

Does audit improve diabetes care in a primary care setting? A management tool to address health system gaps

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Abstract

Introduction: Diabetes mellitus is one of the emerging epidemics. Regular clinical and biochemical monitoring of patients, adherence to treatment and counseling are cornerstones for prevention of complications. Clinical audits as a process of improving quality of patient care and outcomes by reviewing care against specific criteria and then reviewing the change can help in optimizing care. **Objective:** We aimed to audit the process of diabetes care using patient records and also to assess the effect of audit on process of care indicators among patients availing diabetes care from a rural health and training center in Puducherry, South India. **Materials and Methods:** A record based study was conducted to audit diabetes care among patients attending noncommunicable disease clinic in a rural health center of South India. Monitoring of blood pressure (BP), blood glucose, lipid profile and renal function test were considered for auditing in accordance with standard guidelines. Clinical audit cycle (CAC), a simple management tool was applied and re-audit was done after 1-year. **Results:** We reviewed 156 and 180 patients records during year-1 and year-2, respectively. In the audit year-1, out of 156 patients, 78 (50%), 70 (44.9%), 49 (31.4%) and 19 (12.2%) had got their BP, blood glucose, lipid profile and renal function tests done. Monitoring of blood glucose, BP, lipid profile and renal function improved significantly by 35%, 20.7%, 36.4% and 56.1% over 1-year. **Conclusion:** CAC improves process of diabetes care in a primary care setting with existing resources.

Key words: Clinical audit cycle, diabetes mellitus, primary health care, quality of care

INTRODUCTION

India like many developing countries is undergoing epidemiological transition as evidenced by the increasing incidence of noncommunicable diseases (NCDs); attributed to urbanization, adoption of unhealthy lifestyles, and the global marketing of health risks.^[1,2] Diabetes

mellitus (DM) is one of these emerging epidemics. India has the second highest burden of DM worldwide with an estimated 65.1 million people suffering from DM which is expected to rise to 109 million by the year 2035.^[3]

DM is associated with reduced life expectancy, significant morbidity due to micro-vascular complications, macro-vascular complications (ischemic heart disease, stroke and peripheral vascular disease), and diminished quality of life.^[4] Regular clinical and biochemical monitoring of patients, adherence to treatment and counseling are cornerstones for proper DM management and prevention of complications. In India, DM management guidelines are provided by the Indian Council for Medical Research (ICMR) and adopted by National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke

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(NPCDCS).^[5,6] The WHO as well as the NPCDCS stress on provision of care management of DM at the primary health care level so that care is accessible and sustainable for the patients.^[2,5] Furthermore, the chronic nature of the disease requires the management process to be lifelong and requires continuous engagement of the patient with the health system.

The formulation of clinical guidelines alone is insufficient to ensure optimum diabetes care. Clinical audits as a process of improving quality of patient care and outcomes by reviewing care against specific criteria and then reviewing the change can help in optimizing care.^[7] Different studies from other countries have shown that conducting audits is one of the methods of improving efficiency, accountability and the quality of care in diabetics.^[8-10] In developed countries like the United Kingdom, government sponsored annual National Diabetes Audit is conducted to measure the effectiveness of diabetes healthcare which is useful in bringing about changes and improving the quality of services and health outcomes for people with diabetes.^[11] A recent systematic review reported lack of studies on auditing and bench marking against evidence based guidelines for diabetic care in Asia.^[12] Medical records serve as important source of data for audits as they are an archive of important patient medical information^[13] and can be utilized for audits if properly maintained. In this study conducted among patients availing diabetes care from a rural health and training center (RHTC) in Puducherry, South India, we aimed to audit the process and outcomes of diabetes care using patient records and also to assess the effect of audit on process of care indicators.

MATERIALS AND METHODS

Study setting and population

A record based audit was conducted among patients registered for diabetes care in RHTC during November 2013 and November 2014. The center is run by Department of Preventive and Social Medicine (PSM) of Jawaharlal Nehru Institute of Postgraduate Medical Education and Research and it is located in Ramanathapuram, a village situated around 16 km from Puducherry town, south India. The RHTC caters to health needs of 9852 individuals, who are spread over four villages - Ramanathapuram, Thondamanatham, Thuthipet and Pilayarkuppam. Majority of people in these villages belong to low socioeconomic status and are dependent on agriculture for living. In RHTC all medical services are provided by six to eight MBBS internship trainees under the supervision of medical officer and a postgraduate from Department of PSM. Along with outpatient services, special clinics like NCD clinic, antenatal

clinic and well-baby clinics are conducted on Wednesday, Thursday and Friday respectively.

