# General Practitioners' Knowledge and Clinical Practice in Management of People with Type 2 Diabetes in Iran; The Impact of Continuous Medical Education Programs

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**Abstract**

**Background:** To obtain information related to the knowledge and clinical practice of general practitioners (GPs) in management of people with type 2 diabetes, and to explore the impact of formal continuous medical education (CME) programs.

**Methods:** A total of 1104 GPs participated in a cross sectional survey related to diabetes management considering ADA/EASD consensus 2011 focused on demographic and background characteristics, diabetes related knowledge, and patient care. Fisher's Exact and Chi-square tests were used in the analysis of contingency tables.

**Results:** The majority of the participants (83.9%) worked in large cities and 39.8% had taken part in CME programs in diabetes management. Overall, 52% of the GPs knew the treatment goal for HbA1c. The rate was slightly higher for those taken part in CME ($P$ = 0.003). Considering patient care, slightly more than half of the participants answered correctly to the questions on duration and distribution of physical activity, with no difference by taking part in CME programs. On average, 41.5% of the physicians selected metformin as the first OGLD for treatment of type 2 diabetes, and only 27.9% stated that they add basal insulin to OGLD if treatment failed.

**Conclusion:** The results of this study provide the evidence that the knowledge and clinical practice of Iranian GPs in management of type 2 diabetes were not satisfactory. Furthermore, traditional CME programs in diabetes management were not effective in changing the GPs' clinical practice. Consequently, designing and implementing more effective strategies are necessary for improving patient health related outcomes.

**Keywords:** General practitioner, knowledge, practice, type 2 diabetes

## Introduction

Type 2 diabetes mellitus is a common chronic disease that affects 382 million people worldwide.[1] In a study that was conducted by Esteghamati, et al. in 2014, it was shown that more than four million people in Iran have diabetes which has increased by 35% since 2005.[2] Development of long-term diabetes related complications is insidious. These complications are responsible for the serious morbidities that have a great impact on the quality of life of people with diabetes.[3,4]

The role of doctors in the management of diabetes is to keep their patients healthy by decreasing the rate of diabetes-related chronic complications, and to improve their quality of life. Primary care physicians are on the front line for delivering diabetes care for this group of patients.[5–7] However, the quality of care delivered by the primary care physicians depends on their knowledge about diabetes management as well as their practice behavior related to diabetes care.[7–9]

Continuous medical education (CME) programs based on clinical practice guidelines could help the practitioners to be updated on the specific aspects of the patient care.[10] In Iran, the national diabetes prevention and management program has been developed since 2004, and type 2 diabetes guidelines for the general practitioners were evolved based on international guidelines and local demands. Since then, several CME programs have been run for the general practitioners in order to upgrade their knowledge and change their clinical practice during the last couple of years.

To the best of our knowledge, Iranian general practitioners' knowledge and clinical practice in people with type 2 have not been assessed before. Therefore, the aim of this study was to assess the knowledge and clinical practice of general practitioners, and to explore the effect of CME programs on self-reported care of patients with type 2 diabetes.

## Materials and Methods

A cross sectional survey was conducted in 2011. Eleven hundred and four general practitioners who took part in the annual meeting of the Iranian Society of General Practitioners participated in the survey.

The survey was adapted from the original four steps of the awareness-to-adherence study by Pathman, et al.[11,12] This study assesses the awareness, and adoption of the recommended practice considering ADA/EADS consensus and standard of medical care in diabetes 2011. In addition, adherence was also assessed by

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asking GPs about their use of a systematic approach to implement a given strategy consistently. The survey includes the following areas:

### 1. Demographic and background characteristics

The variables were age, sex, number of years in general practice, location of practice, and taking part in CME programs in diabetes management.

### 2. Diabetes related knowledge

The GPs were asked for the targets of fasting plasma glucose, post prandials, HbA1c, systolic and diastolic blood pressure, as well as the goals for low density lipoprotein (LDL), high density lipoprotein (HDL), and triglyceride in people with type 2 diabetes.

