ORIGINAL ARTICLE

Process and outcome measures of quality of care at the diabetes outpatient clinic, University College Hospital, Ibadan

JO Adeleye, MA Kuti[1]

Departments of Medicine and [1]Chemical Pathology, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

Abstract

Objective: The study aims to assess the quality of care provided at a diabetes outpatient clinic of a tertiary hospital in Nigeria using quality indicators approved by the National Diabetes Quality Improvement Alliance (NDQIA).

Materials and Methods: The medical records of patients who had visited the clinic at least two times within a 12 months period preceding the index visit were reviewed during a 5 month period. Process measure indicators, approved by the NDQIA (evaluating the functioning of the clinic) and outcome measures, published by the American Diabetes Association, (evaluating the health status of the attending patients) were retrieved from the medical records.

Results: The 332 records reviewed showed that the most consistently performed process measures were blood pressure and weight measurement (>90%). Foot examination was done infrequently (10.5%). Less than 50% had at least an annual low-density lipoprotein cholesterol (LDL-C) and hemoglobin A1c testing done. The mean (standard deviation) HbA1C (%), LDL-C (mg/dL) systolic blood pressure (SBP) (mmHg), and diastolic blood pressure (DBP) (mmHg) were 7.6 (2.0), 107.3 (31.5), 134.3 (20.8), 79.5 (11.0), respectively. HbA1C >8.0%, LDL-C >130 mg/dL, SBP >130 mmHg, and DBP >90 mmHg) were observed in 34.8%, 21.1%, 40.4%, and 23.8%, respectively.

Conclusion: Although the organization of the outpatient services allowed for good performance with regards to "free" services such as blood pressure and weight measurement, it performed suboptimally for foot examinations. Performance indicators that required payment were consistently underperformed. Regular assessment of the quality of care may help in the identification of opportunities for improvement in the organization and delivery of care.

Key words: Diabetes, outpatient, quality

Introduction

Diabetes mellitus is a huge and growing problem and its cost to society are high and escalating worldwide.[1] The International Diabetes Federation's estimates indicate that 387 million people have diabetes as at 2013, and the number is expected to rise to 592 million by 2015.[1] Nigeria has the highest number of persons with diabetes in Sub-Saharan Africa (3.9 million), and the burden is expected to increase.[1]

Diabetes mellitus is a complex, chronic illness requiring continuous medical care with multifactorial risk reduction

Address for correspondence:
Dr. MA Kuti,
Department of Chemical Pathology, College of Medicine,
University of Ibadan, Ibadan, Oyo State, Nigeria.
E-mail: modupekuti@yahoo.com

strategies beyond glycemic control.[2] It should therefore be the aim of health decision-makers and health professionals in any health care system to strive toward providing optimal quality of care for persons with diabetes. Measures of quality of care for persons with diabetes have arisen out of concern about the care of persons with diabetes and the need to benchmark the performance of health care systems.[3] Assessment of quality of care can help draw attention to the need for improving diabetes management and provide a benchmark for monitoring changes over time, in a bid to promote an optimal organization, and delivery of care for persons with diabetes.[4]

Various quality care indicators have been outlined by a variety of health care organizations. Prominent among the quality indicator measures for the diabetes care process are those identified by the National Diabetes Quality Improvement Alliance (NDQIA).[5] This study sought to retrospectively assess process and outcome quality indicators of care provided to patients with diabetes mellitus at the diabetes clinic in a tertiary hospital (University College Hospital, Ibadan) using quality indicator measures as stipulated by the NDQIA.[5]

Materials and Methods

Study setting
The University College Hospital, Ibadan is a public tertiary hospital in the South West of Nigeria, located in an urban setting. The diabetes outpatient clinic holds once a week, and approximately 3000 patients are seen annually. There are at most 4 endocrinologists, 1–2 senior registrars, and 2 registrars per clinic session. Public Health nurses with interests in diabetes mellitus serve as diabetes educators.

