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IMPLEMENTING QUALITY INDICATORS FOR DIABETES AND HYPERTENSION IN FAMILY MEDICINE IN SLOVENIA

UVAJANJE KAZALNIKOV KAKOVOSTI ZA SLADKORNO BOLEZEN IN ARTERIJSKO HIPERTENZIJO V DRUŽINSKI MEDICINI V SLOVENIJI

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ABSTRACT

Introduction. A new form of family practices was introduced in 2011 through a pilot project introducing nurse practitioners as members of team and determining a set of quality indicators. The aim of this article was to assess the quality of diabetes and hypertension management.

Methods. We included all family medicine practices that were participating in the project in December 2015 (N=584). The following data were extracted from automatic electronic reports on quality indicators: gender and specialisation of the family physician, status (public servant/self-contracted), duration of participation in the project, region of Slovenia, the number of inhabitants covered by a family medicine practice, the name of IT provider, and levels of selected quality indicators.

Results. Out of 584 family medicine practices that were included in this project at the end of 2015, 568 (97.3%) had complete data and could be included in this analysis. The highest values were observed for structure quality indicator (list of diabetics) and the lowest for process and outcome quality indicators. The values of the selected quality indicators were independently associated with the duration of participation in the project, some regions of Slovenia where practices were located, and some IT providers of the practices.

Conclusion. First, the analysis of data on quality indicators for diabetes and hypertension in this primary care project pointed out the problems which are currently preventing higher quality of chronic patient management at the primary health care level.

Keywords:
family practices, healthcare quality indicator, diabetes mellitus, hypertension, Slovenia

IZVLEČEK

***Uvod**. Pilotni projekt na področju družinske medicine v Sloveniji je leta 2011 uvedel novo metodo dela v družinski medicini, pri čemer je nov član tima postala diplomirana medicinska sestra, prav tako pa se je uvedel nadzor kakovosti s pomočjo kazalnikov kakovosti. Namen tega članka je bil oceniti kakovost vodenja bolnikov s sladkorno boleznijo in hipertenzijo.*

***Metode**. V analizo smo vključili vse ambulante družinske medicine, ki so sodelovale v projektu konec decembra 2015. Iz avtomatične baze poročil smo izluščili in analizirali naslednje podatke: spol in specializacijo zdravnika, status zdravnika (javni uslužbenec, koncesionar), trajanje sodelovanja v projektu, regijo, v kateri je ambulanta, število prebivalcev na območju, ki ga pokriva ambulanta, računalniško hišo, ki nudi program, in raven izbranih kazalnikov kakovosti.*

***Rezultati**. Od 584 ambulant družinske medicine jih je imelo 568 (97,3%) popolne podatke in so bile vključene v analizo. Najvišja vrednost kazalnikov kakovosti je bila opazovana pri kazalnikih kakovosti pogojev (register diabetikov), najnižja pa pri kazalnikih procesa in izida. Vrednosti izbranih kazalnikov kakovosti so bile neodvisno povezane s trajanjem sodelovanja v projektu, nekaterimi regijami Slovenije in nekaterimi računalniškimi hišami, ki nudijo elektronsko podporo.*

***Zaključek**. Prva analiza podatkov kazalnikov kakovosti za diabetes in arterijsko hipertenzijo je pokazala na probleme, ki trenutno onemogočajo doseganje višje kakovosti obravnave bolnikov na primarni ravni zdravstvenega varstva.*

Ključne besede:
družinska medicina, kazalniki kakovosti, sladkorna bolezen, arterijska hipertenzija, Slovenija

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1 INTRODUCTION

Assessing quality of care with quality indicators is paramount (1) and has already become a standard for working in family practice in several countries (2-5). Various quality indicators are being used (6) and in some countries performance-related-pay based on quality indicators has been introduced (7-9).

