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The impact of specialist care for low back pain on health service utilization in primary care patients: A prospective cohort study

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Abstract

Guidelines portray low back pain (LBP) as a benign self-limiting disease which should be managed mainly by primary care physicians. For the German health care system we analyze which factors are associated with receiving specialist care and how this affects treatment. This is a longitudinal prospective cohort study. General practitioners recruited consecutive adult patients presenting with LBP. Data on physical function, on depression, and on utilization of health services were collected at the first consultation and at follow-up telephone interviews for a period of 12 months. Logistic regression models were calculated to investigate predictors for specialist consultations and use of specific health care services. Large proportions (57%) of the 1342 patients were seeking additional specialist care. Although patients receiving specialist care had more often chronic LBP and a positive depression score, the association was weak. A total of 623 (46%) patients received some form of imaging, 654 (49%) physiotherapy and 417 (31%) massage. Consulting a specialist remained the strongest predictor for imaging and therapeutic interventions while disease-related and socio-demographic factors were less important. Our results suggest that the high use of specialist care in Germany is due to the absence of a functioning primary care gate keeping system for patient selection. The high dependence of health care service utilization on providers rather than clinical factors indicates an unsystematic and probably inadequate management of LBP.

Keywords: Low back pain; Specialist care; General practice / primary care; Health care service utilization

1. Introduction

According to research and evidence based guidelines low back pain (LBP) is a benign self-limiting condition, which is rarely due to serious underlying conditions (Grotle et al., 2007; Becker et al., 2003; van Tulder et al., 2006). Therefore, most patients with LBP should be managed by primary care physicians with only limited utilization of further health care resources (Deyo and Philipps, 1996). Recommended management includes basic evaluation, patient education, encouragement of physical activity, and simple pain medication.

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Without warning signs (''red flags'') further evaluation, imaging, referral to specialist care or intensified therapy (e.g., physiotherapy) is not considered appropriate within an initial period of 4–6 weeks.

Variations of care for patients who seek medical treatment for LBP have been observed in several studies and attributed to multiple factors (Sundararajan et al., 1998). Over- and underutilization of health care services, especially imaging studies, have been reported (Weiner et al., 2006).

Germany's ambulatory health care system offers easy access to community specialist care (Altenstetter, 2003). Access to specialists without referral from GPs is not restricted and there is no co-payment. A referral is needed for physiotherapy and massage and requires a little co-payment. Prescriptions of medications require a limited co-payment unless patients qualify for free prescriptions. All physicians have to manage a budget regulating the amount of prescriptions of medications an physiotherapy referrals. Manual therapy and acupuncture is usually offered by physicians who received special training and is mostly covered by the statutory health insurance. Although patients are encouraged to consult a GP first before seeking specialist care, no gate keeping system is enforced. Patients are not formally enlisted with a personal primary care physician and until recently trusts or preferred provider organizations were not allowed. In the German ambulatory care system the number of specialists is exceeding the number of generalists. The proportion of generalist in ambulatory care went down from 52.4% in 1975 to down to 38.4% in 2005 (German Medical Council, 2005). In 2000 an expert panel of the German ministry of health concluded that LBP among other diseases is an example for the coexistence of over- and as well underutilization of health care resources in Germany (Advisory Council on the Assessment of Developments in the Health Care System, 2001).

The aim of this study is to explore (1) factors which are associated with LBP patients' seeking specialist care and its appropriateness, (2) how specialist care affects management of LBP and (3) whether there is an over- and underutilization of healthcare resources. This could be an important step in optimizing the allocation of limited health care resources.

2. Methods

2.1. Design

This prospective cohort study was embedded within a three-armed randomized controlled trial (RCT) with an educational intervention in primary care (Chenot et al., 2005). The present cohort encompasses all patients enrolled in that trial. The primary goal of the RCT was to assess the impact of guideline-based treatment on functional capacity in patients with LBP. A predefined secondary goal of the study was to explore the variation of health care services for LBP. The intervention consisted in intensive seminars for general practitioners (GPs) on an evidence-based LBP guideline (in both intervention arms) and in a training of practice nurses in motivational counseling to promote patients' physical activity (in one intervention arm). The promoted guideline is in accordance with other, e.g., the European guidelines (Becker et al., 2003; van Tulder et al., 2006). The study was conducted in two centers (Marburg, Göttingen). Ethical approval was obtained from both study sites.

