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Quality of care of patients with type-2 diabetes in Galicia (NW Spain) [OBTEDIGA project]

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Summary

Aims: The aim of this study was to describe the degree of compliance of agreed practices with reference to primary care patients with Type 2 diabetes of 40 years old and older in Galicia (NW Spain).

Methods: A total of 108 primary care physicians were selected at random from the totality of doctors. Each physician selected 30 patients at random from their patients suffering from diabetes of 40 years old or older. External observers gathered information from each patient's medical record regarding their characteristics, condition and degree of compliance of selected indicators of good practice.

Results: Group of physicians participated in this study had a mean age of 50 years (standard deviation = 3.9); 48% of them were females; and 17.5% involved in medical residents training. A total of 3078 diabetic patients were included in the study: mean age = 69 years (SD = 10.9), 47.6% women, presence of high blood pressure (72%), hypercholesterolaemia (56%), and regular smokers (10.3%). Compliance with selected indicators such as foot examination (14%), ophthalmological examination (30.6%), abdominal circumference measurement (6.1%), measurement of total or LDL-cholesterol (78.1), blood pressure measurement (84.8), glycosylated haemoglobin measurement < 7% (54.3%) was observed. Adequate monitoring in cases of high blood pressure and hypercholesterolaemia were 34.2% and 27.4%, respectively. Variability between physicians differs according to the different indicators, with interquartile range for compliance of between 16.4 and 66%.

Conclusions: There is a wide margin for improvement in the adaptation of clinical practice to recommendations for diabetic patients. The large variation existing in certain indicators would suggest that certain control objectives are less demanding than advisable in those that comply least, while low compliance and low variability in other indicators point to structural problems or unsatisfactory training of doctors.

Introduction

Type-2 diabetes is currently one the of the greatest public health problems, because of its associated complications (diabetic nephropathy, neuropathy and retinopathy, as well as cardiovascular disease) (1,2). Estimates indicate that the burden of this disease will increase worldwide, turning it into a global pandemia during the course of the present century, affecting 366 million people worldwide by the year 2.030 (3). Ageing populations, obesity and sedentary lifestyles are some of its main causes in the developed world (4).

In Spain, estimates of its prevalence range from 7% to 16%, depending on the geographical area and diagnostic criteria used, highlighting the fact that undiagnosed diabetes could constitute a further 3.7%. Incidence ranges between 8.1 and 10.8 per thousand inhabitants/year (5–10).

A strict control of glucose levels is associated with a reduction of its main complications (11–15), which has led to the development of different recommendations and treatment guides issued by scientific organisations (16). Even so, the degree of compliance to these in clinical practice is far from optimal in such patients (17). This disparity has been previously observed in the case of a large number of chronic conditions, especially in the cardiovascular area, and within very diverse environments (among different countries, among areas within a country, in hospitals and primary care, etc.) and is one of those factors responsible for failure to reach therapeutic targets (15,18). The gap existing between recommendations and clinical practice varies between different areas and conditions, and we do not currently dispose of information concerning the situation of care for diabetic patients (19) in Galicia. The aim of this study was to describe the current degree of compliance and variation between agreed practices in the care of diabetic patients of 40-years old and over in primary care in Galicia. This information will be of assistance in defining specific improvement strategies.

Methods

A cross-sectional study was carried out on a sample of primary care physicians randomly selected by stratified random sampling (by administrative area, seven in Galicia) among all primary care physicians working in Galicia (North West of Spain). The objective was to include 30 diabetic patients randomly selected from the relationship of type 2 diabetic patients of every participating physician.

Exclusion criteria

All doctors who expected to change their practices while the study was conducted (because of reallocation) and those attending very small populations (< 500 people) because of the small number of diabetic patients expected were excluded. Patients under 40 years of age and/or with a recent diagnosis of diabetes (< 1 year) were also excluded.

Physicians were invited to participate by letter and the data collection was performed in 2007–2008.

Variables

Each physician provided information on general aspects of her/his professional practice. Information regarding each patient was collected from medical records by outside observers (nursing staff) previously trained by the research team. Data collected included characteristics of doctors and their work environment, characteristics of patients and their condition, personal and family history of disease and indicators of process quality and diabetes outcome (Table 1).

