Abstract

Background: Successful quality improvement using Plan-Do-Study-Act (PDSA) cycles have been noted in many fields including diabetes care. Diabetes is a costly disease in terms of morbidity, mortality and quality of life placing an enormous economic and health burden worldwide. Quality care for diabetes with regular follow-up is a cornerstone for proper glycemic control and better quality of life.

Objective: To improve the quality diabetes services through using the (PDSA) quality improvement process.

Method: This study is a quality improvement intervention study using PDSA model to initiate a pilot improvement cycle for diabetes care. The study has passed into 4 phases according to the PDSA model between September 2013 to December 2014. It was conducted at outpatient clinic in Diabetes and Endocrine Center (DEC) in Cairo, Egypt. It is as a referral center affiliated to Kasr Al-Aini University Hospital (KAUH) providing ambulatory care to diabetic patients. Diabetic patients attending the DEC at KAUH for regular follow-up visits. Two groups of patients (104 Vs. 50) and (100 Vs. 93) aged (18-65 year) were randomly selected for the new design and self-care education interventions respectively.

A new follow-up sheet design and a self-care education program were implemented for 3 months. The outcome measures include: physicians process performance, patients’ knowledge and practices, diabetes clinical indicators and patients’ satisfaction.

Results: A significant improvement in physicians' performance was noticed after implementation of the new sheet regarding history taking, physical examination (BP, body weight, and foot examination), referrals to dietitians and to ophthalmologists, as well as follow-up investigations (A1C% and lipid profile).

A significant improvement of total knowledge score was observed among patients from median (IQR) 10 (8-12) to 15 (14-17) after the intervention \( (p=0.000) \), in addition to a significant increase in the number of patients who always follow healthy dietary habits \( (p=0.000) \). A significant reduction in mean BMI, SBP and A1C% was observed after the intervention \( (p=0.000, p=0.000\) and \( p=0.001) \) respectively.

Conclusion: The current study revealed that PDSA model is a valuable method to improve the diabetes services. Implementation of the new sheet design as well as self education had a positive impact on diabetes care and patients clinical outcomes and satisfaction.

Key Words: Quality of health care – PDSA – Diabetes – Follow-up sheet – Self-care education – Quality indicators – Kasr Al-Aini University Hospital – Egypt.

Introduction

QUALITY Improvement (QI) consists of systematic and continuous actions that lead to measurable improvement in health care services and health status of targeted patient groups [1]. The Institute for Healthcare Improvement (IHI) approach to quality improvement emphasizes rapid-cycle testing in the field in order to learn which interventions, in which context, can predictably produce improvements. The (PDSA) cycle has formed the mainstay of IHI's teaching and improvement methodology over the years [2]. In the "Plan" stage identification of a change aimed at improvement; the 'do' stage testing this change; in the 'study' stage examining the success of the change; and in the 'act' stage identification the adaptations for next steps to plan a new cycle [3]. It is the method of choice for testing ideas for improvement that can lead to higher performance [4]. Successful quality improvement using PDSA cycles have been noted in many fields and diabetes care is among them [5].

Diabetes is a costly disease in terms of morbidity, mortality and quality of life [6]. Due to the rising prevalence of diabetes, it is placing an enormous economic and health burden on the nations of the world [7] and the majority (80%) of them
live in low- and middle-income countries [8]. Egypt is not exception with around 17% of the Egyptians had raised fasting blood glucose level [9].

Diabetic care is a continuous process starting with initial comprehensive evaluation that includes medical history, physical examination, laboratory evaluation and referrals [10], in addition to regular follow-up visits determined according to the patient's conditions and availability of resources.

Kasr Al-Aini University Hospital (KAUH) is the largest hospital in the region providing medical services to more than a million people annually. Diabetes and Endocrinology Center (DEC) in KAUH is a specialized center providing diabetes care. A current process of reform is going on in this institution.

Aim and objectives:
To improve the quality diabetes services through using the (PDSA) quality improvement process in DEC at (KAUH).

Key study objectives included:
(A) Identification of the system of work and the client's needs
(B) Identification of opportunities for improvements
(C) Implementation of interventions using the PDSA model, and
(D) Evaluation of the impact of the implemented interventions on physician performance, patients' outcome and their satisfaction.

Material and Methods
This study is a quality improvement intervention study using PDSA model with pre and post assessment. It was conducted over the period of September 2013 to December 2014.

