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Importance of lifestyle counselling by primary care physicians for diabetic patients

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Summary

Objective: To identify diabetic patients' characteristics and medical care factors associated with recommended glycaemic control (HbA_{1c} ≤7%).

Methods: As part of a cross-sectional assessment of diabetes care involving 204 Swiss primary care physicians, we identified 366 diabetic patients with a recent HbA_{1c} value. Cross-tabulations and χ^2 tests were used to explore the association of patients' sociodemographic and disease characteristics and medical care characteristics with HbA_{1c} ≤7%. Significant factors were included in a regression logistic model to identify multivariate predictors of HbA_{1c} ≤7%.

Results: HbA_{1c} values were in the recommended range for 57% of the patients. A less than five years' history of diabetes, absence of follow-up by a diabetes specialist, absence of microalbuminuria or retinopathy, adherence to dietary and physical activity counselling, no participation in a diabetic education programme, no glycaemic self-monitoring, oral or no antidiabetic therapy and influenza vaccine in the last 12 months were associated with HbA_{1c} ≤7%. In the multivariate analysis, HbA_{1c} ≤7% remained associated with a less than five years diabetes history (odds ratio [OR] 2.5, 95% confidence interval [CI] 1.5–4.3), as well as patients' adherence to dietary (OR 1.9, 95% CI 1.2–3.0) and physical activity counselling (OR 1.8, 95% CI 1.1–2.9).

Conclusion: In this sample of diabetic patients, adherence to dietary and physical activity counselling were associated with better glycaemic control. Further research should focus on the importance of appropriate lifestyle counselling by Swiss primary care physicians, ideally in prospective trials using objective and reproducible measures of patients' observance.

Key words: diabetes; quality of care; counselling; primary care

Introduction

In recent decades the prevalence rate of diabetes mellitus has continuously increased [1], in conjunction with the progression of obesity and sedentary lifestyle worldwide [2–4], thus increasing its role as a major risk factor for cardiovascular diseases [5–7]. At the same time, several studies have shown that improving glycaemic control can reduce both the risk of macrovascular (coronary heart disease, stroke and peripheral vascular disease) and microvascular complications (retinopathy, neuropathy and nephropathy) [7–10]. More recently, intervention trials have shown that diabetes may be delayed by appropriate lifestyle counselling, including dietary changes [11] and increased physical activity [12, 13].

However, adhering to recommended standards in the care of diabetic patients is no easy task, since diabetes not only affects the patient's health but also his social [11–14] and economic life [15–19]. This complexity is sometimes invoked as an explanation for failing to reach therapeutic goals with chronic patients, especially when lifestyle changes are also necessary.

Switzerland is no exception to the upward trend in diabetes mellitus [7, 20–22] and, as in most health care systems, primary care physicians are closely involved in the detection, treatment and prevention of its complications. However, little is known about the quality of diabetes care and its determinants in this country. In this paper we use the data from a diabetes care quality assessment project conducted among primary care physicians to identify factors associated with recommended glycaemic control and determine how patients' sociodemographic, disease, and medical care characteristics, including lifestyle counselling, are related to recommended glycaemic control.

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Research design and methods

Sample and design

As part of a quality assessment project we conducted a cross-sectional survey between July and September 2004 in the French-speaking part of Switzerland (Cantons of Geneva and Vaud) to assess adherence to diabetes care standards in adult primary care. The survey included 186 community-based primary care physicians and 18 residents enrolled in a primary care training programme at Geneva University Hospitals Department of Community Medicine. Community-based primary care physicians were recruited by mailing or by phone on a voluntary basis. Almost half of them were certified general practitioners (48%, n = 89), 46% certified general internists (n = 85), and 6% physicians without a speciality qualification (n = 12). This distribution of medical specialities is representative of adult primary care in Switzerland. The participant community-based primary care physicians represented 15% of all primary care physicians in these two Cantons (186/1219) and their socio-demographic characteristics were similar (data not shown).

Data collection

Prior to the visit by the research assistants (11 medical students from the University of Lausanne and 11 from the University of Geneva), the participant physician was asked to keep the medical files of the last 20 (25 for residents) consecutive patients with appointments who had visited his office. Medical files of patients who missed their appointments were also included. During the face-to-face assessment, the participant physicians answered the research assistants' questions according to the information contained in the medical files. To ensure confidentiality, patients' personal data (name, date of birth, address) were not recorded and medical files were not consulted by the research assistants at any time. For residents, all assessments had been done by one research nurse. The interviews lasted approximately 1 hour.

