursing staff, including a step-by-step demonstration of how to correctly use the EHR vital data entry template and how to correctly measure the weight and height with existing equipment (eye-level beam scales and wall-mountable height-rod). An additional eye-level beam scale with height rod was also purchased so staff could take patients' weight and height at the same time.

POST-TEST FEEDBACK AND AWARD

Each nursing staff member's post-test performance and the comparison between the pre- and post-test results were provided individually with the groups' aggregate performance. Each member of nursing staff was given an award based on the aggregate improvement of data entry. The two nursing staff members with 100% completion of data entry and who did intake on more than 30 patients in both the pre- and post-intervention period were recognised during the post-intervention meeting and received additional awards.

Measures

Data entry to the EHR

All clinical data are entered directly into the EHR at each patient's visit. At intake, nursing staff enter the reason for the visit, vital signs (temperature, height, weight, systolic and diastolic blood pressure, respiratory rate), allergies and current medications, and take a focused review of social history (smoking and alcohol drinking). These data are entered in a standardised format. While taking vital signs, nursing staff first record the measurements in an individualised notebook (with the member of staff's identification for tracking purpose), then open a new progress note screen in the EHR, select and pull down the vital template from a group of pull-down templates into the patient's current progress note screen, and then type in all measurements to the vital template. Height is entered in either centimetres or inches, and weight is entered in kilograms or pounds. The EHR automatically calculates the BMI.

Data audit at pre- and post-test

During the pre- and post-intervention periods, each patient's progress note was audited to determine if height, weight and blood pressure (systolic and diastolic) were entered or left blank. The RA also verified the data in the progress note in the EHR with the member of nursing staff's back-up notebook. The chart audit was conducted by a trained RA and was blinded to nursing staff.

Statistical analysis

The data entry rates of entered height, weight, and blood pressure data were calculated for each of the eight nursing staff participants and for the total sample at pre-test and post-test, respectively. The Wald χ^2-test was used to assess the differences in the completion rates of entered height, weight and blood pressure data between pre-test and post-test for each nursing staff participant and for the total sample. Results with a P value ≤ 0.05 for two-tailed tests were considered to be statistically significant. SAS (version 9.1) was used for all data management and analyses.

Results

The completeness of data entry for height, weight and blood pressure was assessed in the EHR for 279 patients at pre-test and 246 patients at post-test. There was a much higher rate of data entry for weight and blood pressure at pre-test compared to the rate of data entry for height. Among the nursing staff, there were large variations in the pre-test rates of data entry for height (13.5–100%) and less so for weight (75–100%) and blood pressure (87.5–100%) (see Table 1). At post-test, the rates of data entry for height improved compared to the rates of pre-test for most nursing staff. When combining entered data from all nursing staff members, there was a significant overall improvement in the post-test data entry of height ($P < 0.001$) and blood pressure ($P < 0.05$).

Discussion

This study demonstrated that a targeted educational intervention to improve the documentation of basic and important clinical data by nursing staff can be effective. Because the intervention was simple, targeted and efficient, it could be adapted in other practices that use EHR.

The pre-intervention focus group identified a lack of understanding of the importance of height as a clinical parameter and its importance to the diagnosis of the MetS. Most of the nursing staff did not know that height was used to calculate BMI, which is a measure for overweight and obesity; thus with the time pressures to prepare patients for their clinical visit, height was only recorded for 13.5–18.5% of patients by certain staff and an average of 46.6% of patients by all staff during the pre-test period. Thus, educational interventions should include both the need and clinical importance of reliably documented clinical parameters. Our educational course was conducted using an individualised method that was based on individual knowledge of a staff member's performance and that of the peer group, targeted perceived barriers, and an individually focused review of the clinical relevance of the collected data. Consistent with previous studies which have shown that education and feedback can improve the end-of-life communication skills of medical residents, improve quality of care among nurses, and reduce the rate of inappropriate hospital stays among patients,[8–10] our results provide further support that education and feedback can be a simple and effective way to improve the EHR clinical data entry by nurses and medical assistants.