Setting: The study was conducted in the diabetes outpatient clinic in Diabetes and Endocrine Center (DEC) in Cairo, Egypt. It is as a referral center affiliated to Kasr Al-Aini University Hospital (KAUH) providing ambulatory care to diabetic patients. The service was provided through 5 physicians and 6 nurses. Every day, 2 physicians and 3 nurses were on duty to serve an average of 70 patients [outpatient statistical record, 2012]. The DEC receives patients from everywhere in Greater Cairo area. Each patient visits the clinic once a month to get medical care and free diabetes medication. Patients' files were kept in the clinic and retrieved each visit.

Study tools:
• Checklist to assess the medical services provided such as history taking, physical examination, investigations, referral and management process.
• Interview questionnaire to assess diabetes patients' knowledge and healthy self-care practices. In addition, clinical indicators were measured: Weight, Height, BP, RBG and (A1C% for a randomly selected 40 patients). Patient satisfaction was assessed using 5 points Likert's scale including administrative, financial, and communication domains.
• New sheet design for documentation of essential diabetes care items that should be provided during the initial and follow-up visits: History and physical examination updates, periodic follow-up investigations (biannually for A1C%, annually lipid profile and others), medications, and referral to dietitian, education and screening to detect complications. The sheet was used to act as a memo to direct physicians to the essential components of follow-up care. We referred to the Egyptian Clinical Practice Recommendations for Diabetes care [11], the American Diabetic Association guideline [12] and Canadian Diabetes Association guideline [13].
• Self-care education lectures using audiovisual presentations and sessions for discussions. A printed colored booklet was handed to each patient. It was adapted from the following sources [14-16]. The education massages included the following items: Diabetes basic knowledge, diabetic diet plate, physical activity and exercise, regular follow-up for diabetic patients, insulin administration and preservation, diabetes complications, as well as hypoglycemia (causes, symptoms, and home management).

Implementation:
• Plan stage (planning the intervention):
Analysis of the system to find any defects, the structure and system of work in the center were studied. To identify the system, 50 patients and all of the working staff (physicians and nurses) were interviewed. Observation of 104 clinical examinations of patients and reviewing 150 follow-up sheets were performed. The results revealed that the components of diabetes care were not fulfilled. Deficiency in taking history, examination, investigation and referral to specialties was noticed. In addition to lack of patient education of self-care.

Accordingly, two interventions were applied: A new follow-up sheet that included the main components of diabetes services according to the guidelines, and a self-care education program providing self-care practice massages.
Do stage (implementation):

Initially the new sheet was designed, reviewed by experts and a pilot testing was done after orienting the physicians about it. The final format was applied on a sample of 50 patients with observation of physicians while providing services using the checklist.

A random sample of 100 patients who were previously interviewed was selected to participate in the self care education program. They were followed-up for 3 month. Monthly self care education sessions were provided. Each session emphasized the items provided in the previous one. A final assessment was performed at the fourth month.

Study stage (methods of evaluation):

Physicians' performance was compared before and after using the new sheet. The effect of self-care education on patients' knowledge and practices, diabetes clinical indicators and patients' satisfaction were compared before and after.

Statistical analysis:

Data were revised, entered and then analyzed using IBM statistical Package for Social Sciences (SPSS) for Windows, (Version 21.0. Armonk, NY: IBM Corp).

The knowledge score: Scores given were either 0 (does not know) or 1 (knows). The total score was calculated for each patient and the mean total was presented.

Satisfaction score was obtained using 5-points Likert's scale. Scoring was done where 1 means strongly dissatisfied and 5 means strongly satisfied. Then the total score was calculated for each patient the mean total was presented.

Qualitative data was presented in numbers and percent and tested using Chi square or Fischer's exact test. Quantitative variables were summarized using the mean ± SD for normally distributed data and the median and Inter-Quartile Range (IQR) for the variables that were not normally distributed. Paired quantitative data were tested using Wilcoxon signed rank test for non-normally distributed quantitative variables while the normally distributed quantitative variables were tested using paired t-test. Mc.Nemar test was used for paired qualitative data.

Act phase (wide scale application):

The results of the study were announced to the manager of the DEC who accepted the findings and currently applying them on a wide scale.

Results

A- Results of physicians' performance using the new sheet design:

Physicians' performance was significantly improved after using the new sheet design. This was particularly noticed in items of history taking (inquiry about diabetes duration, co-morbidities, complications, smoking history, and compliance to foot care). There was a significant improvement in physical examination components (weight, BMI and BP measurement a well as foot examination) (p=0.000, 0.004 and 0.000) respectively.