Around 480 patients with chronic diseases such as DM, hypertension, chronic obstructive pulmonary disease, epilepsy, bronchial asthma and hypothyroidism attend the NCD clinic. Patients attend the NCD clinic once in a month and drugs are also issued for a month. All health care services such as consultation, laboratory investigations, counseling on lifestyle modifications and medications are provided free of cost. The consultation is provided by MBBS internship trainees under supervision of the medical officer of RHTC. The posting of trainees in RHTC is part of compulsory residential rotatory internship and every batch of trainees is posted for 1-month each. During every clinic visit, the trainees prescribe medications and laboratory investigations if necessary. Investigations like blood sugar estimation, renal function tests, lipid profile and urine examination are available. The laboratory is attached to the RHTC and functions between 9 a.m. and 4.30 p.m. on all working days. Every patient has individual comprehensive case records wherein all particulars of history, examination, laboratory investigations and treatment are updated during every visit. The audit was carried out among all patients receiving treatment for DM for at least 1-year.

Clinical audit cycle

The schematic representation of clinical audit cycle (CAC)^[14] is shown in Figure 1.

Identifying problem

Audit focused primarily on finding and correcting lacunae in the DM care system. The process indicators chosen were adequate examination and appropriate investigations for early detection of complications like renal failure, cerebrovascular accidents, persistent hyperglycemia, neuropathy and retinopathy. All the above process indicators are

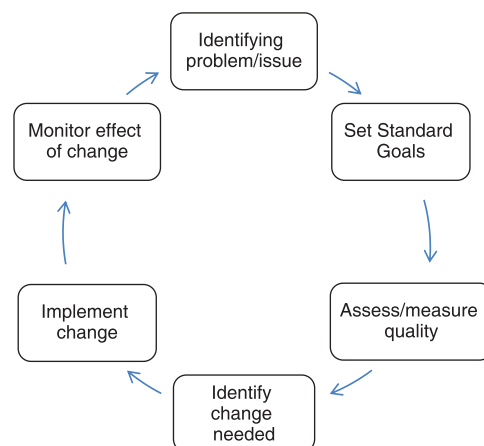


Figure 1: Clinical audit cycle

physician centered and depend on the physician's ability to bind to standard care protocols.

Setting standards/goals

We considered audit of process indicators based on ICMR guidelines and adopted by NPCDCS. For the current audit we considered care process to be "optimal" when a diabetes patient had undergone

- a. Blood pressure (BP) measurement in every visit.
- b. Blood sugar (fasting blood sugar/postprandial blood sugar/random blood sugar) once a month if the patient is on treatment with insulin and once in 3 months if the patient is on oral hypoglycemic agents.
- c. Lipid profile monitoring once in 6 months.
- d. Renal function test once in 6 months.
- e. Annual fundus examination.
- f. Annual electrocardiographic monitoring.
- g. Regularity: Patient is considered to be regular if he/she had made his/her last two visits to NCD clinic as per schedule.
- h. Ideal when all the recommended and available investigations were done as per schedule.

Assess/measure quality

In November 2013, the patients' case records were retrospectively reviewed for the above mentioned process indicators for a period of 1-year. Individual details like age, gender, village, duration and type of treatment were extracted from patients' case records. The process indicators were extracted from the lab reports attached to patients' case records or from the physician notes entered in the case record. Data entry and analysis were carried out using EpiData (Version 2.2.2.182, EpiData Association, Odense, Denmark) analysis software. Process of care indicators were summarized as proportions.

Identify changes

As process indicators of quality assessment were poor, we planned interventions to improve the care process. The results of audit-2013 were discussed with the medical officer and faculty from the Department of PSM. Three major areas of concern were identified viz. Poor compliance to diabetes management protocol among treating physician (trainees), incompleteness in recording laboratory reports and irregularity in care seeking among diabetes patients.

Implement changes

Orientation to MBBS trainees

Every month a new batch of MBBS trainees happened to be the treating physicians and hence it was necessary to orient every batch of trainees. The results from 2013 audit were shared with the trainees and orientation regarding ICMR standard guidelines on diabetes management was given.