Over 99% of eligible patient files were reviewed (3684 from community-based care physicians and 448 from hospital residents). Diabetic patients represented 11% (453/4132), in 366 of whom (81%) HbA_{1c} had been measured at least once in the last 12 months.

Measures

Sociodemographic patient characteristics collected during the quality assessment project included age, sex, nationality and information on economic status (unemployed, drawing disability pension), cultural and/or language barriers (asylum seeker status, use of a common language to communicate with the physician) and social support (living alone).

The following disease characteristics were recorded: duration of diabetes, duration of follow-up, follow-up by a diabetes specialist, psychiatric comorbidities (e.g. depression, schizophrenia, addiction, posttraumatic stress disorders), somatic comorbidities (obesity, smoking status, hypertension, dyslipidaemia), diabetes complications (microalbuminuria, retinopathy, foot neuropathy), knowledge of the disease (participation in an education programme for diabetic patients), and therapeutic skills (plasma glucose self-monitoring, self-management of antidiabetic treatment).

Questions on physicians' sociodemographic characteristics included age, sex, speciality, location, type of practice, and postgraduate training in diabetes care.

The questions used to assess diabetes care were based on a list of quality indicators identified by British primary care physicians and diabetes specialists [23, 24] adapted by three primary care physicians working at the Geneva University Hospitals Medical Outpatient Clinic, according to recommendations used in Switzerland [25], and then reviewed for criteria consistency and validity by two diabetes specialists working in the same hospital and involved in postgraduate training of primary care physicians. These questions addressed physicians' lifestyle counselling (change in dietary habits and/or follow-up by a dietician, daily physical activity of 20–30 minutes, losing weight when body mass index was over 30, tobacco cessation for smoker), medical care follow-up (HbA_{1c} monitoring ≥3 times per year, blood pressure monitoring 4 times per year, annual eye examination, annual foot examination, annual microalbuminuria monitoring, annual lipid profile, influenza vaccination in the last 12 months), antidiabetic treatment (insulin, oral antidiabetic treatment), specific treatment for hypertension and dyslipidaemia, aspirin use.

The questionnaires and the interview procedure were pretested with success for approximately 100 patients of 5 primary care physicians. To minimise variation across interviewers, specific training sessions in the use of the questionnaire (4 hours) were organised and all interviewers received a detailed manual with specific instructions for each item.

Data analysis

For descriptive purposes, we first computed frequency tables of patients' and community-based physicians' characteristics. Second, in accordance with current recommendations [25, 26], $HbA_{1c} \leq 7\%$ was used to define the dependant variable. Then, to identify factors associated with recommended glycaemic control, we compared the patients' sociodemographic and disease characteristics and medical care characteristics across groups using cross-tabulations and χ^2 tests. Since 50 variables were analysed, a major concern was multiple testing. For 50 independent tests the probability that at least one result will be significant at the 0.05 level is high ($1–0.95^{50} = 92\%$). In order to control the type I error, the level of significance for p-values was adjusted using the Bonferroni correction (adjusted p-value = n × p-value, where n = number of tests). Significant factors in the univariate analysis, but before Bonferroni correction to avoid underrecognition, and other important confounding factors (age and sex of patients and physicians) were included in a regression logistic model to identify multivariate predictors of recommended glycaemic control. Predictive factors not associated with the dependent variable were progressively removed from the model using a backward procedure guided by the analyst. We repeated the multivariate analysis with factors still significant after Bonferroni correction, as well as other important factors (multivariate predictors before correction for multiple testing, and age and sex of patients and physicians). All statistical analyses were performed with SPSS (Statistical Package for Social Sciences, version 11.0).

Results

Diabetic patients were more frequently male, over 65, and Swiss (table 1). Duration of follow-up had been longer than 12 months for the majority of diabetic patients and this was more frequently the case for community-based physicians' patients than for those of residents (88% vs. 62%, p <0.001). Over 95% were considered to be type 2 diabetes, which had been diagnosed 7 years previously on average. 22% were under insulin therapy. Diabetic patients without an available HbA_{1c} value (n = 87) were similar to patients with a known HbA_{1c} value except that they were more frequently female (57% vs. 43, p = 0.01) and had had less antidiabetic treatment (54% vs. 90%, p <0.001).