Also a significant improvement in referral to dietitian, requesting glycemic indicators and follow-up investigations including A1C%, RBG and lipid profile after using of the new follow-up sheet by physicians (p=0.041, 0.000 & 0.000) respectively (Table 1).

B- Results of self-care education:

Sociodemographic and clinical characteristics of the patients:

About three fourths (70%) of participants were older than 50 years, the majority were females (89%) and married (88%). More than a half of them were illiterate and had a family history of diabetes (53% and 54%) respectively.

Hypertension was the most frequent co-morbidity in (65%) and peripheral neuropathy was most frequent complication among participants (56%) followed by eye complications in (42%). The mean BMI of the study sample was 33.75 (±4.77) kg/m$^2$, and (79.5%) were obese (BMI >30kg/m$^2$).

Knowledge:

A statistically significant improvement in self care and lifestyle knowledge score among the study participants was observed after the self-care education compared to their knowledge before, with a median knowledge score of 7 and 5 respectively (p=0.000).

Diabetes complication knowledge score improved significantly after the self-care education
compared to that before, with a median knowledge score of 8 and 5 respectively \( (p=0.000) \) (Table 2).

**Healthy habits practice:**

A significant increase in the number of patients who always follow healthy dietary habits to (43\%) after the self-care education compared to (10.8\%) before \( (p=0.000) \). Also a significant reduction in the number of patients who didn't follow healthy dietary habits was observed from (39.8\%) before to (9.7\%) after self-care education. A significant improvement was observed in the number of those who were physically active from (71\%) before to (50.5\%) after self-care education \( (p=0.000) \) (Table 3).

**Clinical indicators:**

A significant reduction in BMI from 33.75±4.77 kg/M\(^2\) to 32.85±4.25kg/M\(^2\) was observed after self-care education with a mean reduction of 0.9 kg/M\(^2\) \( (p=0.000) \).

Also a significant reduction was observed in (SBP) from 128.3±13.3mmHg to 123.55±10.97 mmHg with a mean reduction of 4.8mmHg \( (p=0.000) \). In addition, a significant reduction in (DBP) was observed after self-care education from 90.7±9.047mmHg to 88.4±8.4mmHg with a mean reduction of 2.3mmHg \( (p=0.000) \). Glycated hemoglobin (A1C\%) was significantly reduced from 9.7%±1.5% to 7.9%±1.45% with a mean reduction of 1.8\% \( (p=0.001) \). Random Blood Sugar (RBG) was also significantly reduced from 247.6±63.6mg/dl to 205±41mg/dl with a mean reduction of 42mg/dl \( (p=0.001) \) (Table 4).

**Patient satisfaction:**

A significant improvement in patients' total satisfaction score towards the provided services was noticed after the interventions with mean score of (69.19) compared to (64.1) before the intervention \( (p=0.000) \) Fig. (1).

**Table (1): Physician performance change using the new sheet design.**

<table>
<thead>
<tr>
<th>Performance before using the new sheet design (N=104)</th>
<th>Performance after using the new sheet design (N=50)</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>History:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-morbidity</td>
<td>34</td>
<td>32.7</td>
</tr>
<tr>
<td>Smoking history</td>
<td>13</td>
<td>12.5</td>
</tr>
<tr>
<td>Compliance to foot care</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Examination:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight measurement</td>
<td>5</td>
<td>4.81</td>
</tr>
<tr>
<td>BMI calculation</td>
<td>1</td>
<td>0.96</td>
</tr>
<tr>
<td>BP measurement</td>
<td>21</td>
<td>20.19</td>
</tr>
<tr>
<td>Foot examination</td>
<td>1</td>
<td>0.96</td>
</tr>
<tr>
<td>Referral to dietitian</td>
<td>6</td>
<td>5.8</td>
</tr>
<tr>
<td>Referral to ophthalmology</td>
<td>13</td>
<td>12.50</td>
</tr>
<tr>
<td>Investigations requested:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Request for A 1 C (%)</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>Request for lipid profile</td>
<td>11</td>
<td>10.6</td>
</tr>
<tr>
<td>Request for liver function test</td>
<td>41</td>
<td>39.4</td>
</tr>
<tr>
<td>Request for serum creatinine</td>
<td>42</td>
<td>40.4</td>
</tr>
<tr>
<td>Management:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication review</td>
<td>103</td>
<td>99.0</td>
</tr>
<tr>
<td>General diabetes education</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dietary advice by physician</td>
<td>66</td>
<td>63.5</td>
</tr>
<tr>
<td>Foot care advice</td>
<td>1</td>
<td>0.96</td>
</tr>
<tr>
<td>Physical activity motivation by physician</td>
<td>50</td>
<td>48.1</td>
</tr>
</tbody>
</table>