Study design
This retrospective cross-sectional study was conducted between April and August 2013 by reviewing the records of persons diagnosed to have diabetes mellitus and who received care in the outpatient diabetes clinic during this period.

Records selection
Records of patients were considered appropriate for inclusion in the study if they had been seen in the clinic on more than one occasion, within a 12 months period preceding the current visit. The clinic documentation for each patient was evaluated using a structured questionnaire.

Records review
Data for the quality of care indicators were extracted from the records of eligible patients attending the clinic during that period. Data collected included: Basic demographic data, diabetes duration, and type of diabetes. The process measures evaluated were as stipulated by

the NDQIA[5] and are summarized in Table 1. Outcome measures were evaluated based on the American Diabetes Association (ADA) 2013 position statement on the standards of diabetes care.[2] Process and outcome quality of care indicators were evaluated on the basis of documentation by health care providers in the patients' medical records.

Definitions of quality indicators
Process measures indicators, approved by the NDQIA, evaluate the functioning of the clinic [Table 1]. The higher the percentage of persons attending the clinic experiencing the process, the more satisfactory.

Outcome measures, published by the ADA, evaluate the health status of the persons attending the clinic.

Statistics
Continuous variables were expressed as means (standard deviation [SD]) while categorical variables were expressed as percentages. Significance testing was done with Chi-square test for categorical variables and with the independent Student's t-test for continuous variables. $P \leq 0.05$ were taken as statistically significant. Data analysis was carried out using the Statistical Package for Social Science (IBM SPSS) software, version 20 (IBM Corp Armonk, NY).

Results

Records of 332 persons satisfied the inclusion criteria and were analyzed. Virtually, all the patients (99%) had type 2 diabetes mellitus. A total of 204 (61.4%) were females while 128 (38.6%) were males. The age of the subjects ranged between 33 and 69 years with a mean (SD) age of 61.9 (10.3) years. The mean age of the female subjects was significantly lower than for the males, 60.6 (10.2) versus 63.9 (10.2) years, respectively, $P = 0.005$. The duration of diabetes ranged from 1 to 38 years, with a mean of 9.3 (6.8) years.

Table 1: Quality indicators of process measures of diabetes care (National Diabetes Quality Improvement Alliance)

Percentage of patients with one or more HbA1c tests annually

Percentage of patients with at least one LDL-C test annually

Percentage of patients with at least one test for microalbuminuria during the measurement year or who had evidence of medical attention for existing nephropathy

Percentage of patients who received a dilated eye examination or evaluation of retinal photography by an ophthalmologist or optometrist during the current year or during the prior year if the patient is at low risk of retinopathy

Percentage of patients receiving at least one-foot examination annually

Percentage of patients whose smoking status was ascertained and documented annually

HbA1c=Hemoglobin A1c; LDL-C=Low-density lipoprotein cholesterol

Process measures

The frequency of process measures is shown in Table 2. The processes most consistently carried out in the clinic were measurement of blood pressure and weight while the least frequently performed were foot examination, documentation of smoking status, and urine test for microalbuminuria.

Table 2: Clinic performance - process measures

Process measure	n (%)
BP measured at each clinic visit	328 (98.8)
Weight recorded at each clinic visit	310 (93.4)
One or more HbA1c test performed	138 (41.6)
At least one LDL-C test performed	114 (34.3)
At least one test for urine microalbuminuria performed	1 (0.3)
At least one dipstick test for overt proteinuria performed	86 (25.9)
Documentation of eye examination	18 (15.4)
Documentation of at least one-foot examination	35 (10.5)
Smoking status documented at least once	24 (7.2)

n=Number of persons who had process measure performed; HbA1c=Hemoglobin A1c; LDL-C=Low-density lipoprotein cholesterol