Doctors' detailed sociodemographic characteristics were available only for community-based physicians. They were predominantly male, over 50, and were practising in an urban setting. 22% had worked in a diabetes division during postgraduate training. Characteristics of physicians of patients without an HbA_{1c} value were similar (data not shown).

HbA_{1c} values were in the recommended range for 57% of the patients (mean 7.2, SD 1.5, min. 4.3, max. 15, 25th percentile 6.2, median 6.8, 75th percentile 7.6). Glycaemic control was not associated with patients' and physicians' sociodemographic characteristics (table 2). Concerning patients' disease characteristics, a less than 5 years' history of diabetes, absence of follow-up by a diabetes specialist, absence of microalbuminuria or retinopathy, no participation in a diabetic education programme and no glycaemic self-monitoring were *all* associated with HbA_{1c} ≤7% (table 2). Concerning medical care factors, we found that dietary counselling was more frequently reported for patients with HbA_{1c} >7%, but adherence to dietary and physical activity counselling and tobacco cessation were more frequent in patients with HbA_{1c} ≤7% (table 3). Finally, oral or no antidiabetic therapy, as well as influenza vaccination in the last 12 months, were also associated with HbA_{1c} ≤7% (table 3).

Since 50 characteristics were compared, a major concern was multiple testing. Using Bonferroni correction only diabetes history of less than 5 years, absence of retinopathy and use of oral or no antidiabetic therapy were associated with HbA_{1c} ≤7% (data not shown).

In the multivariate analysis before correction for multiple testing, a less than five years' diabetes history, adherence to dietary and physical activity counselling, absence of insulin therapy and reports of influenza vaccination in the last 12 months remained associated with HbA_{1c} ≤7% (table 4). The

Table 1

Characteristics of Swiss diabetic patients and their community-based primary care physicians.

	n	%	Mean	SD
Patients' characteristics (n = 366)				
Age (years)	366		65.8	13.6
Male	366	54.5		
Swiss nationality	366	65.3		
Patients followed for more than one year	366	85.5		
Type 2 diabetes (%)	366	98.7		
Time since diagnosis of diabetes (years)	341		7.2	6.5
HbA_{1c} (%)	366		7.2	1.5
Antidiabetic treatment	365			
No treatment		10.4		
Oral antidiabetic		66.6		
Insulin + oral antidiabetic		12.9		
Insulin alone		10.1		
Community-based physicians' characteristics (n = 186)				
Age (years)	186		51.6	8.3
Male	186	72.0		
Practice location	186			
Canton of Geneva		50.0		
Canton of Vaud		50.0		
Urban area		88.2		
Specialisation	186			
General medicine		47.8		
Internal medicine		45.7		
Practitioner		6.5		
Postgraduate training in diabetology		22.0		

Table 2

Patient and physician characteristics associated with recommended glycaemic control in 366 Swiss primary care diabetic patients.

	HbA_{1c} ≤7%		HbA_{1c} >7%		
	%	n/N *	%	n/N *	p-value
Patients' socio-demographic characteristics					
Age (>65 years)	54.6	113/207	52.2	83/159	0.65
Sex (male)	59.9	124/207	54.1	86/159	0.26
Nationality (Swiss)	65.7	136/207	62.3	99/159	0.49
Regular occupation	22.8	47/206	20.3	32/158	0.55
Unemployment	1.9	4/206	2.5	4/158	0.70
Disability pension	13.6	28/206	16.5	26/158	0.44
Asylum seeker	6.8	14/206	3.8	6/159	0.20
Use of a common language	93.7	193/206	90.6	144/159	0.26
Living alone	36.4	75/206	35.8	57/159	0.91
Patients' disease characteristics					
Diagnosis of diabetes >5 years	45.8	87/190	67.5	102/151	<0.001
Follow-up for more than 1 year	89.7	165/184	89.9	124/138	0.96
Follow-up by a specialist during the last year	13.1	27/206	22.0	35/159	0.02
Psychiatric comorbidities	36.2	75/207	40.3	64/159	0.43
Somatic comorbidities					
Obesity (BMI >30)	45.6	93/204	47.4	74/156	0.72
Current smoker	19.9	41/206	17.9	28/156	0.63
Hypertension †	60.0	120/200	60.1	92/153	0.98
Dyslipidaemia ‡	44.4	84/189	52.7	78/148	0.13
Complications of diabetes					
Microalbuminuria §	18.8	24/128	35.6	32/90	0.01
Retinopathy ++	12.3	18/146	26.5	27/102	<0.001
Foot neuropathy **	18.1	26/144	26.7	32/120	0.09
Diabetes knowledge and skills					
Participation in a diabetic education programme	22.4	46/205	35.2	56/159	0.01
Glycaemic self-monitoring	47.3	98/207	60.4	96/159	0.01
Self-management of anti-diabetic treatment	59.7	123/206	59.7	95/159	0.99
Physicians' characteristics					
Age (>50)	54.9	101/184	64.5	89/138	0.08
Sex (male)	61.4	127/207	67.9	108/159	0.19
Urban practice	86.4	159/184	89.1	123/138	0.46
Speciality in internal medicine	47.3	87/184	44.9	62/138	0.50
Postgraduate training in diabetology	28.8	53/184	22.5	31/138	0.20
Location (vs. Canton of Vaud)	51.6	95/184	53.6	74/138	0.72
Community-based physician (vs. resident)	88.9	184/207	86.8	138/159	0.54

