German Primary Care Doctors' Awareness of Osteoporosis and Knowledge of National Guidelines

Author
R. Chenot[1], C. Scheidt-Nave[2], S. Gabler[3], M. M. Kochen[1], W. Himmel[1]

Affiliation
[1] Department of General Practice, University of Göttingen, Germany
[2] Robert Koch Institute, Berlin, Germany
[3] Centre for Survey Research and Methodology (ZUMA), Mannheim, Germany

Key words
- attitude of health personnel
- family practice
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- osteoporosis

Abstract

Aims: With the aging of populations in industrialized countries, managing osteoporosis in the primary care setting becomes increasingly important. General practitioners (GPs) are in an ideal position to identify and manage patients who are at an increased risk of osteoporosis and fracture. In a cross-sectional survey we studied whether German GPs (1) are aware of osteoporosis as an urgent health problem, (2) felt competent to manage patients with osteoporosis, (3) knew and used the national guideline for osteoporosis treatment and if not, (4) which barriers prevented them from doing so.

Participants and Methods: A representative random sample of German GPs were sent a 30-item standardized questionnaire by mail. Chi-square statistics and multiple logistic regression were used to detect associations between knowledge of guidelines and explanatory variables.

Results: Of 2,194 doctors addressed, 892 (41.1%) answered the questionnaire. The majority of doctors (82.7%) felt competent in osteoporosis management (95% confidence interval: 80.2 – 85.2) and only 11.2% (8.2 – 13.1) did not consider osteoporosis an important problem in their practice. About half (459/892) reported knowing the national osteoporosis guideline well (51.7%; 48.4 – 55.0), whereas 22.6% (19.9 – 25.4) admitted to not being familiar with it at all. Knowledge of the guideline was positively associated with being a female doctor (OR=1.36; 1.01–1.85), having Internet access (OR=1.40, 1.06 – 1.85), seeing institutionalized patients (OR=1.67; 1.03 –2.69), and caring for patients with osteoporosis at a higher frequency (OR=2.60; 1.93 – 3.50). Nearly 43% (39.7 – 46.2) used the guideline in their practice without problems. In free-text fields, GPs reported most frequently that budgetary restrictions preventing the prescription of appropriate medication represented a severe problem for osteoporosis management.

Conclusion: Although most GPs are aware of osteoporosis as an important health problem and felt competent in the management of this disease, only half of the respondents knew and used the national guideline. This may explain deficits in diagnosis and therapy of osteoporosis in Germany. Since guideline knowledge and frequency of consultations for osteoporosis strongly correlate, proper dissemination of the guideline may further enhance awareness of, and evidence-based treatment for, osteoporosis.

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Correspondence
Dr. R. Chenot
Department of General Practice
University of Göttingen
Humboldtallee 38 · 37073
Göttingen · Germany
Tel.: +49/551 39 26 48
Fax: +49/551 39 95 30
rheiden@gwdg.de

Introduction

The development of diagnostic and therapeutic procedures in recent years is expected to lead to a reduction of the fracture rate and secondary injuries, as well as costs involved in the management of patients with osteoporosis (Borgström et al., 2006; Eisman et al., 2004). Like other guidelines, the German osteoporosis guideline is based on scientific evidence and supports appropriate care for patients with clinical risk factors for osteoporosis and fracture. Such guidelines are considered a key instrument to improve health care (McGuirk et al., 2001).

The main topics of this particular guideline are prevention, diagnostics and treatment of the most common forms of osteoporosis seen in daily routine. The overall aim is to facilitate identification and counselling of people at risk. In 2002, the Association of Osteological Scientific Medical Societies (Dachverband Osteologie [DVO]; an association of multi-disciplinary expert groups—including two representatives of the German general Practitioners (GPs)—in Germany, Austria and Switzerland) had initiated a guidelines clear-

ing procedure according to criteria of evidence-based medicine. It is publicly available on http://lutherhaus.de/osteo/leitlinien-dvo/index.php (in German and English) and has just recently been revised (2006). The revised guidelines are based on information from a systematic literature search up until February 2005 and an interdisciplinary internal and external consensus process.