### 3. Patient care

The doctors were also asked to report if they discussed the importance of lifestyle modification with their patients in details, and their first choice in selecting an oral glucose lowering drug (OGLD). In the following section, they were asked to report the follow-up plan for checking HbA1c, and the next step in case of treatment failure with OGLDs. The role of self-monitoring of blood glucose (SMBG), and the first drug of choice in the management of hypertension in type 2 diabetes were also asked. In addition, the rate of prescription of medications related to type 2 diabetes as well as cardiovascular risk assessment was assessed. The response options were "never", "less than half of the times", "more than half of the time", and "always".

### Statistical analysis

Data were analyzed using IBM SPSS for Windows Version 19 (IBM Corp., Armonk, NY, USA). Fisher's Exact and Chi-square tests were used in the analysis of contingency tables. Results reported in Figure 1 were analyzed to show the proportion of general practitioners' adhering to standards of care. Mean age was compared in two groups with Mann-Whitney U test. All statistical analyses were two sided, and a $P$-value $< 0.05$ was considered statistically significant.

## Results

### Demographic and background characteristics

Overall, 1104 general practitioners completed the survey. The mean age of the participants was $41.22 \pm 9.80$, and 59.2% were male. The majority (84.2%) worked in urban areas, and 39.8% stated that they had previously taken part in CME programs in diabetes management (Table 1).

### Diabetes related knowledge

Fifty two percent of the GPs mentioned the HbA1c treatment goals correctly. The rate was higher for those who had taken part in CME programs (57.6% $vs.$ 48.2%, $P = 0.003$). Similarly, more than half of the doctors knew the targets for fasting plasma glucose (FPG) and post prandial glucose values.

The knowledge for systolic blood pressure target was slightly better (60.3%). However, the results were disappointing for the lipid targets. Table 2 summarizes the distribution of diabetes related knowledge in relation to taking part in CME programs.

### Patient care

Although the majority of the doctors reported that they always discuss the importance of the lifestyle modification in management of diabetes, only 47.2% correctly answered the recommended duration of physical activity and 98.3% reported the correct distribution of the physical activity throughout the week. Taking part in CME programs had no statistically significant effect on these variables.

On average, 41.5% of the physicians selected metformin as the first OGLD for treatment of type 2 diabetes. The rate was slightly higher for those who took part in CME programs compared to
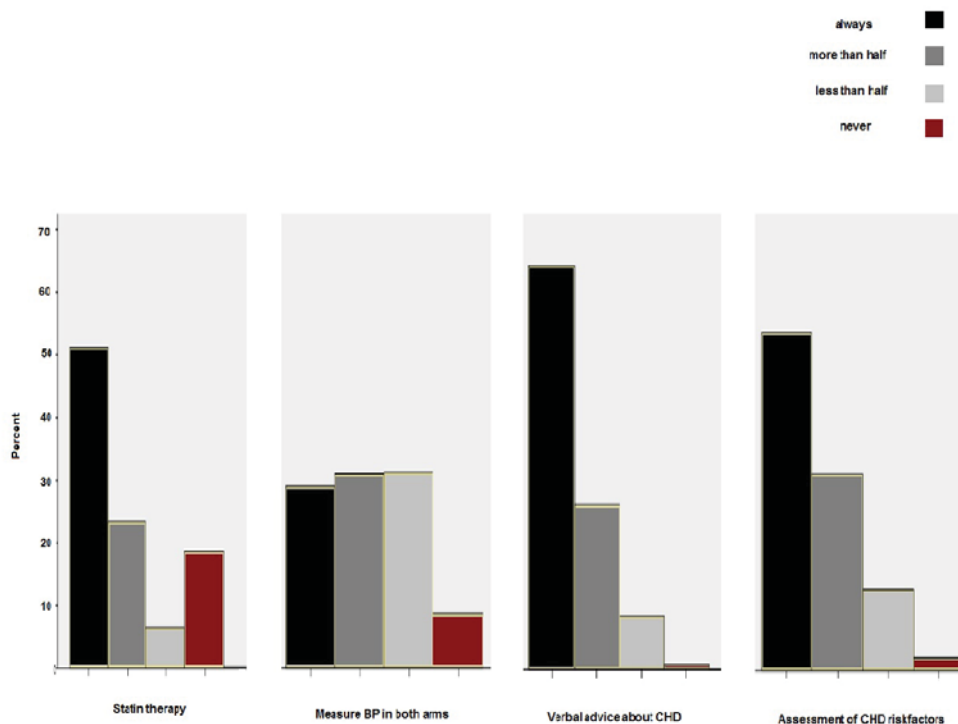