In Slovenia, quality assurance at the primary health care level is formally a priority, but the legislation that would ensure quality in this area is proceeding very slowly. External quality assessment and inspections commissioned by the Ministry of Health are rarely used. Supervision of quality in primary care is fragmented and poorly coordinated. Family physicians (FPs) are more involved in unofficial and ad hoc forms of quality improvement than in formalised procedures. There are formal instruments for assessing quality, such as attestation of physicians, voluntary certification and accreditation, and mandatory licensing of physicians or nurses, but quality of primary health care has not yet been systematically assessed by quality indicators (10), despite the fact that a set of quality indicators was developed for cardiovascular prevention (11, 12) and that there is ample scientific evidence in this field in the literature (1, 5-7, 13-17)

In 2011, an ongoing pilot project at the primary care level in Slovenia was launched with the support of the Ministry of Health. It introduced a new model of family medicine practice where the family physicians' working team (consisting of one FP and one nurse with a baccalaureate degree – a practice nurse) was extended by a nurse practitioner working four hours a day or 0.5 full-time equivalents. The nurse practitioner is responsible for preventive activities (screening for and counselling on cardiovascular risk factors, diabetes, depression, chronic obstructive pulmonary disease (COPD), hypertension, and smoking and management of smoking and risky alcohol consumption) and routine management of patients with stable chronic diseases (COPD, asthma, hypertension, diabetes, benign enlargement of prostate, depression, osteoporosis and coronary heart disease) (18, 19). Preventive activities can also be carried out by physicians in terms of a comprehensive approach to the patients, but in this model of family medicine practice they are mainly performed by the nurse practitioners.

As part of this project, a list of quality indicators was introduced in order to monitor the work of family medicine practices participating in the project. The list included 35 quality indicators, of which nine were structure quality indicators, 23 were process quality indicators, and three were outcome quality indicators (1, 20).

The electronic database for collecting quality indicators was established at the beginning of 2015. Before that, data entry was manual and carried out by each practice itself into the Excel spreadsheets. There are five IT providers for family practices in Slovenia with their own data extraction systems, and data had to be gathered in one electronic database, which presented some problems at the start.

Hypertension and diabetes were among eight chronic diseases which were monitored by quality indicators, and are at the same time among the most common chronic diseases encountered in family medicine.

The aim of this article was to assess the differences in the values of the selected quality indicators between new model family medicine practices with different characteristics. The objective of this article was to conduct a relationship analysis between values of two selected indicators and some important characteristics of practices.

2 METHODS

We included all family medicine practices that were participating in the project in December 2015 as the source of data. The data were gathered from automatic electronic reports on quality indicators provided monthly by each individual family medicine practice. The data are stored in a common electronic database which can be used by project managers. For the purpose of the analysis, the following data were extracted: gender and specialisation of the family physician, status (public servant/self-contracted), duration of participation in the project, region of Slovenia, number of inhabitants covered by the family physician, name of the information technology (IT) provider, and quality indicators. The units of observation were family medicine practices with their staff (a physician, a practice nurse and a nurse practitioner).

At the end of 2015, there were 35 different quality indicators that family medicine practices reported on (20). For the purpose of this study, we chose one quality indicator from each different type (structure, process and outcome quality indicator (1) (Table 1).

Table 1. Quality indicators for diabetes and hypertension.

Quality indicator	Calculation formula	Type of quality indicator	Quality standard	Mean value (SD)	Median
List of patients with diabetes	Number of diabetic patients/ (Number of registered patients * 0.061) * 100	Structure	0	84.2 (53.6)	84.0
Percentage of patients with diabetes with measured HbA1C once a year	Number of patients with diabetes with measured HbA1C at least once a year/number of registered diabetic patients[2] * 100	Process	80	25.6 (22.3)	21.2
Percentage of patients with hypertension with a systolic blood pressure 140/90 mmHg or lower	Number of patients with hypertension with blood pressure 140/90 mmHg or lower/number of registered[3] patients with hypertension * 100	Outcome	50	18.2 (16.3)	14.3

[1] Prevalence of diabetes in Slovenia which is 6% (21)

[2] The expression "registered" describes the number of patients with diabetes/hypertension on the patient list of each family medicine practice

Statistical analysis was carried out using IBM SPSS Statistics version 22.0 (Armonk, NY: IBM Corp.). We performed multivariate analysis with general linear models. We set $p<0.05$ as the limit for statistical significance.