**Table (2): Knowledge score among study participants pre and post the self-care education (N=93).**

<table>
<thead>
<tr>
<th>Knowledge score</th>
<th>Before self-care education</th>
<th>After self-care education</th>
<th>( p )-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-care and life style knowledge score (Median (IQR))</td>
<td>5 (4-5)</td>
<td>7 (6-8)</td>
<td>0.000</td>
</tr>
<tr>
<td>Complication knowledge score (Median (IQR))</td>
<td>5 (4-7)</td>
<td>8 (7-10)</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

*: Wilcoxon signed rank test.
Table (3): Health habits practice among study participants pre and post the self-care education (N=93) (No,%).

<table>
<thead>
<tr>
<th>Healthy habit practices</th>
<th>Before self-care education</th>
<th>After self-care education</th>
<th>( p )-value †</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Healthy dietary habits:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not following healthy diet</td>
<td>37</td>
<td>(39.8)</td>
<td>9</td>
</tr>
<tr>
<td>Sometimes follow healthy diet</td>
<td>46</td>
<td>(49.5)</td>
<td>44</td>
</tr>
<tr>
<td>Always following healthy diet</td>
<td>10</td>
<td>(10.8)</td>
<td>40</td>
</tr>
<tr>
<td>Physical activity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physically inactive (sedentary)</td>
<td>66</td>
<td>(71)</td>
<td>47</td>
</tr>
<tr>
<td>Sometimes physically active</td>
<td>23</td>
<td>(24.7)</td>
<td>38</td>
</tr>
<tr>
<td>Always physically active</td>
<td>4</td>
<td>(4.3)</td>
<td>8</td>
</tr>
</tbody>
</table>

†: Mc Nemar test.

Table (4): Clinical indicators among study participants pre and post the self-care education (N=93) (mean ±SD).

<table>
<thead>
<tr>
<th></th>
<th>Before self-care education</th>
<th>After self-care education</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/M(^2))</td>
<td>33.75±4.77</td>
<td>32.85±4.25</td>
<td>0.000*</td>
</tr>
<tr>
<td>SBP (mm/Hg)</td>
<td>128.3±13.3</td>
<td>123.55±10.97</td>
<td>0.000*</td>
</tr>
<tr>
<td>DBP (mm/Hg)</td>
<td>90.7±9.047</td>
<td>88.4±8.4</td>
<td>0.000*</td>
</tr>
<tr>
<td>Glycated hemoglobin (A1C%)</td>
<td>9.7±1.5</td>
<td>7.9±1.5</td>
<td>0.000*</td>
</tr>
<tr>
<td>Random Blood Glucose (RBG mg/dl)</td>
<td>247.6±63.6</td>
<td>205±41</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

*: Paired \( t \)-test.

Fig. (1): Total satisfaction score before and after the self-care education.

Discussion

Situation analysis for quality improvement in a health system will always take place against a background of structure, existing policies and priorities, as well as current health-system performance [17].

Situation analysis in the current study revealed lack of documented and properly disseminated Standards of Practices (SOP) and guidelines. This may affect the performance of the physicians and the effectiveness of the service.

About two fifths (40%) of patients in the current study had missed some visits during the last year. This may indicate dissatisfaction with the system of work and may be related to low level of caring by providers, deficiency of medication or delay in laboratory results.

It is recommended that the number of follow-up visits for glycemic control evaluation is at least 2-4 visits/year and special attention to patients who do not keep scheduled appointments, or have frequent hospitalizations or missed days of work/school [18]. In DEC, patients should visit the clinic monthly for follow-up and dispensing their medication. The increase number of follow-up visit in this setting can be an opportunity for providing patients with more effective care and self-education.

A- Physicians’ performance change:

Many intervention studies have found that use of appropriate follow-up sheet improves patient care by drawing attention to a particular medical condition or needed preventive service and encouraging an immediate response from the health care professional [19].