Figure 1. Analysis of proportion of general practitioners' adhering to standards of care

**Table 1.** Demographic and background characteristics of the participants according to gender

|  | All participants (n = 1104)* | Female (n = 413) | Male (n = 654) | P-value |
|---|---|---|---|---|
| **Age (years)** | 41.22 ± 9.80 | 37.05 ± 7.76 | 43.83 ± 9.98 | **0.000** |
| **Clinical practice (years)** | 12.72 ± 9.27 | 9.33 ± 6.99 | 14.65 ± 9.77 | **0.000** |
| **Practice location (%)** |  |  |  | **0.615** |
| Urban | 84.2 | 84.9 | 83.7 |  |
| Rural | 15.8 | 15.1 | 16.3 |  |
| **CME* (yes) (%)** | 39.8 | 41.2 | 38.7 | **0.432** |
| *Thirty-seven participants did not mention their gender; **CME: Continuous Medical Education | | | | |

**Table 2.** Diabetes related knowledge distribution of the participants in relation to taking part in CME programs

|  | All participants (n = 1104)* | CME Programs | | P-value |
|---|---|---|---|---|
|  |  | Yes (n = 422) | No (n = 637) |  |
| FPG (70–130 mg/dL) | 56.9% | 66.4% | 50.4% | **0.000** |
| PPG (< 180 mg/dL) | 51.1% | 61.4% | 44.7% | **0.000** |
| HbA1c (< 7%) | 52.1% | 57.6% | 48.2% | **0.003** |
| Systolic BP (< 130 mmHg) | 60.3% | 68% | 55.7% | **0.000** |
| Diastolic BP (< 80 mmHg) | 50.5% | 55% | 48% | **0.027** |
| TG (< 150 mg/dL) | 30.8% | 38.4% | 26.5% | **0.000** |
| LDL (< 100 mg/dL) | 41.8% | 51.4% | 35.9% | **0.000** |
| HDL (> 40 mg/dL) | 35.5% | 41.5% | 32.5% | **0.003** |
| *Forty-five participants did not mention whether they had participated in CME programs or not; FPG: Fasting Plasma Glucose; PPG: Post-Prandial Glucose; HbA1c: Glycosylated Hemoglobin; BP: Blood Pressure; TG: Triglyceride; LDL: Low Density Lipoprotein; HDL: High Density Lipoprotein. | | | | |

**Table 3.** Patients-care parameters depending on CME programs

|  | All participants (n = 1104) | CME Programs | | P-value |
|---|---|---|---|---|
|  |  | Yes (n = 422) | No (n = 637) |  |
| Physical activity |  |  |  |  |
| Duration (≥ 180 min/Wk) | 47.2% | 50.0% | 45.1% | **0.121** |
| Distribution (≥ 3 times/Wk) | 98.35% | 98.5% | 98.3% | **1.000** |
| Metformin (Primary treatment) | 41.5% | 45.6% | 38.9% | **0.033** |
| ACEI/ARB | 76% | 73.5% | 79.7% | **0.025** |
| Statins (always) | 51.7% | 57.9% | 47.6% | **0.001** |
| Add basal insulin | 27.9% | 31% | 25.8% | **0.065** |
| CVD risk assessment (≥ 50%) | 84.7% | 87.7% | 82.7% | **0.031** |
| *Forty-five participants did not mention whether they had participated in CME programs or not; ACEI/ARB: Angiotensin Converting Enzyme Inhibitors / Angiotensin Receptor Blockers; CVD: Cardiovascular disease. | | | | |

those who did not (45.06% *vs.* 38.9%, *P* = 0.03)

The results for selecting an angiotensin converting enzyme inhibitor and/or angiotensin receptor blocker for the treatment of hypertension showed that 76% of the participants correctly select the medication. Moreover, 70.9% reported that they start statin therapy for the high risk patients.