The role of GPs in managing patients with osteoporosis has increased considerably. Two studies could show that care for patients with osteoporosis in general practice has improved in recent years (Pérez-Edo et al., 2004; Solomon et al., 2004). Further research in Israel, Australia and the United States has examined GPs' attitudes and knowledge regarding the diagnosis of osteoporosis and its management (Werner and Vered, 2000; Jaglal et al.; 2003, Eisman et al., 2004). In general, the doctors' knowledge of the diagnostics and risk factors associated with osteoporosis seemed adequate (Werner and Vered, 2002; Werner, 2005). Several authors attributed such knowledge of osteoporosis management especially to women doctors and younger GPs and found room for improvement of management capabilities (Taylor et al., 2001; Werner and Vered 2002; Werner, 2005; Pérez-Edo et al., 2004). It is assumed that GPs use guidelines only if they consider osteoporosis an urgent health problem and perceive guidelines as helpful for the demands of clinical situations (Taylor et al., 2001; Ouimet et al., 2006).

In a cross-sectional survey we studied whether German GPs (1) are aware of osteoporosis as an urgent health problem, (2) felt competent to manage patients with osteoporosis, (3) knew and used the national guideline for osteoporosis treatment. The overall objective was to identify barriers and facilitators to the implementation of the osteoporosis guideline in German primary health care.

Participants and Methods

Sampling procedure

The Robert Koch Institute (CSN) and the Centre for Survey Research and Methodology (SG) designed the sampling protocol for this survey. We targeted a random sample of German doctors (GPs or general internists) enlisted in family practice stratified by region and sex.

According to foreign and German primary care studies (Butzlaff et al., 2006; Pérez-Edo et al., 2004; Simonelli et al., 2002; Taylor et al., 2001), the percentage of doctors who know, or are familiar with, different guidelines varies around 30%. Considering these rates, we calculated that a sample of approximately 900 doctors would allow us to determine the true proportion of GPs who know the guideline with an error of 10% (i.e., ±3 percent points of its true value) with a two-sided alpha of 5% (Machin et al., 1997). We expected a response rate of about 40–50% (Taylor et al., 2001; Jaglal et al., 2003).

Participants were selected by stratified random sampling on the basis of the 17 regional Associations of Statutory Health Insurance Physicians in Germany (National Association of Statutory Health Insurance Physicians, 2005). Thirteen of these associations provided lists including names, addresses and sex of their members. Four regional associations preferred to send the questionnaire to their members themselves. To accommodate this, these associations were sent a list of random numbers according to their relative share, allowing them to draw the sample themselves and then send the questionnaire to the selected doctors.

The defined sample of primary care doctors received a self-administered questionnaire that had previously been piloted with 18 GPs in a county of the federal state of Thuringia. A cover letter provided details about data security and the objectives of the study. A second mailing was sent out in January 2006 to all those who had not responded. All questionnaires received within two months of the second mailing were included in the analysis.

The Questionnaire

The standardized questionnaire consisted of 30 items, comprising knowledge, use of, and experience with the German osteoporosis guideline. Knowledge of guideline and self-assessed competency could be rated on four-point scales (0="not at all" to 3="very good"). Additionally, practice characteristics and socio-demographic details were explored as well, as exploratory factors for knowledge of the osteoporosis guideline. Furthermore, doctors assessed the frequency of specialist involvement (diagnosis validation, co-treatment) and their satisfaction with such input. Awareness of the condition and experience with guideline use in daily practice were evaluated by multiple-choice questions. There were "free text" sections for additional comments relating to the items concerning practical experience with the osteoporosis guidelines.