Table 3: Clinical performance: outcome measures

Outcome measure	Total	Male	Female	P
HbA1C (%)	7.6 (2.0)	7.3 (2.0)	7.3 (2.0)	>0.05
LDL-C (mmol/l)	107.3 (31.5)	106.1 (30.2)	108.1 (32.6)	>0.05
SBP (mmHg)	134.3 (20.8)	133.8 (19.1)	134.6 (21.9)	>0.05
DBP (mmHg)	79.5 (11.0)	79.2 (10.4)	79.7 (11.4)	>0.05

Values are expressed as mean (SD). HbA1c=Hemoglobin A1c; LDL-C=Low-density lipoprotein cholesterol; SBP=Systolic blood pressure; DBP=Diastolic blood pressure; SD=Standard deviation

Table 4: Frequency distribution of outcome measures

Parameter	n (%)
HbA1c (%)	
<7	66 (47.8)
7-7.9	24 (17.4)
8.0-8.9	19 (13.8)
≥9.0	29 (21.0)
LDL-C (mg/dl)	
<100	48 (42.1)
100-129	42 (36.8)
130-159	19 (16.7)
≥160	5 (4.4)
SBP (mmHg)	
<130	138 (41.6)
130-139	60 (18.1)
140-159	63 (25.0)
≥160	51 (15.4)
DBP (mmHg)	
<80	125 (37.7)
80-89	128 (38.6)
90-99	49 (14.8)
≥100	30 (9)

HbA1c=Hemoglobin A1c; LDL-C=Low-density lipoprotein cholesterol; SBP=Systolic blood pressure; DBP=Diastolic blood pressure

Among the 138 (41.6%) patients who had hemoglobin A1c (HbA1c) test done, approximately half (49.3%) also had low-density lipoprotein cholesterol (LDL-C) test done while 39% of them had their urine tested for overt proteinuria. However, among the patients who did not have any HbA1c test performed, only 23.7% of them had LDL-C measured while just 12% had their urine tested for overt proteinuria. Among the patients who had their urine tested for overt proteinuria, 65.1% also had their LDL-C measured while 62.8% had their HbA1c concentration measured as well. In contrast to this, among the patients who did not have a urine test for overt proteinuria in the year under review, only 34.1% had an HbA1c assay performed while just 23.6% of them had their LDL-C measured.

Outcome measures

Table 3 shows the mean (SD) of most recent outcome measures assessed. The frequency distribution of the various outcome measures for patients who had the tests done at least once within the year under review is shown in Table 4. About 52.2% of patients who had HbA1c measured and 57.9% of those with LDL-C assayed did not achieve stipulated targets as recommended by the ADA for the majority of adults with diabetes. The mean HbA1c among the persons who had the assay was suboptimal (7.6%), with only 47.8% of persons achieving the ADA target of <7%.

Discussion

Performance indicators have been found to vary considerably in different countries and health-care settings. The results from this study on process measures quality indicators for persons with diabetes in this diabetes clinic were generally unsatisfactory, with the exception of blood pressure measurement. Nearly 41.6% of the patients had at least one HbA1c assay performed within a follow-up period of 1 year. This figure is much lower than that obtained from clinics within a United States (US) public hospital situated in an urban setting where the frequency of HbA1c testing ranged from 76 to 94%.[6] In contrast to this, frequency of HbA1c testing in community centers in medically, underserved areas within the US was similar to those found in this study (43%).[7] The frequency of HbA1c testing among patients with diabetes in various health care facilities in developing countries also varies considerably. Figures from two diabetes clinics situated in a tertiary hospital in South Africa were 41.5% and 65.5%.[8] In another study conducted in India partly based on self-reported data, the frequency of HbA1c testing within the a year period was just 13.1%.[4]

Approximately, one-third of the patients had at least one LDL-C measurement performed within a follow-up period of 1 year. These results are also well below the frequency of LDL-C testing of 76%–86% reported in an audit of clinics within a US public hospital.[6] Low rates of serum cholesterol

measurement were also reported in audits from 2 diabetes clinics in South Africa (15.1%–26%)[8] and a self-reported survey from India (32%).[4]