Surprisingly, only 27.9% of the doctors stated that they "add basal insulin to OGLDs", if a treatment failure happened with OGLDs. The majority reported that they "discontinue the OGLDs and start insulin therapy."

Considering cardiovascular risk assessment, the majority of the physicians reported that they "assess other cardiovascular risk factors more than half of the time" in people with type 2 diabetes. The respondents' practice in the assessment of these risk factors did not depend on whether they had taken part in CME.

## Discussion

This study assessed the general practitioner's knowledge and clinical practice in people with type 2 diabetes in Iran and explored whether continuous medical education programs in diabetes management could improve the knowledge and change the clinical practice of the participants. We found that almost half of the GPs do not have enough knowledge in relation to the targets for glucose and blood pressure in diabetic patients. The results for the goals of lipid control were even more disappointing. Taking part in CME programs improved diabetes related knowledge; however, the effect was not substantial. Furthermore, we found a very significant gap between the standards of patient care and current clinical practice of the GPs in Iran. This was reflected dominantly on physicians' decision making in relation to OGLDs prescription, and insulin initiation as the first steps in the manage-

ment of diabetes.

Most importantly, the changes in doctors' clinical behaviors attributable to CME were not promising, although the situation was better for blood pressure control and assessment of cardiovascular risk factors.

The aim of CME programs is to change physicians' behaviors and improve patients' outcomes. Lynne, et al. described that education is involved in about one third of the doctors' changes in clinical practice.[13]

Generally, four stages are involved in physicians' learning: identifying the problem, finding the relevant resources, acquiring the knowledge, and gaining experiences through practice and feedback.[14] When a physician recognizes a gap in his/her knowledge or skill, there are several resources that could be used to close the gap. These include available journals, textbooks, and guidelines.[15] Based on clinical practice guidelines, CME programs are expected to provide up-to-date clinical information. However, moving from awareness through agreement to adopt and adhere to recommendations is a complex process.[16] Moreover, the nature of CME intervention has been shown to have a great impact on the physicians' performance and health care outcomes. Bloom examined the effect of CME on improving physicians clinical practices and patient outcomes.[17] Interactive techniques such as audit/feedback and academic detailing were found as the most effective techniques. On the other hand, the least-effective CME didactic programs such as presentations and distributing printed information had little beneficial effect in changing physician practice. Others found that live media, multimedia, interactive sessions, and multiple exposures are more effective in achieving and maintaining physicians' performance and clinical practice outcomes.[18–20]

In Iran, the current CME programs in diabetes management are mostly based on didactic presentations and the participants have little chance to be involved as an active learner in interactive sessions. Moreover, we use live media and multimedia very rarely, and physicians' exposures are infrequent. This was confirmed by the results of this study which showed that over 50% of the respondents did not take part in any CME programs in diabetes management by the end of 2011. This might be explained by the fact that 42% of the physicians took part in this study practice in small cities or rural areas with little chance to participate in formal CME programs which are held in large cities. Thus, education providers should develop more multifaceted strategies with the patient in mind, in order to address the shortcomings of the current formal CME programs in management of diabetes.

Finding from this study cannot be generalized to all general practitioners who provide diabetes care in Iran. Meanwhile, self-reported data might not reflect the actual practice. However, the results provide valuable information about the knowledge and clinical practice of general practitioners in diabetes management. Furthermore, these data have the potential value in designing and implementing future educational interventions to improve health outcomes.

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