Data Analysis

The Statistical Analysis Software package, version 9.1 was used for data analysis. We applied descriptive statistics to analyze the responses to each item. Associations between knowledge of guideline and explanatory variables such as socio-demographic characteristics were first analyzed by chi-square tests and then by multiple logistic regression. A P-value of 0.05 was used to define statistical significance. To estimate goodness-of-fit of the regression model, the Hosmer-and-Lemeshow chi-square statistic was calculated comparing observed and expected frequencies (Allison, 1999). Collinearity diagnostics were performed to measure how strongly regressors are related to other regressors (Belsley et al., 1980).

Results

Out of 44,699 GPs and general internists in Germany, 2,194 were randomly selected (4.9%) and 2,169 of these were deemed eligible. The overall response was 892 (41.1%; **Fig. 1**). Thus, the study covered nearly 2% of all primary care physicians in Germany.

Sample characteristics

Participants' characteristics are summarized in **Table 1** and compared with available national data. The mean age of participating doctors was 51.6 years (median 52.0; range 30–70). One-third (305/892) were women doctors. More than half of the participants (487/892) operated single practices, the most common practice type in Germany. The vast majority (800/892) also visited patients in nursing homes.

Physicians' attitudes and experiences

A total of 479 doctors (54.8%; 95% confidence interval: 51.5 to 58.1) stated that osteoporosis should receive more careful attention, about 11 % felt its relevance overestimated (**Fig. 2**). As many as 585 (66.0%) saw several patients with osteoporosis or a

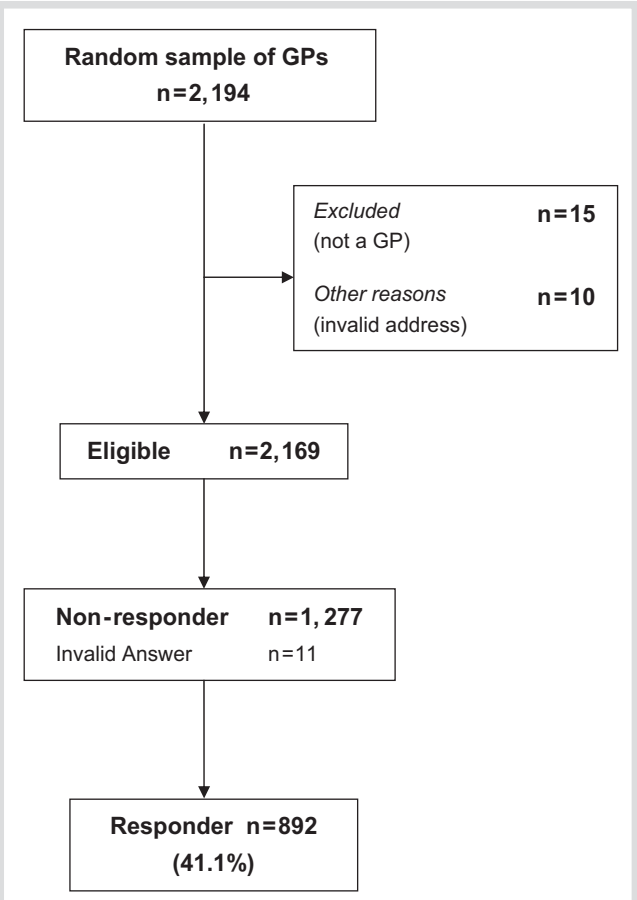

Fig. 1 Inclusion procedure and response rate.

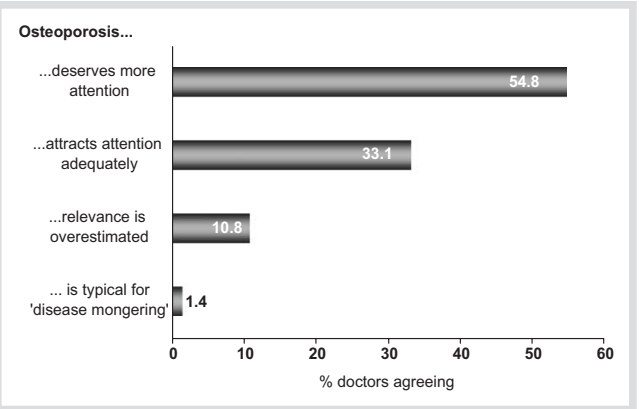

Fig. 2 Judgement of osteoporosis as a health problem in daily practice.

related health problem several times a week; 232 (27%) estimated to see an episode of osteoporosis less than once per week; 28 (3%) less than once per month, and 20 (2%) hardly ever.