2.2. General practitioners

We contacted 818 general practices surrounding both study centers. Addresses were obtained from local health authorities. The areas encompass two medium size university cities and surrounding small towns and rural areas, thus being representative for most parts of Germany except for large cities. The goal was to recruit 120 practices. From 118 practices which agreed to participate, two dropped out after randomization. The GPs were on average 12.7 years in practice (range 1–31 years), the average age was 48 years (SD $\pm$ 6) (national average 50.4 years) and 42% of them were female (national average 36%). A total of 68 (59%) practices were run by a single GP. The basic demographic data of our sample is not substantially different from the national average (Wetzel et al., 2005). Of the 116 participating practices 5 (4%) offer manual therapy and 25 (21%) acupuncture to their patients.

2.3. Patients

During the recruitment period practice nurses asked consecutive patients with LBP to participate in the study. To identify eligible patients they were either routinely asked for the reason they consulted or a poster asked them report to the practice nurse. All meeting the inclusion criteria during the recruitment period were registered. Inclusion criteria were (1) consulting for LBP, (2) age above 18, (3) ability to read and understand German, and (4) written consent.

2.4. Instruments and data collection

After written consent had been obtained, socio-demographic data were collected prior to the consultation with a baseline questionnaire. During the consultation, GPs assessed warning signs for complicated LBP (''red flags''). Those were major trauma, suspicion or history of cancer,

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suspicion of inflammatory disease, suspicion of osteoporosis, fever, immunosupression and severe neurological deficits. At follow-ups four weeks, six months and 12 months later, study nurses conducted standardized telephone interviews and patients were asked about their individual health care utilization, e.g., specialist consultations, medication, and non-pharmacological treatments for LBP within the last 6 months. In the interview, study nurses actively presented a list of 42 possible interventions for LBP. Study nurses were trained in conducting standardized interviews and were able to describe each method in more detail if necessary.

The Hanover Functional Ability Questionnaire (HFAQ) was used for the assessment of functional capacity. The HFAQ is a frequently used instrument for the assessment of back pain disability; the scale had previously shown good psychometric properties. It consists of 12 items in which patients can rate their limitation in activities of daily living (Kohlmann and Raspe, 1996). It can be compared to the Roland and Morris Scale, but is advantageous in telephone interviews (Roese et al., 1996). The scale ranges from 0 (extreme functional limitation) to 100 (no functional limitation); scores below 70 are considered to represent a significant impairment.

To classify the natural history of LBP, we used a modification of the von Korff procedure as follows (Von Korff, 1994):

- *acute LBP:* single episode of LBP of less than 90 days duration;
- *recurrent LBP:* multiple episodes LBP of less then 90 days duration within the last 12 months;
- *chronic LBP:* more than 90 consecutive days of LBP within the last 12 months.

The questionnaire includes a visual analogue scale for rating pain severity. To estimate the proportion of patients with radicular symptoms, we relied on the patients' reported level of pain radiation into the leg, which we considered as an indicator of possible nerve root irritation. Given the absence of reliable methods, this is a frequently used and pragmatic approach for assessing radicular pain in large cohorts (Luijsterburg et al., 2004).

For the assessment of depression, we applied the German version of the Centre for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). Scores above 23 are considered clinically relevant depression (Hautzinger and Bailer, 1993).

2.5. Statistical analysis

In a first step, we conducted univariate analyses in order to compare patients who received specialist care with those who did not. In case of missing data, we provide the number of subjects analyzed. Dependent on the biometric properties of the scales, we either used χ^2-tests for categorical data, or *t*-tests and non-parametric tests (Kruskall–Wallis) for continuous data. Continuous data on depression and functional capacity were dichotomised. For depression (CESD) (Radloff, 1977) we used a cut-off score of >23 and for functional capacity (HFAQ) (Kohlmann and Raspe, 1996) a cut-off score of >70. All *P*-values are two-sided and the significance level was 5%.