Table 1. Process and result indicators* analysed

Process indicators
Proportion of individuals whose glycated haemoglobin (HbA1c) has been measured at least once in the past 6 months
Proportion of individuals who have had at least one ophthalmological exploration in the past 2 years, out of all patients included in the study
Proportion of individuals who have undergone at least one microalbuminuria assessment in last 12 months, out of all patients under 75 years of age without established nephropathy
Proportion of individuals who have undergone a complete foot examination at least once in the last year, out of all patients included in the survey
Proportion of individuals who have their cardiovascular risk factors measured in the last 12 months:
Blood pressure
Serum cholesterol
Result indicators
Proportion of individuals, with glycosylated haemoglobin (HbA1c) below 7%. Denominator: all patients surveyed; patients with that measurement
Proportion of individuals with a specific monitoring and/or treatment plan for high blood pressure or high cholesterol levels among those who need it:
High blood pressure: monitoring and treatment plan needed if the blood pressure being higher than 130/80 mmHg
Dyslipemia: monitoring and treatment plan needed if total cholesterol is over 200 mg/dl or LDL-cholesterol over 100 mg/dl

*From ‘Plan de Saúde 2007–10’ (19).

Definition of variables

Body mass index (BMI) was calculated using the following formula: Weight (kg)/height (in metres)^2. We classify BMI values into ‘non-obese’ (BMI between 18.5 and 24.9), ‘overweight’ (BMI between 25 and 29.9) and ‘obese’ (BMI $\geq$ 30). Central Obesity criteria was as follows: A) Adult Treatment Panel-III (ATP-III): waist circumference $\geq$ 102 cm in men and $\geq$ 88 cm in women; B) International Diabetes Federation (IDF): waist circumference $\geq$ 94 cm in men and $\geq$ 80 in women.

Sample size considerations

The study was powered to offer a precision to estimate a proportion of ± 2.6% in the most unfavourable case (p = q = 50%) with a confidence level of 95% and adjusting for the effect of our study design, which was assumed to be 1.5.

Data analysis

Numerical variables are summarised by average and standard deviation and categorical variables by frequency distribution. The percentages of compliance with quality indicators for each participating physician were plotted for each indicator separately. Variability among physicians for each indicator and between the different indicators is represented by a box-and-whisker plot.

Ethics

All patients received detailed explanation of the study and signed an informed consent. The protocol study was approved by the Ethics Committee of Clinical Research of Galicia.

Results

Of the total of 2120 primary care physicians working in Galicia, 295 were invited to participate and 114 were agreed to participate (38.6%). Six physicians were excluded because of failure to meet inclusion criteria, leaving 108 who carried out their professional activity in 84 different health centres who included 3078 type-2 diabetic patients.

The demographic and professional characteristics of the doctors involved, and of the total primary care physicians in the area of Galicia are shown in Table 2. There is no nursing consultation in 2.6% of them; 17.5% of the participating physicians were involved in medical residents training. In general, although no marked differences are observed between the sample and the population in terms of age, gender and years of professional activity in the last place of work, differences do appear in the proportion of participating teaching practices.

Table 2. Characteristics of primary care physicians participating compared with the total number of physicians in Galicia (results in percentage unless otherwise stated)

	Study subjects (*n* = 108)	Total Galicia† (*n* = 2120)
Average age (SD) in years	49.9 (3.9)	51.3 (n.d.a.)
Gender (Female)	48.2	47.1
Professional activity, in years. Average (SD)		
Total years	23.6 (5.3)	n.d.a.
In current position	11.6 (9.3)	13.1 (n.d.a.)
Nursing consultation	94	n.d.a.
MIR* training performed in their health centre	34.3	11
Tutor of FCM residents	17.5	9.3
Performs diabetological education	91.8	n.d.a.
Education performed by (*n* = 99)		
Physician	23.3	n.d.a.
Nurse	6.7	n.d.a.
Both	70	n.d.a.