The majority of doctors (82.7%; 80.2–85.2) felt competent in osteoporosis management. About half (459/892) reported good knowledge of the guideline (51.7%; 48.4–55.0), whereas 197 admitted to not knowing the guideline at all (22.6%; 19.9–25.4). The doctors' practical experience with the osteoporosis guideline is depicted in **Fig. 3**. Nearly 43% (46.3–39.5) used the guideline in their practice without problems.

There was a positive (although somewhat trivial) association between competence and use of guidelines. Nearly 94% of those who used the guideline in their practice felt competent in osteoporosis management, compared to 74% who did not.

In free-text fields, GPs reported most frequently (19.8%) that budgetary restrictions for prescribing adequate medication represented a severe barrier against adequate osteoporosis management. (In Germany, there are negotiated target budgets for prescribing in primary care. If these budgets are exceeded, individual GPs have to pay back their excess to the sickness funds.) When the guideline was not applied, the main reason given (29/87 responses to this question) was again that financial concerns interfered with the appropriate management of patients with osteoporosis.

Collaboration with specialists

Most of the responding primary care physicians (76.5%) reported to collaborate with specialists (**Fig. 4**). Satisfaction with the consultants depended on their specialty: more respondents were satisfied with endocrinologists (81.4%) than with orthopedic surgeons (66.5%). More than 80% of the respondents (749/892) estimated the distance to the nearest DXA bone density scan (to validate diagnosis and to determine if medication to treat osteoporosis is advisable) to be less than 20 km.

Factors influencing knowledge of the guideline

Knowledge of the guideline was positively associated with younger age, working in a group practice, being a teaching prac-

Table 1 Sociodemographic and practice characteristics

	Own survey	National data* (in %)
Age; mean (SD)	51.6 (8.2)	51.0 (mean age)
men	52.6 (8.1)	–
women	49.9 (8.0)	–
Women; no. (%)	305 (34.8)	37.6
Type of practice; no. (%)		
single practice	487 (55.6)	68.1
shared income group practice	334 (37.8)	–
separate income group practice	62 (7.0)	–
Practice years; mean (SD)	14.6 (8.2)	–
Less than 10 years of practice; no (%)	232 (26.6)	30.9
Patients in institutions; no (%)	800 (90.2)	–
Working with practice assistant; no (%)	102 (11.6)	–
Teaching in practice; no (%)	210 (23.9)	–
Internet access; no (%)	224 (27.8)	–

*National Association of Statutory Health Insurance Physicians, 2005

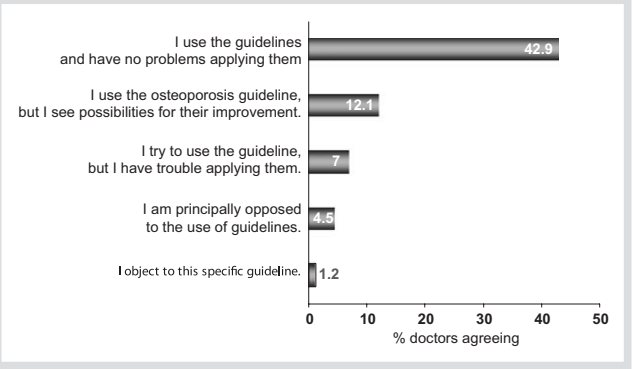

Fig. 3 Primary care physicians' practical experience with osteoporosis guidelines.