In a second step, we performed logistic regression analyses modeled towards receiving a specific health care service with all univariate significant socio-demographic and disease-related characteristics and consultation of a specialist as covariates. This procedure provides odds ratios and 95% confidence intervals. With a selection procedure (stepwise and score option) we selected the best model retaining the three most significant predictors, unless there were more predictors improving the models fit (Allison, 1999). Due to listwise deletion of patients with missing data, the final models included 1109–1342 patients. We did not perform a multiple imputation procedure since the proportion of excluded patients never exceeded 20%. Goodness of fit was tested with Hosmer–Lemeshow test (Bender and Grouven, 1996) and we report only models in which the null hypothesis of goodness of fit was not rejected (Allison, 1999).

Given the fact that the present study was an embedded cohort study, we also checked if one of the study arms was a significant factor in the model, which was not the case. Comparison of consultation frequencies were adjusted with ANCOVA including the same covariates as the logistic regression models.

The software package SAS 9.1 was used for analysis.

3. Results

3.1. Patients

Over a period of three months, the 116 participating practices invited approximately 3400 patients with LBP to participate. This estimation is based on completed registration list from 96 (83%) practices. They recruited on average 11.6 (SD $\pm$ 5.8) patients. A total of 1342 of 1588 patients who agreed to participate were finally included. Patients' flow and reasons for exclusion are listed in Fig. 1. Eventually, 1218 patients were followed up for one year and 127 (9.4%) finally dropped out of the study. Drop outs showed no differences to study remainers in baseline characteristics. The age distribution in our patients corresponds to patients with low back pain in the national health survey from 1999 (Schneider et al., 2006).

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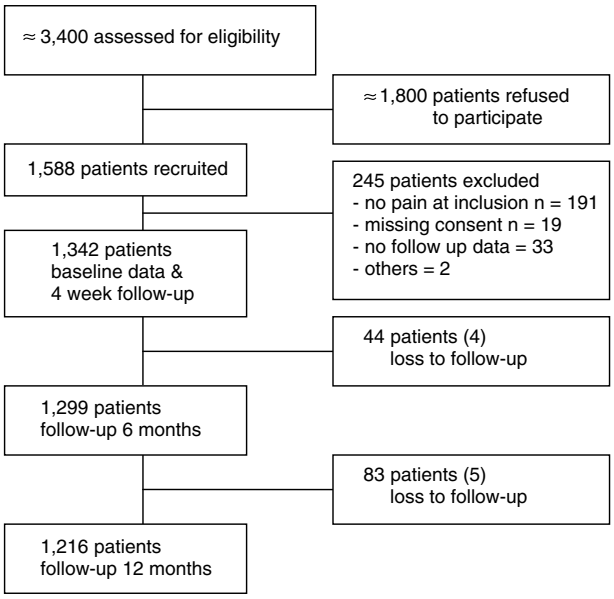

Fig. 1. Patient flow.

3.2. Baseline data

Approximately, one third of the patients seen for LBP in general practice (507; 38%) had consulted a specialist within one month and more than half of the patients (762; 57%) within 12 months. This does not include consultation of radiologists and psychotherapists.

Most often they contacted an orthopedist (645; 85%) and less frequently a neurologist, general surgeon, pain specialist or other specialists (Table 1). Overall, 525 patients (70%) saw only one specialist, 181 (24%) two specialists and 40 (5%) three and more specialists. Except for those patients consulting pain specialists, most patients consulted specialists only once.

In the univariate analysis, patients consulting specialists were more likely to be male, tended to be older, had a lower school education and were more often retired (Table 2). Among them was a higher proportion of chronic LBP and patients with pain radiating down the foot. Patients receiving specialist care were more likely to have a positive depression score. The proportion of patients with a functional capacity below 70 was higher than in the other group at baseline and at follow-up.