We used the observed outcome variables and explanatory factors in the analyses. The observed outcome variables were: 1) the value of the quality indicator "List of patients with diabetes"; 2) the value of the quality indicator "Percentage of patients with diabetes with measured HbA1C once a year" (continuous variable); and 3) the value of the quality indicator "Percentage of patients with hypertension with a systolic blood pressure 140/90 mmHg or lower" (continuous variable). Higher levels of observed outcome variables indicated a higher quality of work.

The explanatory factors were: 1) gender (nominal variable: male/female); 2) specialisation of family physician (nominal variable: has specialisation in family/ general medicine/does not have specialisation in family/ general medicine; 3) status of family medicine practice (nominal variable: public servant/self-contracted); 4) duration of participation in the project (continuous variable); 5) region of Slovenia (nominal variable: Celje, Koper, Krsko, Kranj, Ljubljana, Maribor, Murska Sobota, Nova Gorica, Novo Mesto, Ravne na Koroskem); 6) area covered by the practice (nominal variable: urban/rural); and 7) name of IT provider (nominal variable: IT No. 1, IT No. 2, IT No. 3, IT No. 4, IT No. 5). The variable "Urban/ rural area" was determined according to the definition of rural areas in Slovenia provided by the Statistical Office of Slovenia, which defines rural areas as those with less than 5,000 inhabitants.

The dummy variables created for the multivariate analyses were gender (reference category: male gender), the region of Slovenia (reference category: Ravne na Koroskem), the IT provider (reference category: IT provider No. 5), specialisation (reference category: no specialisation), area (reference category: urban), and status (reference category: public servant) and were created by a simple coding.

3 RESULTS

3.1 Sample Description

Out of 584 family medicine practices that were included in this project at the end of 2015, 568 (97.3%) had complete data and could be included in this analysis (Table 2). The mean duration of participation in the project was 28.7±18.7 months, with a median of 33.0 months. The mean age of the family physicians was 51.4±9.0 years, median 53.0.

Table 2. Characteristics of family medicine practices included in the project.

Characteristic	Number (%)
Region	
Celje	71 (12.5)
Koper	34 (6.0)
Krsko	20 (3.5)
Kranj	63 (11.1)
Ljubljana	148 (26.1)
Maribor	84 (14.8)
Murska Sobota	37 (6.5)
Nova Gorica	44 (7.7)
Novo Mesto	37 (6.5)
Ravne na Koroskem	30 (5.3)
Gender of the physician	
Male	132 (23.2)
Female	436 (76.8)
Specialisation of the physician	
General medicine	313 (55.1)
Family medicine	195 (34.3)
Other specialities	1 (0.2)
No specialisation	59 (10.4)
Status	
Public servant	426 (75.0)
Self-contractor	142 (25.0)
IT provider	
No. 1	159 (28.0)
No. 2	6 (1.1)
No. 3	210 (37.0)
No. 4	90 (15.8)
No. 5	97 (17.1)
Area	
Urban	459 (80.8)
Rural	109 (19.2)

3.2 Quality Indicator 'List of Patients with Diabetes'

The mean value of this quality indicator was 84.2±53.6, with a median of 84.0 (Table 1).

The results of a multivariate analysis showed that the variables 'IT provider No. 1 and 4' and 'Duration of participation in the project' were significantly correlated with a higher value of this quality indicator, and 'Working in the Maribor region' was significantly correlated with a lower value of this quality indicator (Table 3).

For continuous variables regression coefficients indicate the change of the observed variable with each increasing unit of explanatory variable.

For categorical variables regression coefficients indicate the changes of the observed variable in comparison to a reference category.

3.4 Quality Indicator "Percentage of Patients with Diabetes with Measured HbA1C Once a Year"

The mean value of this quality indicator was 25.6±22.3, with a median of 21.2.

The results of a multivariate analysis showed that the variable 'Duration of participation in the project' was significantly correlated with a higher value of this quality indicator, and 'IT provider No. 3 and 4' were significantly correlated with a lower value of this quality indicator (Table 4).

Table 3. Characteristics of family medicine practices included in the project.