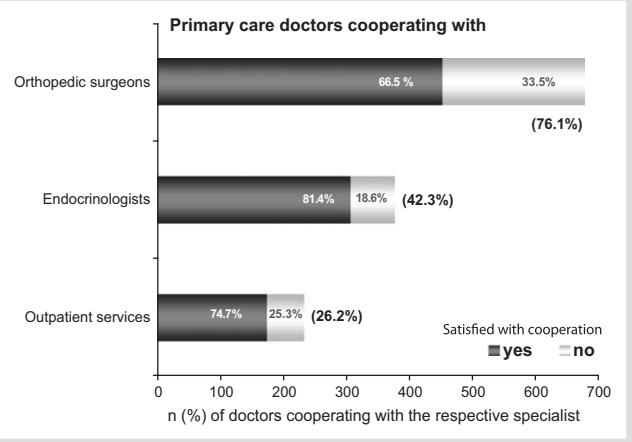

Fig. 4 Cooperation with specialists.

tice, having access to the Internet, seeing institutionalized elderly patients, and encountering patients with osteoporosis more often (**Table 2**). More women than male GPs knew the guideline but this difference was not significant (55.1 vs. 49.5%, P=0.114). In the multivariate model with all covariates, female sex turned into a nearly significant predictor (P=0.051) while other covariates, Internet access, visiting institutionalized patients, and a higher frequency of seeing patients with osteoporosis, remained independently predictive of guideline knowledge (**Table 2**). When computing the model on the basis of stepwise selection (level for entry P<0.1), four characteristics had a positive effect on GPs' guideline knowledge: sex, seeing more patients with osteoporosis, visiting patients in nursing homes and having access to the Internet. The Hosmer-and-Lemeshow statistics supported the hypothesis of general association within the model ($chi^2=7.8$; df=8; P=0.04). There was no indication of collinearity among the explanatory variables in the model.

Bivariate analyses provided deeper insight into the role of the doctor's gender for guideline knowledge, consultation rates for osteoporosis and Internet use. The association between Internet use and knowledge of the osteoporosis guideline was significant only for men (55.9% of men who use the Internet knew the guideline but only 43.1% of non-users; P=0.0024). The corresponding rates for female GPs were 56.7 and 53.5% (P=0.5681). A strong positive association between knowledge of the guidelines and the frequency of osteoporosis consultations was true for both sexes: 57.4% of the male GPs who see osteoporosis frequently knew the guideline, but only 31.2% for those who see them infrequently (P<0.0001); the respective rates for women were 63.7 vs. 42% (P=0.0002). There were no significant differences in Internet use and seeing institutionalized patients between men and women, but more male than female GPs reported to see patients with osteoporosis at least several times per week (69.2% vs. 59.7%; P=0.0044).

Discussion

This study highlights awareness of osteoporosis and knowledge of the respective guideline in the primary care setting. Although most GPs in Germany felt competent to care for patients with osteoporosis, only half of the respondents knew the respective guideline well. Awareness of, and knowledge about, osteoporosis and the respective guideline were significantly associated with Internet use and seeing more patients with osteoporosis than the average. There is still room for improvement in the use of the guideline among those who claim to know the guideline.

Strengths and limitations

The response rate was excellent for surveys with doctors (Jaglal et al., 2003; Taylor et al., 2001) and the margin of error of guideline knowledge of 3.3% in a 95%-confidence interval is sufficient to draw valid conclusions for health policy measures. The stratified and randomized sampling strategy contributed to a balanced sample so that the results can be generalized in primary care. However, we cannot exclude that those who did not respond were different, in some important instances, from those who participated. The participating primary care physicians are likely to be more interested in osteoporosis and related conditions and to have a better knowledge and more appropriate attitudes towards these conditions.

We did not test the doctors' competence in osteoporosis management since we tried to avoid any feeling of an awkward exam which might have negatively affected the response rate. The high rate of GPs who felt competent may, therefore, be an overestimate. Moreover, social desirablilty may have stimulated a tendency to overreport the use of the osteoporosis guideline. Although we believe our conclusions from the multiple regression analysis to be valid, we should be cautious. The percentage of GPs who already perform well in osteoporosis management may also be a slight overestimate.