SD, standard deviation; n.d.a., no data available; FCM, family and community medicine.
*MIR: Professionals who were trained as Interim Medical Residents in family and community medicine (FCM) for at least 3 years after graduating in Medicine.
†Data provided by the Department of Health of the Xunta de Galicia (regional government).

Table 3 shows socio-demographic characteristics and personal history of disease of the patients. These patients are old (80.8% are over 60 years old) and show a high prevalence of risk factors such as hypertension and hypercholesterolaemia.

Table 3. Characteristics of patients included (results in percentage unless otherwise stated)

Average age (SD) (*n* = 3078)	69.3 (10.9)
Women (*n* = 3077)	47.6
Educational level (*n* = 470)	
Graduates	4
Secondary school	10.9
Primary school	76.6
Little or none	8.5
Employment status (*n* = 2702)	
Paid work	20.6
Unpaid work	4.9
Pensioner	74.5
HBP (*n* = 3009)	72.1
Dietetic treatment	88.8
Pharmacological treatment	92.2
Hypercholesterolemia (*n* = 2964)	56.2
Dietetic treatment	88.5
Pharmacological treatment	84.8
Smoking habit (*n* = 2859)	
Smoker	10.3
Ex-smoker	17.9
Non-smoker	71.8
Peripheral artery disease (PAD)	5.2
Cerebrovascular Accident (CVA)	6.6
Heart failure	7.3
Prior revascularisation	7.6
Angina pectoris	5.2
Myocardial infarction	5.6
Relatives with sudden death or IHD	15.4

SD, standard deviation; HBP, high blood pressure (if mean arterial pressure is above 130/80); CVA, stroke, IHD, ischaemic heart disease.

Important information to establish self-care programmes (such as educational level) is lacking from the clinical history (84.7% do not provide this information).

The characteristics of the disease and its treatment are shown in Table 4 while obesity-related information index is shown in Table 5. Very few patients (*n* = 188; 6.1%) have information on waist circumference.

Table 4. Characteristics and treatment of the diabetes (results in percentage terms unless otherwise stated)

Years since diagnosis of diabetes. Average (SD) (*n* = 1703)	8.4 (6.3)
Complications	
Retinopathy (*n* = 3078)	9.2
Nephropathy (*n* = 3078)	5.1
Neuropathy (*n* = 3078)	3.1
Self-analysis (*n* = 2895)	30.1
Diet (affirmative): (*n* = 2707)	88
Qualitative (*n* = 2707)	85.6
Quantitative (*n* = 2707)	2.8
Both (*n* = 3078)	11.5
Calories. Average (SD) (*n* = 380)	1,544.4 (182)
Oral antidiabetic drugs (*n* = 3021)	76.5
Insulin (*n* = 2994)	16.2
HbA1c. Average (SD) (*n* = 1971)	7.2 (2.0)
Total cholesterol (mg/dl). Average (SD) (*n* = 2322)*	191.4 (41.8)
LDL cholesterol (mg/dl). Average (SD) (*n* = 1899)*	116.7 (36.7)

SD, standard deviation; LDL, low density lipoprotein.
*Only analyses less than 1 year old are included.

Table 5. Distribution of body mass index and central obesity (results in percentage terms unless otherwise stated)

	Males	Females
Body mass index (kg/m^2). Average (SD) *n* = 2267	30.2 (4.2)	31.4 (5.9)
Waist circumference (cm). Average (SD) *n* = 188	104.8 (11.3)	99.6 (11.4)
Non-obese (BMI: 18.5–24.9 kg/m^2)	43.2	31.5
Overweight (BMI: 25–29.9 kg/m^2)	8.2	10.2
Obesity (BMI: ≥ 30 kg/m^2)	48.6	58.3
Central obesity (ATP-III*)	57.7	90.9
Central obesity (IDF†)	85.6	96.1

SD, standard deviation; BMI, body mass index.
*ATP-III criteria: waist circumference in men ≥ 102 and ≥ 88 cm in women.
†IDF criteria: waist circumference in men ≥ 94 and ≥ 80 cm in women.