Explanatory variables	Regression coefficient	Standard Error	Upper and lower 95% confidence Interval	p
Gender				
Female	0.17	4.66	-8.97, 9.30	0.972
Male	reference			
Status				
Self-contractor	6.47	5.22	-3.76, 16.70	0.215
Public servant	reference			
IT provider				
No. 1	19.03	8.13	3.10, 34.96	0.019
No. 2	12.18	19.57	-26.18, 50.55	0.534
No. 3	8.88	6.53	-3.92, 21.67	0.174
No. 4	21.85	7.79	6.57, 37.12	0.005
No. 5	reference			

Explanatory variables	Regression coefficient	Standard Error	Upper and lower 95% confidence Interval	p
Area				
Rural	-2.61	5.17	-12.74, 7.52	0.614
Urban	reference			
Specialisation				
General Practice	-2.92	6.99	-16.62, 10.78	0.676
Family Medicine	-0.46	7.00	-14.17, 13.26	0.948
No specialisation	reference			
Region				
Celje	-8.32	11.03	-29.94, 13.31	0.451
Koper	-1.99	11.92	-25.36, 21.38	0.868
Krsko	11.18	14.45	-17.14, 39.49	0.439
Kranj	4.02	10.70	-16.95, 24.99	0.707
Ljubljana	-4.58	9.42	-23.05, 13.88	0.627
Maribor	-35.92	10.97	-57.42, -14.42	0.001
Murska Sobota	-17.34	11.32	-39.52, 4.85	0.126
Nova Gorica	-0.40	11.00	-21.95, 21.15	0.971
Novo Mesto	0.37	11.45	-22.07, 22.80	0.975
Ravne na Koroskem	Reference			
Age (years)	-0.17	0.22	-0.61, 0.26	0.435
Duration of participation in the project	1.47	0.11	1.24, 1.69	< 0.001

Table 4. Multivariate analysis for higher value of the quality indicator 'Measured HbA1C in patients with diabetes at least once a year'.

Explanatory variables	Regression coefficient	Standard Error	Upper and lower 95% confidence Interval	p
Gender				
Female	1.60	2.11	-2.53, 5.74	0.447
Male	Reference			
Status				
Self-contractor	1.03	2.37	-3.61, 5.66	0.664
Public servant	reference			
IT provider				
No. 1	-6.27	3.68	-13.49, 0.95	0.089
No. 2	-12.00	8.87	-29.38, 5.38	0.176
No. 3	-6.05	2.96	-11.85, -0.25	0.041
No. 4	-14.58	3.53	-21.50, -7.66	< 0.001
No. 5	reference			
Area				
Rural	-0.73	2.34	-5.32, 3.86	0.757
Urban	reference			
Specialisation				
General Practice	5.13	3.17	-1,07, 11.34	0.105
Family Medicine	3.34	3.17	-2.87, 9.55	0.292
No specialisation				

Explanatory variables	Regression coefficient	Standard Error	Upper and lower 95% confidence Interval	p
Region	-9.28	5.00	-19.07, 0.52	0.063
Celje	-6.55	5.40	-17.14, 4.04	0.225
Koper	-4.37	6.54	-17.19, 8.46	0.505
Krsko	-6.37	4.85	-15.87, 3.13	0.189
Kranj	0.85	4.27	-7.51, 9.22	0.842
Ljubljana	3.88	4.97	-5.86, 13.62	0.435
Maribor	7.20	5.13	-2.85, 17.25	0.160
Murska Sobota	-9.18	4.98	-18.94, 0.58	0.065
Nova Gorica	-0.40	5.18	-10.56, 9.76	0.939
Novo Mesto	reference			
Ravne na Koroskem				
Age (years)	-0.11	0.10	-0.31, 0.08	0.265
Duration of participation in the project	0.30	0.05	0.20, 0.40	< 0.001

For continuous variables regression coefficients indicate the change of the observed variable with each increasing unit of explanatory variable.

For categorical variables regression coefficients indicate the changes of the observed variable in comparison to a reference category.

3.3 Quality Indicator 'Percentage of Patients with Hypertension with a Systolic Blood Pressure 140/90 mmHg or Lower'

The mean value of this quality indicator was 18.2±14.3, with a median of 16.3 (Table 1).