Information charts

For management of diabetes patients, we developed comprehensive information charts, which were placed on treating physicians' desk. It included standard management guidelines to emphasize what they had learnt during orientation.

Investigations monitoring sheet

The Investigation monitoring sheet was a proforma, which included domains for periodic recording and monitoring of investigations considered for auditing. All patients' case records were attached with this Investigation monitoring sheet and trainees were instructed to prescribe investigations and enter all the lab reports as and when patients are investigated so that it will be easy to review during further consultation.

Patient card

We devised patient cards which have personal details of individual and also morbidity and medication details. Patient card has column for date of visit, BP during that visit and also scheduled date for next visit. As these cards have date of next visit, it acts as a tool to assure attendance to clinic at least once in a month. These patient cards are compact and patients can carry them in their pockets.

Monitor result of change

Re-audit was carried out after a period of 1-year in the month of November, 2014. The same process indicators were assessed as per ICMR guidelines. The results were extracted directly from the investigations monitoring sheet, entered and analyzed in EpiData analysis software.

RESULTS

We reviewed 156 and 180 patients records during year-1 and year-2 respectively. Sociodemographic information and morbidity details of patients were described in Table 1. Female patients and elderly (age 60 and above) constituted little above half of the total patients in both audits. Hypertension was present in about half of the patients.

Process of care indicators are shown in Table 2. Regularity of patients attending the NCD clinic improved from 54% to 91% ($P < 0.001$). Patients who had ideal follow-up care increased from 3% to 48% ($P < 0.001$). Monitoring of blood glucose, BP, lipid profile and renal function improved significantly between the two audits. The outcome indicators of patients who had their investigations done in year-2 are shown in Table 3.

We assessed for possible association between patient characteristics (age, gender, duration of treatment, village of residence and regularity) and having ideal monitoring

as per guidelines. Only being regular in seeking care was significantly associated with ideal monitoring on bivariate analysis ($P = 0.04$).

DISCUSSION

This is the first study from India on use of audit in addressing health system gaps in management of diabetes in a primary care setting. Though standard treatment guidelines were available, year-1 audit revealed process of care to be poor with only 3.2% of patients undergone ideal monitoring. This poor performance can be attributed largely to system failure in adhering to standard guidelines. Applying CAC in this setting significantly improved all indicators related to process of care as depicted in year-2 audit. This significant improvement on applying CAC may be due to low baseline adherence to the recommended

practices and further improvement in process of care might require patient level interventions.^[15]

A study conducted in a secondary health care setting in south India, had shown improvement in process of care indicators after applying CAC.^[16] Findings related to improvement in monitoring of BP, lipids and creatinine over 6 months were comparable to our study. Improvement in blood sugar monitoring was not comparable as the baseline blood sugar monitoring in the other study was very high among diabetes patients. Similar postaudit improvements in primary settings have been reported from South Africa, Malaysia and Alexandria.^[15,17,18] The improvement in care can be attributed to system changes adopted as part of CAC. Orientation to treating physician was cornerstone of the system change where all other changes were facilitators in practicing physicians' learning. An audit done in US showed improvement in diabetes care following physician education program orienting toward standard guidelines.^[19]

The major strength of this study is that the entire CAC was carried out with existing manpower and other resources and in the in a primary care setting where majority of NCD patients are treated. These audits will be useful even in low socioeconomic settings as it primarily targets change in system rather than intervening at patient level requiring less resources. Audits similar to this study will serve as eye-openers in clinical setting to assess quality of care and to adequately improve health care delivery in secondary and tertiary care levels as well.

Since it is a record based study, we did not have information on patients' characteristics like education, occupation and socioeconomic status, which might have effect on treatment seeking behavior other indicators of diabetes care such as monitoring of foot care, counseling and compliance to lifestyle modification and presence of diabetes complications were not studied as these parameters are not routinely recorded in the patient records. Finally