* n = number with factor considered; N = number of data available. Denominators do not add to 366 because of missing values

† Blood pressures >130/80 mm Hg.

‡ ≥2 of the following criteria: total cholesterol >5 mmol/l, total cholesterol / HDL cholesterol >5 mmol/l, LDL cholesterol >3 mmol/l.

§ Albumin-to-creatinine ratio in an untimed urine specimen ≥2.5 µg/umol (males) and 3.5 µg/umol (females), or 24-hour urine albumin >30 mg.

++ Preproliferative retinopathy or more severe stage.

** Callus, ulcers, absence of pedal pulses, pallaesthesia <4/8

same multivariate model was found after taking into account Bonferroni correction. Because absence of insulin therapy is mainly a consequence and not a cause of good glycaemic control, and influenza vaccination is in general related to better patient compliance and appropriate care by physicians, these two factors were not considered as causal variables. In consequence, we repeated the analysis leaving out these variables. In a multivariate analysis excluding absence of insulin therapy and reports of influenza vaccination in the last 12 months, a less than 5 years' diabetes history and adherence to dietary and physical activity counselling remained associated with HbA_{1c} ≤7%.

Table 3

Medical care factors associated with recommended glycaemic control in 366 Swiss primary care diabetic patients.

	HbA_{1c} ≤7%		HbA_{1c} >7%		
	%	n/N *	%	n/N *	p-value
Counselling					
Dietary changes	92.2	190/206	97.4	152/156	0.03
Physical activity increase	84.5	174/206	80.1	125/156	0.28
Weight loss (BMI >30)	93.2	96/103	92.7	76/82	0.89
Smoking cessation	95.1	39/41	85.7	24/28	0.17
Adherence to counselling					
Dietary changes	57.9	110/190	39.7	60/151	0.01
Physical activity increase	51.1	89/174	36.4	47/129	0.01
Weight loss (BMI >30)	22.9	22/96	14.3	11/77	0.15
Smoking cessation	32.5	13/40	7.7	2/26	0.02
Follow-up					
Regular HbA_{1c} monitoring (3–4 times/year)	87.4	181/207	84.9	135/159	0.48
Annual eye examination (fundoscopy)	71.5	148/207	65.8	104/158	0.24
Annual foot examination	70.0	145/207	76.1	121/159	0.19
Annual microalbuminuria monitoring	62.6	129/206	57.2	91/159	0.29
Regular blood pressure monitoring (4 times/year)	97.6	202/207	96.9	154/159	0.67
Annual lipid profile	92.3	191/207	93.7	149/159	0.59
Vaccination					
Influenza vaccine (in the last year)	80.2	166/207	70.4	112/159	0.03
Treatment					
Antidiabetic treatment					<0.001
No treatment	15.5	32/206	3.8	6/159	
Oral antidiabetic	72.3	149/206	59.1	94/159	
Insulin + oral antidiabetic	5.8	12/206	22.0	35/159	
Insulin alone	6.3	13/206	15.1	24/159	
Lipid lowering treatment	47.3	98/207	49.1	78/159	0.74
ACEI † and/or ARA ‡ and/or calcium antagonist	63.3	131/207	63.5	101/159	0.96
Diuretic and/or β-blocker and/or α-blocker	45.9	95/207	45.3	72/159	0.90
Aspirin	35.0	72/206	35.2	56/159	0.95

* n = number with factor considered; N = number of data available. Denominators do not add to 366 because of missing values
† Angiotensin-converting enzyme inhibitor
‡ Angiotensin II receptor antagonist

Discussion

In this sample of diabetic patients of Swiss primary care physicians, adherence to dietary and physical activity counselling were associated with better glycaemic control even after adjusting for potential confounding factors. None of the patients' sociodemographic variables that we measured was related to better or worse glycaemic control.