Table 6 presents results referring to the degree of compliance in the period of time set for each indicator. The degree of compliance was higher on total or LDL-cholesterol measurement, recommendation of exercise and physical examination (weight, height and blood pressure). Last year, of all the diabetics, only 30.6% had undergone an eye examination and 14.4% a foot examination. With reference to result indicators, 34.2% of diabetics with high blood pressure were put on a specific monitoring and/or a treatment plan. In cases of dyslipidemia (average total cholesterol measurements > 200 or LDL cholesterol > 100 mg/dl), the percentage with a change in diagnosis and/or treatment was 27.4%.

Table 6. Process and result indicators in all 3078 patients (results in percentage)

Process indicators: (at last one measurement in the period indicated)	
Glycosylated Haemoglobin measurement in last 6 months	52.3
Micro-albuminuria measurement in last 12 months:	
Overall	37.6
< 75 years old without nephropathy	39
Foot examination (measuring at least peripheral pulses)in last 12 months	14.4
Eye examination in last 24 months	30.6
Complete physical examination in last 12 months:	
Weight	77.8
Height	80.6
Blood Pressure	84.8
Waist circumference	6.1
Total cholesterol or LDL-cholesterol measurement in last 12 months	78.1
Recommendation to have physical exercise (in last 12 months)	68.8
Result indicators (last 6 months)	
Glycosylated haemoglobin:	
< 7% in patients with that measurement (n = 1592)	54.2
< 7% in all patients	28
High blood pressure. If mean arterial pressure (MAP) > 130/80 mmHg	
Specific monitoring and/or treatment plan (n = 1909)	34.2
Dyslipemia. If total cholesterol > 200 or LDL > 100 mg/dl	
Change of diagnosis and/or treatment (n = 1746)	27.4

LDL, low density lipoprotein.

The figures 1 and 2 show, among the 108 physicians in the study, the compliance with the quality indicators presented in Table 1 plus an adicional one related with recommendations of physical activity. The triangles represent the percentage of compliance for each doctor and the horizontal line represent the overall rate of compliance calculated with the data of all patients. The indicators that are best complied with are measurement of blood pressure (84.4%) and of total cholesterol or LDL-cholesterol (78.1%), recommendation of physical exercise (68.8%) and measurement of glycosylated haemoglobin (52.3%). The compliance of the rest of the indicators is below 40%. We can also see, in these figures, the variability in compliance between physicians, which is quantified for each indicator in Figure 3.