Table 1: Sociodemographic factors of DM patients attending NCD clinic in a primary health center of South India during 2013 and 2014

| Sociodemographic and clinical factors | Year-1, n (%) | |
|---------------------------------------|---------------|------------|
| | n = 156 | n = 180 |
| Age groups (years) | | |
| 30-44 | 15 (9.6) | 24 (13.3) |
| 45-59 | 50 (32.1) | 65 (36.1) |
| ≥60 | 91 (58.3) | 91 (50.6) |
| Gender | | |
| Male | 72 (46.2) | 85 (47.2) |
| Female | 84 (53.8) | 95 (52.8) |
| Duration of treatment (years) | | |
| ≤2 | 53 (34.0) | 71 (39.4) |
| 2-5 | 54 (34.6) | 57 (31.7) |
| >5 | 49 (31.4) | 52 (28.9) |
| Area (village) | | |
| Ramanathapuram | 43 (27.6) | 49 (27.2) |
| Thondamanatham | 65 (41.7) | 67 (37.2) |
| Thuthipet | 9 (5.8) | 15 (8.3) |
| Pillaiyarkuppam | 39 (25.0) | 49 (27.2) |
| Coexisting hypertension | | |
| Yes | 81 (51.9) | 124 (68.9) |
| No | 75 (48.1) | 56 (31.1) |

NCD: Noncommunicable disease, DM: Diabetes mellitus

Table 2: Process of care indicators as per ICMR guidelines for diabetes care among diabetes patients treated in a primary health center of South India during 2013 and 2014

| Process of care indicators | Year-1, n (%) | Year-2, n (%) | Difference (95% CI) | P |
|---|---------------|---------------|---------------------|--------|
| | n = 156 | n = 180 | | |
| BP (checked during last two visits) | 78 (50.0) | 153 (85.0) | 35.0 (25.9-44.4) | <0.001 |
| Blood glucose (once in last 3 months if on OHA, once in 1-month if on insulin) | 70 (44.9) | 118 (65.6) | 20.7 (10.2-31.1) | <0.001 |
| Lipid profile (checked in last 6 months) | 49 (31.4) | 122 (67.8) | 36.4 (26.4-46.4) | <0.001 |
| Renal function test (checked in last 6 months) | 19 (12.2) | 123 (68.3) | 56.1 (47.6-64.7) | <0.001 |
| Ideal follow-up (if checked BP, blood glucose, lipid profile, renal function test as per ICMR guidelines) | 5 (3.2) | 86 (47.8) | 44.6 (36.8-52.4) | <0.001 |
| Regular (if patient had made last two visits to NCD clinic as per schedule) | 84 (53.8) | 163 (90.6) | 36.7 (27.8-45.6) | <0.001 |

ICMR: Indian Council for Medical Research, BP: Blood pressure, OHA: Oral hypoglycaemic agent, NCD: Noncommunicable disease, CI: Confidence interval

Table 3: Outcome indicators as per ICMR guidelines for diabetes care among diabetes patients treated in primary health center of South India during 2014

| Outcome indicators | Number of patients(%) |
|---|-----------------------|
| BP (n=153) | |
| Ideal (SBP <130 and DBP <80) | 56 (36.6) |
| Satisfactory (SBP 130-140 or DBP 80-90) | 63 (41.2) |
| Unsatisfactory (SBP >140 or DBP >90) | 34 (22.2) |
| Blood sugars (n=118) | |
| Ideal (FBS 80–110 and PPBS 120-140) | 27 (22.9) |
| Satisfactory (FBS 111-125 and PPBS 141-180) | 16 (13.6) |
| Unsatisfactory (FBS >125 and PPBS >180) | 75 (63.6) |
| Renal function test (n=123) | |
| Satisfactory (urea ≤40 and creatinine ≤1.2) | 121 (98.4) |
| Unsatisfactory (urea >40 and creatinine >1.2) | 2 (1.6) |
| Lipid profile (n=122) | |
| Satisfactory (TC <180 and TG <150) | 47 (38.5) |
| Unsatisfactory (TC ≥180 and TG ≥150) | 75 (61.5) |

ICMR: Indian Council for Medical Research, BP: Blood pressure, SBS: Systolic blood pressure, FBS: Fasting blood sugar, DBP: Diastolic blood pressure, PPBS: Postprandial blood sugar, TG: Triglycerides, TC: Total cholesterol

improvements in the process of diabetes care should be transformed into better clinical outcomes in terms of decreased mortality and prevention of complications. Hence in future, clinical audits should look beyond process of care and include information on outcomes and patient satisfaction.

CONCLUSION

Physician education and adhering to standard guidelines for management helps in better health care delivery to diabetes patients. Improvement in process of diabetes care can be achieved even in resource-limited settings through application of CAC.

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