HbA_{1c} values of this sample of Swiss diabetic patients and their characteristics were comparable to other studies evaluating factors associated with glycaemic control in primary care [26–29]. However, other national surveys evaluating quality of diabetes in primary care found inferior glycaemic control [30–34]. These differences may be explained by better adherence to recommended standards by Swiss primary care physicians (Adherence to recommended standards of diabetes care by Swiss primary care physicians, PA Bovier, P. Sebo, G. Abetel, F. George, H. Stalder, paper in preparation) and lower physician resistance to insulin therapy [35].

As reported by other authors [36], our study showed no association between doctors' characteristics and HbA_{1c} values (figure 1). Patients diagnosed as diabetic less than five years ago and absence of insulin therapy or oral antidiabetic therapy were also associated with better glycaemic control. The relationship between diabetes duration and glycaemic control can be explained by the progressive

Table 4

Multivariate factors associated with recommended glycaemic control in Swiss primary care diabetic patients.

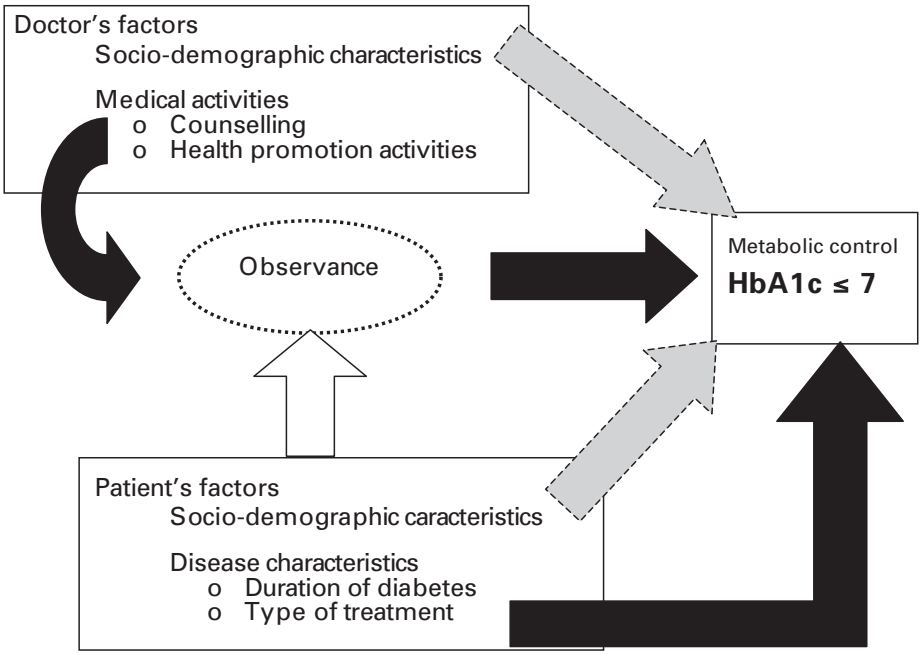
	Crude OR	(CI 95%)	Adjusted OR *	(CI 95%)
<5 years diabetes history	2.46	(1.58 to 3.85)	2.53	(1.50 to 4.28)
Treatment				
No antidiabetic treatment†	9.84	(3.27 to 29.65)	11.20	(3.45 to 36.37)
Oral antidiabetic treatment†	2.93	(1.42 to 6.03)	2.78	(1.27 to 6.05)
Adherence to:				
Dietary counselling	1.87	(1.23 to 2.85)	1.87	(1.15 to 3.03)
Physical activity counselling	1.80	(1.16 to 2.79)	1.77	(1.07 to 2.92)
Influenza vaccination (in the last year)	1.70	(1.05 to 2.75)	2.74	(1.55 to 4.85)

* Adjusted for all factors listed in table 4; Nagelkerte r^2 0.26; 365 observations were included in the final logistic regression model.