EHR data have been recently used to identify research subjects with diabetes mellitus, to improve documentation and treatment of obesity, and to assess cardio-metabolic risk factors in a national primary care database.[11–13] Using EHR data to estimate the prevalence of the MetS has been less explored, particularly among African patients. Because African-Americans have an increased risk of hypertension, diabetes and cardiovascular disease, the EHR can be an efficient resource to identify African-American patients

Table 1 Pre- and post-test documentation of height, weight and blood pressure by staff members

Nurse/ CMA	Pre-test data entry				Post-test data entry			
	Total patients	Height *n* (%)	Weight *n* (%)	Blood pressure *n* (%)	Total patients	Height *n* (%)[a]	Weight *n* (%)[b]	Blood pressure *n* (%)[b]
A	74	10 (13.5)	72 (97.3)	72 (97.3)	51	49 (96.1)	50 (98.0)	51 (100.0)
B	1	1 (100.0)	1 (100.0)	1 (100.0)	4	4 (100.0)	4 (100.0)	4 (100.0)
C	5	2 (40.0)	5 (100.0)	5 (100.0)	9	8 (88.9)	8 (88.9)	9 (100.0)
D	45	20 (44.0)	43 (95.6)	44 (97.8)	48	48 (100.0)	48 (100.0)	48 (100.0)
E	50	50 (100.0)	50 (100.0)	49 (98.0)	30	30 (100.0)	30 (100.0)	30 (100.0)
F	65	12 (18.5)	64 (98.5)	61 (93.9)	55	51 (92.7)	55 (100.0)	54 (98.2)
G	31	31 (100.0)	30 (96.8)	31 (100.0)	47	47 (100.0)	47 (100.0)	47 (100.0)
H	8	4 (50.0)	6 (75.0)	7 (87.5)	2	1 (50.0)	1 (50.0)	1 (50.0)
Total	279	130 (46.6)	271 (97.1)	270 (96.8)	246	238 (96.7)[c]	243 (98.8)	244 (99.2)[d]

CMA = certified medical assistant
[a] There were statistically significant differences in the rates of entered height between pre- and post-test for nurses/CMAs A, D and F (all $P < 0.001$). For Nurse C, the P value was 0.052 for the difference in the rates of entered height between pre- and post-test
[b] Each nurse/CMA had similar rates of weight and blood pressure recording at post-test as at pre-test (all $P > 0.10$).
When combining entered data from all nursing staff members, there was a significant overall improvement in the post-test data entry of height ([c] $P < 0.001$) and blood pressure ([d] $P < 0.05$)

with the MetS for the purpose of early diagnosis, treatment and quality care.

There were two limitations to this study. Given that it was conducted in two clinics managed by one clinical practice, generalisability is limited. Replication of the intervention in other practices should be explored. Second, no control group was used; therefore, we were unable to rule out the possible confounding effects of unmeasured factors. However, no policy or administrative changes occurred during the study period; therefore, the impact of those factors on our findings may be minimal. In addition, due to a lack of control group, the Hawthorne effect on staff behaviour affecting our results is plausible. The principle goal of this intervention was to improve the behaviour and quality of data entry of nursing staff. Thus nursing staff members' knowledge of the study and its purpose was intended. Nursing staff were blinded to the auditing periods so their behaviour should not have been affected by knowledge of when their performance was assessed.

Conclusions

Our educational and feedback intervention provided a simple and effective way to improve nursing staff documentation of important clinical information in the EHR of two primary care clinics. Future studies are warranted to monitor documentation, determine long-term data quality, and intervene if quality is shown to be a concern. The quality of clinical data documentation by nursing staff is important to identify patients with medical conditions such as the MetS and should lead to the appropriate treatment that will improve quality of life and decrease morbidity and mortality.

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ETHICAL APPROVAL

Agreement to proceed with the study was given by the chair of Morehouse School of Medicine Institutional Review Board.

PEER REVIEW

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CONFLICTS OF INTEREST

None.

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