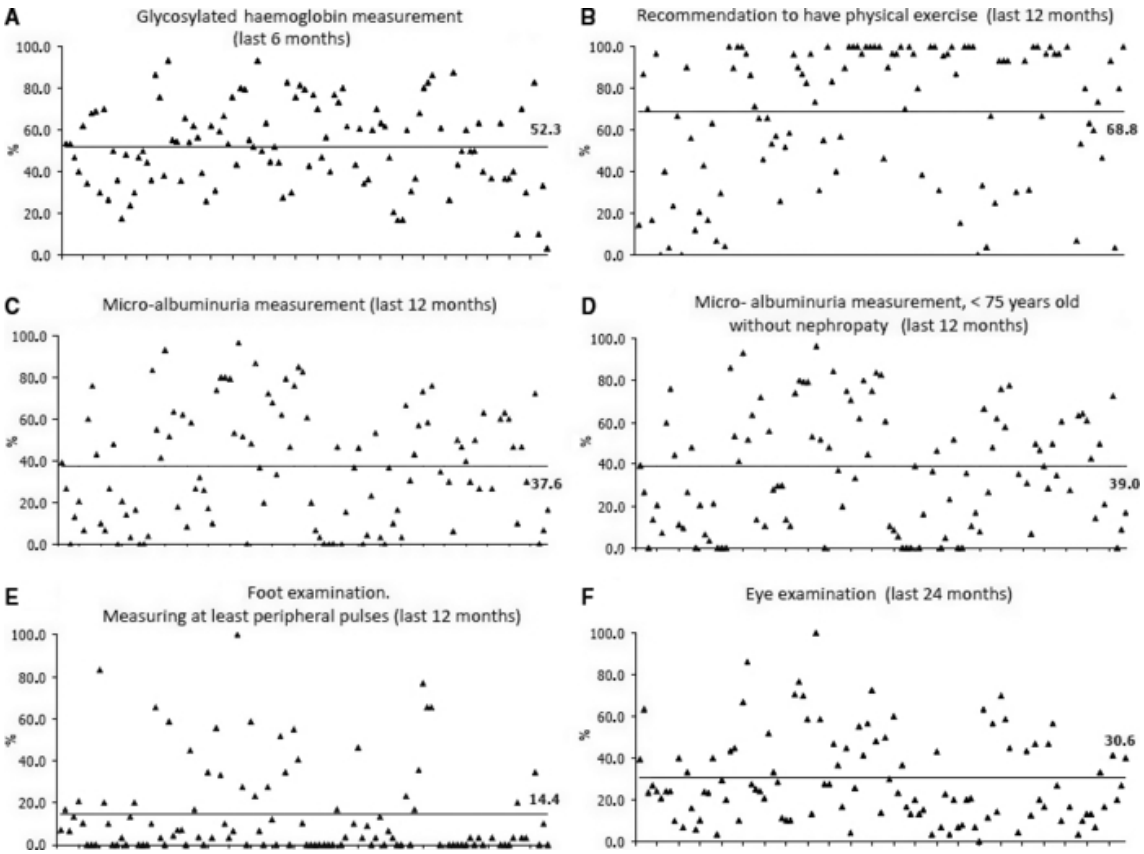

Figure 1. Variability in clinical practice among physicians in six selected indicators. Legend: The triangles represent the percentage of compliance for each physician (n = 108). The horizontal line represents the overall percentage of compliance calculated with data from all patients

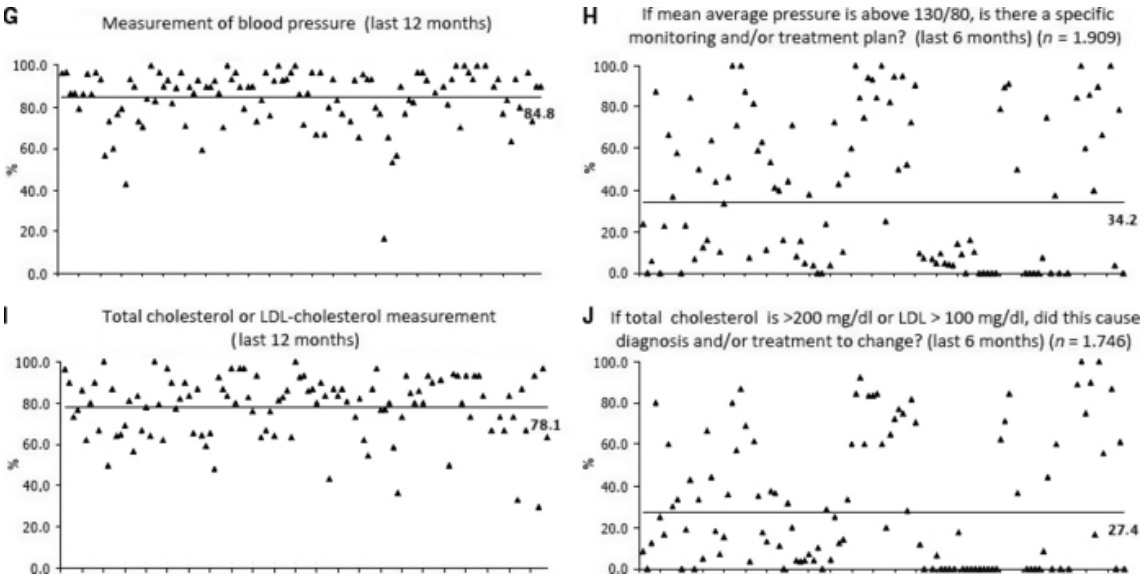

Figure 2. Variability in clinical practice among physician on four selected indicators. Legend: The triangles represent the percentage of compliance for each physician (n = 108). The horizontal line represents the overall percentage of compliance calculated with data from all patients