Testing for overt proteinuria was also well below recommended standards established by the ADA as it was documented in records of only 25.9% of the patients. Only one patient had documentation of urine testing for microalbuminuria. Low rates of nephropathy screening were also reported in the studies conducted in the South African clinics[8] (9.4–14.2%).[6] In sharp contrast to the above-reported studies from developing countries, screening rates for nephropathy in a US public urban hospital were reported to be 58–79% of the clinic population.[6]

Documentation of foot and eye examination in the clinic records was also inadequate in this study as there was evidence of such in 10.5% and 15.4% of patients, respectively. This was also much lower than that observed in the US, where foot examination was done in 24–97% of patients and eye examination in 31–64%.[6] In reports from South Africa, the percentage of clinic attendees who had eye examination and foot examination ranged from 23.4–36.5% to 31.9–39.6%, respectively.[8]

Low rates of HbA1c and LDL-C testing were observed among the study population. This is of concern as there is data to suggest that missing information on intermediate outcome measures, such as HbA1c and LDL-C levels, represents a strong independent predictor of long-term cardiovascular outcomes.[9]

The ability to pay for services may be a significant limiting factor affecting the performance of the clinic with regards to some of the studied quality of care indicators. This is suggested by the observation that process indicators for which there was no extra charge, namely, blood pressure measurement, and weight measurement were performed in the vast majority of these patients. It is further evident from the data that patients who were able to pay for some tests were more likely to pay for others and vice versa. The vast majority of persons attending the clinic are low-income earners who pay out of pocket. Payment for investigations and adherence to therapy is more likely to be suboptimal when patients have to bear part of or the total cost of care. Co-pays and full-cost services have been associated with lower use of preventive processes of care in persons with diabetes.[10,11] The cost of care may therefore be a deterrent to the performance of process measures.

Healthcare giver awareness of standards of care may also be important in improving the quality of care. Although foot examination had no attendant charge, the documented rate of foot screening was quite low (10.5%). To improve on adherence to foot screening for persons with diabetes in this clinic, education of health care providers in the diabetes clinic on the importance and technique of foot care examination in persons with diabetes is crucial. The introduction of physician education programs has also been reported to significantly improve the quality of care.[8] The use of practice guidelines and enhanced delivery systems for health care providers could also lead to improvements in care.

The organization of healthcare delivery may also affect the quality of care. The performance of BP and weighing of patients as part of routine processes in the diabetes outpatient clinic before entrance into the doctor's consulting room may have contributed to the high frequency of performance of these measures. Task shifting of foot examination to trained nurses as part of routine procedures in the diabetes clinic may also be rewarding. Such organizational restructuring and inter-professional teamwork may successfully improve on this process measure and possibly others.

There is evidence to show that acceptably designed interventions are feasible and useful for improving the quality of diabetes care even in resource-poor countries.[9] Improvement in standards of care for persons with diabetes has also been observed with the introduction of interdisciplinary team of health-care providers, task shifting, and active participation by trained nonphysician providers.[9,12]

It was also noted that medical records in the clinic were done in a nonstructured manner making a prompt review of previous clinic proceeding documentation tasking when trying to ascertain investigations and procedures done in the past. The use of structured consultation schedules and management flow sheets in the diabetes clinic has also been noted to improve the quality of diabetes care.[6]

Conclusion

In summary, this study has shown that there are significant opportunities for improvement in the studied outpatient clinic with regards to both process and outcome measures. The factors that may be responsible for this include locally remediable ones such as the organization of service delivery and healthcare personnel education as well as national issues such as the availability of health insurance. Further studies may help in the identification of the true root causes of the observed deficiencies, creating an avenue for changes that will result in effective improvements.

Conflicts of interest
There are no conflicts of interest.

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