Comparison with other studies

GPs' awareness of the German osteoporosis guideline published by the DVO is well in accordance with the results of a study of the guideline implementation process in general practice in Canada in 2001. Jaglal et al. (2003) reported rates for "not read" of three Canadian guidelines between 35.3 and 68.8%, compared to 49.3% among German GPs in our study.

Several studies have assessed the use of osteoporosis guidelines in daily practice in primary care (Butzlaff et al., 2006; Ouimet et al., 2006; Taylor et al., 2001). Among our sample of German primary care doctors, nearly 23% did not know the guideline and consequently, did not use it; 4.5% declared to be fundamentally opposed to the use of any guidelines and a minority (7%) who tried to work with the osteoporosis guideline reported problems applying it. One-quarter of British GPs in the North Thames region stated they rarely or never used the osteoporosis guidelines (Taylor et al., 2001). In a Canadian study on clinical guideline use in hospitals, 21.9% of the respondents never or rarely used clinical practice guidelines and 1.2% considered

Table 2 Guideline knowledge

	Logistic regression Simple Model			Full model[1]		Selected model[2]	
Variables	**%[3]**	**OR [95% CI]**	**P**	**OR [95% CI]**	**P**	**OR [95% CI]**	**P**
Age							
≥51	48.3	1.0			1.0	–	–
<51	55.2	1.31 [1.01–1.71]	0.042	1.32 [0.94–1.85]	0.110	–	–
Sex							
male	49.5	1.0		1.0	1.0	–	–
female	55.1	1.25 [0.95–1.66]	0.114	1.36 [1.00–1.85]	0.051	1.36 [1.01–1.85]	0.011
Years in practice							
10+more	51.6	1.0		1.0	–	–	–
up to 10yrs	52.0	1.02 [076–1.37]	0.338	1.09 [0.81–1.45]	0.661	–	–
Practice type							
single	49.5	1.0		1.0	–	–	–
group	54.5	1.22 [0.94–1.59]	0.142	1.09 [0.81–1.45]	0.571	–	–
Teaching in practice							
no	49.1	1.0		1.0	–	–	–
yes	59.1	1.52 [1.12–2.07]	0.011	1.20 [0.86–1.69]	0.289	–	–
Internet							
no	47.2	1.0		1.0	–	1.0	–
yes	56.4	1.45 [1.11–1.89]	0.006	1.33 [1.00–1.77]	0.049	1.40 [1.06–1.85]	0.017
Patients in institutions							
no	38.4	1.0		1.0	–	1.0	–
yes	53.0	1.81 [1.51–2.85]	0.010	1.58 [0.97–2.57]	0.069	1.67 [1.03–2.69]	0.036
Patients with osteoporosis							
<1/week	36.1	1.0		1.0	–	1.0	–
several/week	59.7	2.6 [1.97–3.50]	<0.001	2.52 [1.85–3.42]	<0.001	2.60 [1.93–3.50]	<0.001
Cooperation with specialist							
no	49.8	1.0		1.0	–	–	–
yes	52.4	1.11 [0.82–1.51]	0.507	1.03 [0.74–1.44]	0.598	–	–

[1]Adjusted ORs on basis of a full model with all variables: 9 df, likelihood-ratio χ-square p < .0001, $R^2 = 0.07$, max-rescaled $R^2_{SAS} = 0.09$, Hosmer-and-Lemeshow n.s

[2]Adjusted ORs for all significant variables: 4 df, likelihood-ratio χ-square P < .0001, $R^2 = 0.07$, max-rescaled $R^2_{SAS} = 0.09$, Hosmer-and-Lemeshow n.s

[3]% of doctors who assessed their knowledge of the guideline as "good" or "very good"

them inadequate with regard to their situation (Ouimet et al., 2006). In a most recent German study (Butzlaff et al., 2006), 55% of the GPs who participated in a telephone interview reported use of guidelines in daily care, compared to 62% in our study of whom 7% had problems applying them.