3.3. Prediction of consultation of specialists

Chronic LBP and a positive depression score were the only significant predictors for specialist consultation (Table 3). Low functional capacity (HFAQ) was associated with increased likelihood of consulting a neurologist or a pain specialist. Presence of warning signs

Table 1
Consultation of specialist for low back pain within 12 months

Specialist	$n = 1342$	Second specialist consultation for LBP within 12 months[a]	Number of consultations within 12 months
Orthopedist	645 (48%)	411 (63.7%) no other specialist 130 (20.1%) Neurologist 80 (12.4%) General surgeon 84 (13%) Pain specialist 38 (5.9%) Other specialists	Range 1–60 median 1 (IQR 1–6)
Neurologist	173 (13%)	24 (13.8%) no other specialist 130 (75.1%) Orthopedist 44 (25.4%) General surgeon 45 (26%) Pain specialist 16 (9.2%) Other specialists	Range 1–30 median 1 (IQR 1–3)
General surgeon	137 (10%)	37 (27%) no other specialist 80 (53.39%) Orthopedist 44 (32.1%) Neurologist 30 (21.9%) Pain specialist 13 (9.5%) Other specialists	Range 1–38 median 1 (IQR 1–3)
Pain specialist	113 (8%)	17 (15%) no other specialist 85 (75. 6%) Orthopedist 30 (26.3%) General surgeon 45 (39.5%) Neurologist 11 (9.6%) Other specialists	Range 1–90 median 7 (IQR 2–15)
Psychotherapist	95 (7%)	94% have been to a specialist	n.a.
Other specialists[b]	58 (4%)	n.a.	n.a.
Emergency services	10 (0.74%)	n.a.	n.a.

IQR: inter quartile range.
n.a.: not applicable.
[a] Some patients consulted more than one additional specialist.
[b] Rheumatologist 15, Neurosurgeon 14, General Internal medicine 14, Sports Medicine 10, Gynaecologist 8, Urologist 2.

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Table 2
Demographic and clinical baseline data

Socio-demographic data ($n = 1342$)	No specialist consultation ($n = 580$)	Specialist consultation ($n = 762$)	P-value
Age in age groups			
<40 years	182 (35%)	188 (28%)	<0.02
40–60 years	220 (43%)	322 (47%)	
>60 years	114 (22%)	169 (25%)	
Gender female	317 (46%)	461 (54%)	0.03
Living with partner ($n = 1190$)	397 (77%)	541 (80%)	n.s.
Body mass index ($n = 1243$)	26.5 (95% CI 26–26.9)	27 (95% CI 26.6–27.3)	n.s.
School education			
<10 years	199 (34%)	307 (40%)	<0.001
10 years	231 (40%)	320 (42%)	
>10 years	150 (26%)	135 (18%)	
Employment status			
Working full or part-time	354 (61%)	411 (54%)	0.007
Housekeeping	87 (15%)	116 (15%)	
Retired	86 (15%)	168 (22%)	
Unemployed	53 (9%)	67 (9%)	
Net income (n = 1069)			
<1000 €	79 (17%)	111 (18%)	n.s.
1001–2000 €	184 (41%)	290 (47%)	
2001–3000 €	135 (30%)	151 (25%)	
>3000 €	55 (12%)	69 (10%)	
Severity of pain at baseline (scale 1–10) ($n = 1307$)	5 (SD ± 2)	5.3 (SD ± 2.1)	0.02
Chronicity			
Acute LBP	146 (25%)	110 (14%)	<0.0001
Recurrent LBP	251 (43%)	285 (38%)	
Chronic LBP	183 (32%)	367 (48%)	
Radiation of pain below the knee	85 (15%)	174 (23%)	<0.001
Positive depression-score (CESD) at baseline ($n = 1129$)	68 (14%)	130 (20%)	<0.01
Suspicion of red flags at baseline	43 (7%)	75 (10%)	n.s.
Functional capacity < 70 at baseline	240 (41%)	393 (52%)	<0.0002

SD: standard deviation.

(''red flags'') or pain radiating down the foot was not significantly associated with specialist consultation.