The results of a multivariate analysis showed that the variables 'Duration of participation in the project,' 'Female gender,' 'Self-contractor,' 'Working in the Maribor region' and 'Having IT No. 2' were significantly correlated with a higher value of this quality indicator. Variables 'IT provider No. 3' and 'IT provider No. 4' were significantly correlated with lower values of this quality indicator (Table 5).

Table 5. Multivariate analysis for higher value of the quality indicator 'Percentage of patients with hypertension with a systolic blood pressure 140/90 mmHg or lower.'

Explanatory variables	Regression coefficient	Standard Error	Upper and lower 95% confidence Interval	p
Gender				
Female	3.36	1.48	0.47, 6.25	0.023
Male	Reference			
Status				
Self-contractor	3.44	1.65	0.20, 6.68	0.037
Public servant	reference			
IT provider				
No. 1	-0.77	2.57	-5.82, 4.27	0.764
No. 2	17.59	6.20	5.45, 29.74	< 0.001
No. 3	-6.64	2.07	-10.69, -2.58	0.001
No. 4	-10.58	2.47	-15.42, -5.74	< 0.001
No. 5	reference			

Explanatory variables	Regression coefficient	Standard Error	Upper and lower 95% confidence Interval	p
Area				
Rural	-1.65	1.64	-4.86, 1.56	0.314
Urban	reference			
Specialisation				
General Practice	2.05	2.21	-2.29, 6.39	0.354
Family Medicine	-0.95	2.22	-5.29, 3.39	0.668
No specialisation	reference			
Region				
Celje	-2.48	3.49	-9.32, 4.37	0.478
Koper	1.78	3.78	-5.62, 9.18	0.637
Krsko	-1.15	4.57	-10.11, 7.82	0.802
Kranj	-3.76	3.39	-10.40, 2.88	0.267
Ljubljana	1.65	2.98	-4.19, 7.50	0.579
Maribor	10.77	3.47	3.96, 17.57	0.002
Murska Sobota	5.33	3.58	-1.69, 12.36	0.137
Nova Gorica	-1.65	3.48	-8,47, 5.18	0.636
Novo Mesto	-0.43	3.62	-7.54, 6.67	0.905
Ravne na Koroskem	reference			
Age (years)	-0.06	0.07	-0.20, 0.07	0.368
Duration of participation in the project	0.15	0.04	0.08, 0.23	< 0.001

For continuous variables regression coefficients indicate the change of the observed variable with each increasing unit of explanatory variable.

For categorical variables regression coefficients indicate the changes of the observed variable in comparison to a reference category.

4 DISCUSSION

This study showed that the structure quality indicator was achieved for diabetes (list of diabetic patients). However, it also showed that the values of the process and outcome indicators were low, which indicates that the quality of management of patients with diabetes and hypertension could be improved. The levels of the selected quality indicators were associated with several features, most commonly with the duration of participation in the project, the region of Slovenia where the practice was located, and the IT provider used by the practice.

4.1 The Assessment of Quality of the Management of Patients with Diabetes and Hypertension

High values of structure quality indicators are an important sign that the conditions for measuring quality have been established. On the other hand, lower levels of process quality indicators were found and could be attributed to several reasons. The lack of continuous quality control with feedback could be one of them; the project continued without continuous data analysis, feedback to practices on the quality of their work, or benchmarking (22), and no staff were employed to carry out these tasks.

It is also possible that adherence to the guidelines was low. A recent study from Slovenia showed that the introduction of this different model of chronic patient management in family medicine improved the process of quality of care, but the desired level of quality has not yet been achieved (23), which probably points to low adherence to the guidelines. Other studies have also shown that primary care physicians' adherence to hypertension and diabetes guidelines is low (24-27). For example, adherence to hypertension guidelines was found to be between 10 and 50% (24, 25). On the other hand, another study showed that HbA1C was measured in almost all the patients (26).

It is also possible that the selection and development of the quality indicators themselves was not optimal. The development of quality indicators must be based on a systematic evidence-based approach, and expert consensus and guidelines should be considered. The indicators should be acceptable, feasible, reliable, sensitive to change, and valid (16). The quality indicators in our project have not yet been evaluated according to these features, and therefore it could be possible that the low levels of quality indicators are associated with their suboptimal nature.