† compared to patients with insulin therapy

Figure 1

Relationships between physician and patient factors and metabolic control in diabetic patients of Swiss primary care physicians (black arrows: significant association; grey arrows: non-significant association; white arrow: not measured in this survey).



decrease of endocrine pancreatic function and oxydative stress that may also play an indirect role [37], resulting in progression of the diabetic metabolic changes and the need for more intensive therapy. Absence of insulin therapy can also be seen as the consequence of other successful measures such as lifestyle changes, appropriate diet or oral antidiabetics. The cross-sectional nature of this work precludes any final conclusion regarding this association. Similar results have also been reported by other authors [26–29].

We also found a positive association between glycaemic control and influenza vaccination. In spite of the lower vaccination rate in patients with poor glycaemic control, the rate was still higher in our study than in another published survey [38]. The significant association between glycaemic control and influenza immunisation can be interpreted as an indicator of quality care and patient observance, since it is not the vaccination *per se* that can improve glycaemic control. Physicians providing their patients with lower quality care probably offer influenza vaccination less regularly. In addition, poor diabetic control is often related to poor compliance, which may hamper regular medical follow-up and limit vaccination coverage. Another surrogate marker of quality care and patient observance, smoking cessation, was also associated with better glycaemic control, but this association did not persist after adjustment in the multivariate model.

Our final model contained only three variables, a non-modifiable factor, duration of diabetes, and two factors directly associated with medical practice, i.e. adherence to dietary and physical activity counselling.

Limitations

Our work has several limitations. First, because of the cross-sectional nature of the survey, a definitive causal link cannot be established since we were unable to assess the temporality of the observed relationships. Second, we cannot rule out the possibility that preferential participation by motivated physicians perhaps more interested in diabetes care resulted in selection bias. Physicians were not selected at random and we could not coerce them to participate. However, according to

the Geneva Medical Association (personal communication), their sociodemographic profile was similar to non-participant community-based primary care physicians (i.e. age, sex, specialities). Third, because students completed interviews according to physicians' answers without checking the information in the patients' medical files, we cannot rule out the possibility that some physicians gave the desirable answer, thus resulting in response bias and differential misclassification. Fourth, classification bias due to interobserver variability remains possible, as 23 different people conducted the interviews. Finally, this survey assessed overall quality of diabetes care, including detection and follow-up of patients with impaired fasting glucose or impaired glucose tolerance, so that the diabetic patients' sample was not very large (n = 453), of whom only 366 with an HbA_{1c} value were included in the analysis, thus limiting the power of this study.

On the positive side, it should be noted that the study design and questionnaire were remarkably well accepted, since over 99% of eligible patients' files were reviewed. Second, the choice to use as interviewers medical students with little medical knowledge of diabetes care was made to minimize judgement during the interviews, in order to collect information in a confident atmosphere and thus minimise response bias. Third, to minimise variation between interviewers, all of them received four hours of specific training and an instruction book with specific guidance for each question. Finally, the questionnaire contained a large number of potentially predictive variables, thus enabling us to explore the influence of many potential factors in the statistical analyses.

Conclusion

In this sample of Swiss diabetic patients, adherence to dietary and physical activity counselling was associated with better glycaemic control, independently of the duration of diabetes or antidiabetic treatment. Further research should focus on the importance of appropriate lifestyle counselling by Swiss primary care physicians, ideally in prospective trials using objective and reproducible measures of patient observance.

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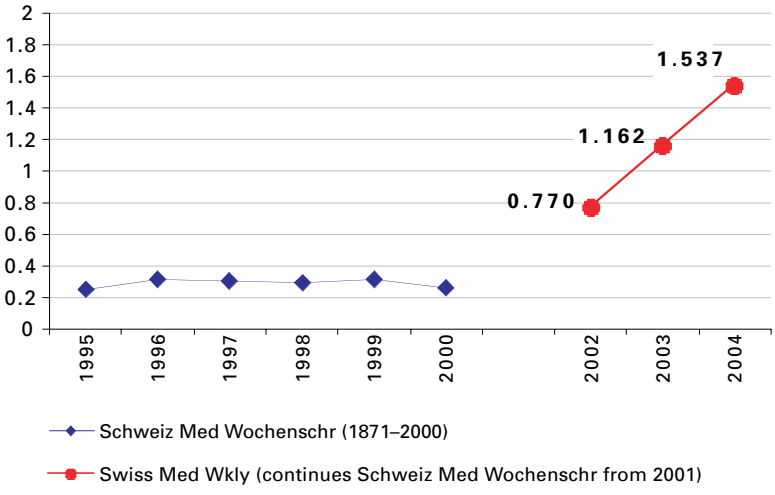

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