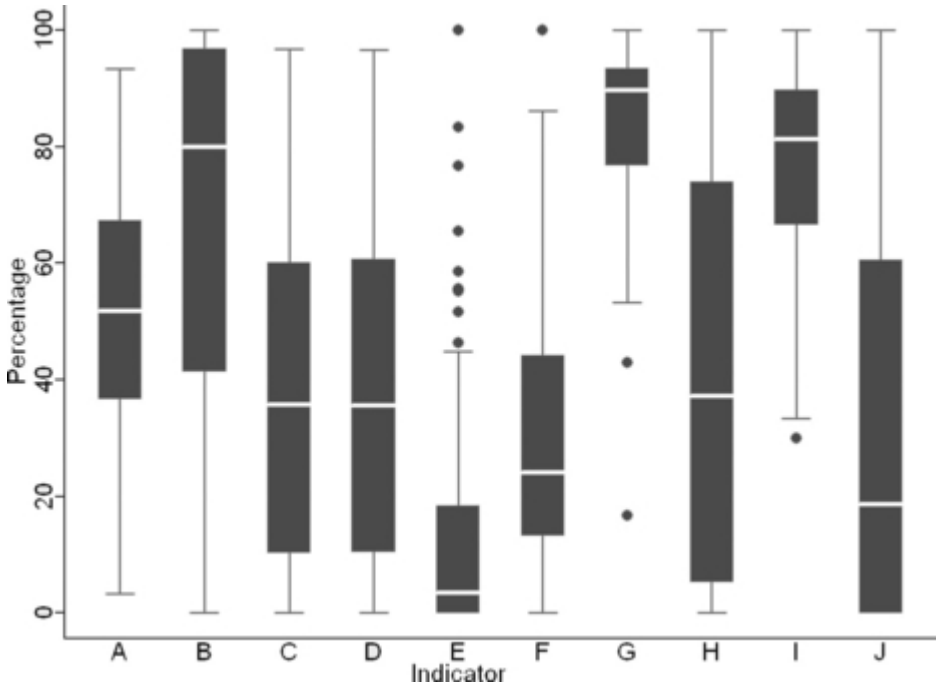

Figure 3. Box plot for percentage of compliance among doctors, by indicator. Note: Each capital letter indicated on the horizontal axis represents the corresponding indicator shown in Figures 1 and 2, marked with the same letter and order. Interquartile range (R): A = 30.3; B = 50.8; C = 48.7; D = 50.1; E = 19.2; F = 30.0; G = 16.4; H = 66.0; I = 22.3; J = 60.0

Discussion

This study shows, within a large sample of primary care physicians in Galicia, the gap between current recommendations for the care of diabetic patients and real care. It also provides valuable information to identify areas in which improvement is most needed.

The characteristics of the physicians included largely resemble those of other primary care physicians in Galicia, with the participation of professionals working in different types of health centres, with their distribution and type of activity which is representative of the care network and is thus non-selective.

The profile of the diabetics included displays a high average age, low level of education (mostly primary or even lower) and a high percentage of patients who are retired from work. With regard to the prevalence of cardiovascular disease and risk factors, our figures are comparable with those described previously and that have led to the implementation of numerous programmes to prevent complications in type 2 diabetes (20,21). The figures related to excess weight and obesity are consistent with other studies both in the general population of our environment (22) and in other diabetic patients in various populations studied (17,23,24).

The proportion of insulinised patients monitored in primary care in our environment does not differ from that described in other publications (17,24–28).

Although great differences exist among various national and international recommendations in managing diabetes (16,29–32), our chosen quality indicators are among those usually used to evaluate quality of care and forms part of Galicia's 'Health Plan 2006–10 for Diabetes' (19).