4.2 Associations between Quality Indicators and Characteristics of Providers

The most important variable that was shown to be associated with higher levels of quality indicators was the duration of participation in the project. This indicates that the practical introduction of quality indicators in the everyday work of practices might be associated with some problems that could influence the quality. These problems are yet to be recognised. The region of practices was also recognised as important. Some previous data from Slovenia indicate that there are differences between regions in terms of quality (10). Which factors contribute to that is unknown and a subject for further studies. In addition, IT providers proved important in our research. Ensuring quality of data during electronic data capture is always a problem, and several ways of reducing errors must be applied (28, 29). There are no reports about the quality of data gathering in this project, and it therefore seems that there are some problems which still need to be recognised and addressed.

The quality indicator 'List of patients with diabetes' indicates the prevalence of diabetes in registered patients of family medicine practices in Slovenia. It should be mentioned here that its value could also be affected by the actual prevalence of diabetes in the region of Slovenia (30), and does not only depend on the quality of work.

Other factors can also contribute to the quality management of chronic patients and were not included in this study. These might include systemic factors, reimbursement, service organisation and capacity, cultural factors, disease epidemiology, practice systems in terms of incentives, practice information capacity, access, the use of teams in quality policy, detection of quality and safety problems, staff and patient safety, inclusion of patients' perspectives, and the length of consultations (31-34). These factors should be considered when studying this topic further.

4.3 Limitations of the Study

We chose only a few quality indicators because we focused on the management of chronic diseases and not on their prevention. This was done to ensure the clarity and focus of the study. It could, however, be possible that by excluding some quality indicators we overlooked some other differences.

The other problem is the quality of the data, as the electronic database was only established in 2015; our analysis was carried out at the end of 2015, and we can, therefore, anticipate that some technical problems had not yet been resolved. Therefore, the reliability of the data might not be as good as if we had done the research later.

Our study did not include other factors that could influence the quality of management of chronic diseases, especially the characteristics of other team members, particularly nurse practitioners. Since nurse practitioners are very involved in the management of chronic patients, the inclusion of their characteristics could have helped us to build a more comprehensive view of this matter, and produced more reliable statistical models. Other limitations are the exclusion of patient data, and the cross-sectional nature of this study, which prevents us from detecting causality. This would further increase the comprehensibility of the results.

In our study, we did not analyse the characteristics of those family medicine practices that did not participate in the project. Therefore, we do not know if they differ significantly from those included in the study.

4.4 Theoretical and Practical Implications of the Study

The study showed that the quality assessment was a challenge, because the values of the quality indicators were set empirically while preparing the new model of family medicine practices in Slovenia. The quality indicators should be re-evaluated and changed if necessary according to the established methodology (16). It was also recognised that expert supervision at the location is necessary to assess the process of work of the family medicine team at different levels (e.g. following protocols, regularly measuring the parameters of chronic diseases, recording them in the electronic database, and their reporting and analysis), and to discuss the obstacles directly with care providers. Continuous quality control and benchmarking should be established in order to improve the quality of chronic patient management in Slovenian family medicine practices. The study also indicated the need for collaboration between different professionals (e. g. IT specialists and health care providers) to adopt the IT system to fully support patient management. The quality indicators should be a basis for financing the practices according to quality standards. It may also be important to inform each team about their quality results every month, and ask for their feedback.

4.5 Suggestions for Future Research in the Field

The regional differences in quality which emerged from our analysis should be further explored. Other possible factors that could contribute to quality should be studied. The quality indicators should be reviewed each year, which would allow a comparison of indicators between two points in time in the same practice, or between practices using the new approach and those using the classical approach, and to observe the trend of change according to the existing circumstances.

5 CONCLUSION

The first analysis of data on quality indicators for diabetes and hypertension in this primary care project pointed out the problems which are currently preventing higher quality of chronic patient management at the primary health care level. There are problems with the quality of data, especially with the IT support, which should be recognised and eliminated.

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CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

Ethical approval was not sought as no patients were involved in the study. The values of quality indicators were extracted from the whole pool of data and other data were gathered from the project database. The data on providers were anonymous.

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