Situation analysis phase revealed that physicians’ performance for history taking, examination, and for requesting follow-up investigations were suboptimal. Similar findings were observed in another study done at the National Institute of Diabetes and Endocrinology in Cairo [20]. Situation analysis also revealed that the follow-up sheet used was a blank page that lacked follow-up care components needed to be fulfilled by physicians. The
new designed sheet included all essential care components. Implementation of the new sheet significantly improved all aspects of health care including registration, history taking, examination, and investigations.

The new sheet will reinforce the importance of referral to the dietitian which showed to be suboptimal while using the old sheet.

It can be concluded that the new sheet is a tool that could be used to improve physicians’ compliance to diabetes care recommendations. Physicians’ commitment to perform and record the required care components with the help of nurses is essential. The new sheet could be used to evaluate the process of physicians performance and the effectiveness of the management procedures.

B- Individual self-care education:

Diabetes requires more than just taking medicine. Other aspects of self-management such as executing behavioral modifications that address personal hygiene, self-management, avoidance of smoking, healthy diet and sufficient levels of physical activity, attending follow-up appointments, self-monitoring of blood glucose, regular foot care and ophthalmic examinations have all been shown to markedly reduce the incidence and progression of complications of diabetes [21,22].

Self-care education intervention in this study significantly improved knowledge about diabetes, healthy life style practices, clinical outcomes (BMI, BP, A1C%, RBG) and patients’ satisfaction (Tables 2-4) & Fig. (1).

The majority of patients in the current study had lack of diabetes knowledge regarding different aspects of diabetes. This finding is consistent to another study performed in Zagazig Governorate in Egypt [23]. There was a similarity in the services provided in both settings as a public institution.

Repeated episodes of hypoglycemia result in significant morbidity and mortality which is reportedly associated with a six-fold increase in death [24].

The study showed that 24% of the patients were aware about hypoglycemia symptoms and its causes compared to (76%) among Omani patients [25], (62.2%) among Libyan patients [26] and (50%) among Pakistanis [27].

The study revealed a statistically significant improvement in self-care and life style knowledge score after the self-care education. This finding is consistent with the findings of [24]. Similar results were announced in Qatar where knowledge score among the intervention group had increased from 14.3±7 to 26.7±5.7 [28].

Compliance to healthy diet significantly improved after self-care education. Similar results were obtained in a study performed in Assuit, Egypt where the intervention improved patients’ compliance [29].

Significant reduction in sedentary life style practices in this study is supported by the findings by Mahdizadeh et al., [30] who found that in the intervention group sedentary behavior was reduced and the mean minutes of physical activity significantly increased.

The current study showed a significant reduction in BMI after the intervention (Table 4). This finding is consistent with the work performed by Agurs-Collins et al., [31] who found significant reduction in BMI 3 months after the intervention.

The current study revealed significant decrease of both (SBP) and (DBP) after the self-care education (Table 4). Similar findings were reported by Mostafa et al., [20] where both SBP and DBP decreased from decreased after the intervention. Comparable findings were reported by [32] who found that the intervention reduced SBP.

The ADA recommends measuring A1C% at least twice yearly in all patients with DM and at least 4 times yearly in patients not at target the recommended glycemic level [10].

• RBG:

The current study revealed that the average random blood glucose RBG was significantly reduced after the intervention (Table 4). This is similar to the effect of education program performed by [23] who found a significant reduction in the mean random blood sugar.

• Glycated hemoglobin (A1 C %):

A1C reflects average glycemia over several months [33] and has strong predictive value for diabetes complications [34] and greater convenience and pre-analytical stability over FPG to diagnose diabetes [35]. Thus, A1C testing should be performed routinely in all patients with diabetes at initial assessment and as part of continuing care. Measurement approximately every 3 months determines whether patients’ glycemic targets have been reached and maintained. The frequency of A1C testing should depend on the clinical situation, the treatment regimen, and the clinician’s judgment [36].
Landmark studies demonstrate that a reduction of 0.5% in A1C is associated with a significant reduction in diabetes-related complications [37].

This study showed a significant reduction of glycated hemoglobin (A1C%) with a mean reduction of A1C 1.8% (Table 4). However, further efforts are needed to reach to the target glycemia (<7%) [10].

The study showed improvement of the following aspects (knowledge, healthy life style, and diabetes outcome). In addition, improvement was noticed in physician’s instructions, physician listening the patients’ complains, time of examination and treatment, cost-benefit of services, satisfaction on, and quality of care. The total satisfaction score of the patients has significantly increased.

Similar findings were reported in a study done by [38], where significant improvement in satisfaction on waiting time was noticed after implementing a program using PDSA model was concluded.