The degree of compliance with some of these indicators (Table 6), such as weight, blood pressure and lipid profile is similar to that of other studies in different environments (24,33,34). In other process indicators, the results are far from both the ideal and from the situation reflected in other studies, and it is therefore necessary to design specific actions for improvement. This is the case of eye examination, foot examination or measurement of microalbuminuria (17,24,26,34). These three indicators are very important for the early detection of macro- and micro-vascular complications in diabetics and, therefore, useful for the prevention of cardiovascular disease, renal failure, blindness and amputations (35), as is also shown in the Saint Vincent declaration (36). In other items, such as 6-monthly HbA1c measurement, or population of diabetic patients within glycaemic control targets (Hba1c < 7), the situation is also far from ideal and there is a lot of room for improvement.

The prevalence of central obesity is based on just 188 patients (6.1% of the total), which reflects how infrequently we use a procedure which is both simple and widely supported in the literature as a predictor of cardiovascular events (37–41).

Although acceptable levels for the quality criteria of measurement of blood pressure and lipid profile were obtained, those with high levels are not frequently engaged in specific follow-up and control programmes as recommended. This also reflects the existence of 'clinical inertia', which is also found in other studies (42–44): despite the lack of positive outcomes (i.e. adequate blood pressure or lipids control), there is a resistance to modify the therapeutic approach. To overcome this inertia, it will not only be necessary to make this information known, but also to develop automated systems that can change attitudes. The type of action chosen is important to achieve results in this area (45).

This study objectifies the problem of the great variability in clinical practice among physicians, a variability that would be reflected, in theory, in clinical outcomes. The selected indicators can be classified into three groups, based on the degree of compliance and its variability among physicians: the least variable ones (divided in turn into two major groups: high and low compliance) and the most variable ones. Measurement of blood pressure and total or LDL cholesterol have low variability and high compliance level, while the complete foot examination and eye test have little variability and a low level of compliance. The rest of the indicators are within the high variability group. This has important implications when corrective measures are incorporated for the target population. The low variability in clinical practice in low performance indicators suggests the necessity of developing education and training procedures for professionals, while the great variability found in different indicators demonstrates the different care practices and suggest physician or practice related causes.

One of the possible limitations of our study is the initial response rate of physicians (39% of all those randomly selected and invited to the initial meeting by letter). Although there are not great differences with the general population of physicians, it can be argued that there is a bias for the participation of those more motivated, either with the disease (diabetes) or with quality of health programmes. In any case, this would probably tend to overestimate the quality of care observed.

The survey may have been affected by the fact that they knew they were going to be investigated, which might have led to a change in their clinical practice, although this is rather unlikely as doctors had little time to make such changes.

In conclusion, there is ample room for improvement in Galicia as far as the adaptation of clinical practice to accepted recommendations for the treatment of diabetic patients is concerned.

The main deficiencies found are those regarding the early identification of micro-vascular complications (feet, eyes and kidneys). These deficiencies, which are widespread among all physicians taking part, are very important because the health cost of diabetes is directly related to the time the disease evolves, and can be primarily attributed to the treatment of complications during the course of the disease (46). Therefore, the prevention of complications is a key aspect in the design of care for diabetic patients.

We need to improve the identification of specific either physician-related factors or place of work-related the adherence to recommendations, to be able to incorporate specific measures in those indicators with higher variability.

These results can be used directly by the primary care physicians and health administrators in Galicia to identify and highlight individual items that need improvement in the care of the diabetic patient and introduce corrections where needed. The use of these results in the rest of Spain should be only orientative, because although a common healthcare system is in place in Spain, the indicators considered are dependent on the health priorities set by local health administrators and therefore, amenable to differ among Autonomous Communities within Spain.

Authors' contributions

- Vidal Pardo, JI: Head investigator, study concept, participation in study design, fund-raising, doctors' training and recruitment, writing of manuscript and critical revision of article.
- Pérez Castro, TR: Doctors' training and recruitment, fieldwork coordination in monitoring of patients, writing of manuscript and critical revision of article.
- López Álvarez, XL: Doctors' training and recruitment, writing of manuscript and critical revision of the article.
- García Soidán, FJ: Doctors' training and recruitment, critical revision of article.
- Santiago Pérez, MI: Statistical data analysis and critical revision of article.
- Muñiz, J: Study concept, participation in its design, fund raising, doctors' training and recruitment, writing of manuscript and critical revision of article.

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