Consistent with our findings, a US survey of primary care doctors and orthopedic surgeons (Simonelli et al. 2002) reported that cost of osteoporosis therapy was the most frequently mentioned specific barrier to guideline adherent treatment. Doctors in our sample frequently identified budgetary restrictions as a severe barrier to osteoporosis management and the prescription of adequate medication. This argument was also put forward by Feely and colleagues (2000) in their explanation as to why British GPs prescribed doses of statin too low for the primary and secondary prevention of coronary heart disease.

In a cross-sectional Spanish survey, the active role of primary care doctors in osteoporosis management became apparent, especially in diagnosing and treating osteoporosis and related health problems (Pérez-Edo et al., 2004). Our results contradicted the Spanish findings that practitioners of a younger age and relatively few years of practice performed better. However, when comparing studies on guideline use in primary care between different health care systems, actors, regulations and restrictions vary so that we should not overestimate the differences in both studies as to the influence of age and practice experience.

Implications of the study

A most recent study of outpatient care for osteoporosis patients in Germany revealed that patients with osteoporosis are underdiagnosed and that only about 20% of those who are supposed to benefit from drug treatment were prescribed appropriate medicine (Häussler et al., 2007). According to our study, one explanation for these deficits may be that only half of the GPs know, and use, the osteoporosis guideline.

Usually, women are considered to perform better in osteoporosis management than their male counterparts (Werner, 2005). We also detected such differences, but the gender effect seems to be more intricate: first of all, the gender effect in our study was only of a moderate degree. More importantly and especially in male GPs, we found a typical cluster of characteristics: those who know the guideline well do have Internet access and admit to see patients with osteoporosis often, whereas women know the guideline independently of Internet access and a higher case frequency. Among male GPs, those who are not familiar with the guideline have in general neither access to the Internet and nor see patients with osteoporosis very often. This group apparently shows resistance towards an Internet-based information strategy.

Our results showed a strong association between reported case frequency of patients with osteoporosis and guideline knowledge. We suggest two opposing explanations for this: frequent consultations of patients with osteoporosis may stimulate GPs

to study and apply the guideline. The alternative explanation seems more convincing, namely that case frequency increases with awareness of the condition and knowledge of the guideline. This consequence is of high importance in the primary care sector where assessment of clinical risk factors is essential to identify patients at high risk of osteoporosis and fracture (Taylor et al., 2001). Although a cross-sectional study is not appropriate to define causal pathways, it seems reasonable to believe that disseminating a guideline could be useful for promoting awareness and providing an evidence-based framework of current knowledge about the management of osteoporosis.

Information management helps to acquire new knowledge and to access information in daily routine. Implementation and dissemination of guidelines via the Internet seems to be such an information management tool that might have contributed to guideline knowledge in our study. A randomized controlled trial among US primary care physicians in Houston showed a positive effect on guideline adherence, especially on knowledge gains for the Internet-based intervention group, similar to those physicians trained in a live interactive workshop (Fordis et al., 2006). The intervention group detected significantly more high-risk patients and prescribed them drugs according to the guideline. However, exclusively focussing on Internet dissemination might enlarge the knowledge gap between those with and without Internet access. Direct strategies to target groups should therefore not be neglected.

Primary care providers are in a good position to assess risk factors and recommend treatment strategies, but their important contribution might be at stake because GPs fear the costs of prescribing medication. As mentioned earlier, this is in line with a British study in general practice indicating that following a guideline maybe difficult if the recommended treatment tends to exceed the practice budget (Feely et al., 2000). This may be particularly true if guidelines decrease the threshold for interventions, especially in primary prevention, as in the case of the osteoporosis guideline. As far as GPs feel distracted from appropriate efficient action by budgetary restrictions, recommendations should include better routine documentation (electronic patient records) and rigorous information about the financial burden of the prescriptions and strategies to cope with billing requirements.

In conclusion, although most GPs in Germany recognize osteoporosis as an important health problem, better knowledge and use of the national osteoporosis guideline could improve diagnosis and treatment of patients with this condition. The Internet seems to be one primary pathway to implement and evaluate the guideline effectively.

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