Limitations of the study:
- Limited ability to generalize the results of this study to diabetes centres with similar structure and system of work.
- Small sample size, short duration of follow-up and testing A1C% for a subsample due to limited resources.
- Initiation of new health service component rather than quality improvement was performed due to poor baseline service provision.
- The long time needed to fill up the new follow-up sheet. This can be overcome by task shift to nurses who can measure blood pressure and body weight to spare physicians’ time for better service provision.

Conclusion and Recommendations:

PDSA model is a valuable method to improve the quality of diabetes care through identifying the problems affecting clinical outcome and physician’s performance and plan appropriate interventions. Self-care education of diabetic patients is crucial for control of diabetes outcomes and hence improves quality of life.

Appropriately designed follow-up sheet could be considered as a memo for physicians to improve their performance.

Adherence to the guidelines of diabetes care ensures better services and improves physician’s patient interaction. However, managers’ commitment and support to implement the recommendations of the study is a key factor to achieve improvements. It is recommended to implement the intervention on a wide scale with regular assessment of physicians’ performance and patients’ improvement.

Further studies are needed to evaluate the quality improvement of these interventions in this setting.

Acknowledgments:

The authors wish to acknowledge and express their gratitude to the administrators, health care providers and the workers at the outpatient center in DEC.

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الملخص العربي

الخليجية: لقد لوحظ تحسين الجودة باستخدام أطار تحسين الجودة المستمري دورة ( خطط، انجاز، ادرس، نفد) في عدد من التخصصات منها رعاية داء السكري. إن السكر داء نو تكلفة بمفهوم الرعاية، الوفيات ونوعية الحياة مما يجعل عبأة الاقتصادى والنسى على مستوى عالمي. الرعاية ذات الجودة للسكري مع المتابعة المنتظمة تعتبر حجر الأساس للتحكم بمستوى السكر ونوعية حياة أفضل.

الهدف: تحسين جودة خدمات داء السكري من خلال استخدام أطار تحسين الجودة المستمري دورة ( خطط، انجاز، ادرس، نفد).

الطريقة: تعتبر هذه الدراسة دراسة داخلية لتحسين الجودة باستخدام الأطار ( خطط، انجاز، ادرس، نفد) للبدء بتحسين الرعاية لداء السكري. وقد مرت الدراسة أربعة مراحل حسب الأطار في الفترة ما بين سبتمبر 2012-أغسطس 2014. أجريت الدراسة في القيادة الخارجية لمركز السكري والفحص العملي التابع لمستشفى قصر العينى. وأجريت على مرضى السكري المتكبدين على المركز للمتابعة الدورية. شملت الدراسة مجموعتين من المرضى تم اختيارهم عشوائياً حسب نوع التنسيق لصحيفة المتابعة الجينية (100-75) والتأكد من الرعاية الانتهائية (100 مع 75) وتدريبهم اعمالهم بين 18 و36 سنة. تم تطبيق التدريس لمدة 3 أسابيع وشملت مقاييس المخرجات: اداء الاطباء، المعرفة وممارسات المرضى، المؤشرات الاكتئبية للسكري وردء المريض.

النتائج: لقد لوحظ تحسناً نو لدالة احصائية في اداء الاطباء بعد تطبيق صحيحة الجيدة في اخذ الالعيبة، الفحص الاكتئبي، وتحويل المرضى إلى الاختصاص التثبيت وطب العيون وكذلك الثلاثة في الفحوصات العملية للمتابعة (السكري الهيبوجليسين ومستوى دهون الدم). كما لوحظ تحسن نو لدالة احصائية في مقابل الكلي المستوي المعمر بيشير من 10 إلى 15. كما ارتفع عدد المرضى الذين يلتزمون ببطء ذائقى من 45% إلى 55% عند اجراء الرؤية الانتهائية. حيث وجدت تحسناً نو لدالة احصائية في معدل كلية الجسم، ضعف الدم الانتقائي، ونسبة الهيموجلوبين السكري.

الاستنتاج: أوضح هذه الدراسة أن أطار تحسين الجودة المستمري دورة ( خطط، انجاز، ادرس، نفد) نو اهمية في تحسين خدمات الرعاية للسكري. حيث أن تطبيق تصميم صحيحة جيدة بالإضافة إلى التثقيف عن الرعاية الانتهائية يؤدي إلى اثير إيجابي على الرعاية وكذلك على المؤشرات الاكتئبية للسكري وبايض رضا المريض عن الخدمة.