3.4. Prediction of the use of imaging and health service utilization

Consulting a specialist was the strongest predictor for the use of any further kind of health care services, while disease-related factors were comparatively less important predictors and socio-demographic factors of negligible importance (Tables 4 and 5).

A total of 623 patients (46%) received at least one form of imaging. Only 61 (9%) of these patients received imaging without referral to a specialist. Most patients (256; 64%) who received imaging within the first four weeks had less than four weeks of pain. Low functional capacity was the strongest clinical predictor for receiving imaging. Pain radiating down the foot was associated with computer tomography (CT) or magnetic resonance imaging (MRI).

After adjustment for socio-demographic and disease-related differences, patients who did not seek specialist care consulted their GP less often for LBP within 12 months (6.3 95% CI 5.7–7.0) than those who did (10.3 95% CI 9.3–11.3). Chronic LBP was a clinical predictor for receiving physiotherapy, massage and acupuncture, while manual therapy was applied less often for patients with recurrent and chronic LBP. For manual therapy and acupuncture, consulting a GP who offered these services directly was a strong predictor for receiving those services. A positive depression score correlated with receiving psychotherapy and opioid prescription. Tramadol was the most commonly prescribed opioid.

4. Discussion

The results of our study show that a large proportion of patients consulting GPs because of LBP was seeking additional specialist care. The majority of specialist care for LBP (85%) was delivered by orthopedists, while other specialists were mostly consulted additionally. Patients seen by a specialist had more often chronic LBP and

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Table 3
Factors predicting specialist consultation ($n = 1342$)

Descriptor	Variable	Adjusted odds ratio (95% CI)	*P*-value
Specialist consultation[a] ($n = 762$)[b]	Chronicity[c]		
	Recurrent LBP	1.6 (1.1–2.2)	0.83
	Chronic LBP	2.5 (1.8–3.6)	0.0001
	Positive depression score	1.5 (1.0–2.0)	0.027
	Employment status[d]		
	Housekeeping	1.1 (0.7–1.7)	0.9
	Retired	1.4 (1.0–2.0)	0.093
	Unemployed	1.0 (0.6–1.9)	0.67
	School education[e]		
	10 years	1.0 (0.8–1.4)	0.13
	>10 years	0.7 (0.5–1.0)	0.017
Orthopedist ($n = 645$)[b]	Chronicity[c]		
	Recurrent LBP	1.6 (1.1–2.2)	0.83
	Chronic LBP	2.4 (1.7–3.3)	0.0001
	Positive depression score	1.4 (1.0–2.0)	0.024
	Pain radiating in the foot	1.3 (0.9–1.7)	0.13
Neurologist ($n = 147$)[b]	Chronicity[c]		
	Recurrent LBP	2.2 (1.2–4.0)	0.003
	Chronic LBP	1.5 (0.8–2.8)	0.91
	Functional capacity < 70	1.9 (1.3–2.8)	0.0007
	Positive depression score	1.5 (1.0–2.4)	0.04
Pain specialist ($n = 113$)[b]	Functional capacity < 70	2.2 (1.4–1.5)	0.0006
	Chronicity[c]		
	Recurrent LBP	1.5 (0.7–3.0)	0.78
	Chronic LBP	1.8 (0.9–3.6)	0.072
	Positive depression score	1.4 (0.8–2.3)	0.23

Odds ratios derived from a logistic regression models.
[a] All specialist consulted, except radiologist and psychotherapists.
[b] Number of patients who consulted this particular specialist.
[c] Compared to acute LBP.
[d] Compared to working full or part-time.
[e] Compared to education less than 10 years education.

Table 4
Factors predicting the use of imaging services ($n = 1342$)

Descriptor	Variable	Adjusted odds ratio (95% CI)	*P*-value
X-ray ($n = 560$)[a]	Specialist consultation	21 (15–30)	<0.0001
	Functional capacity < 70	1.2 (0.9–1.6)	0.13
	Chronicity[b]		
	Recurrent LBP	0.9 (0.6–1.3)	0.35
	Chronic LBP	1.1 (0.7–1.6)	0.46
CT ($n = 188$)[a]	Specialist consultation	7.2 (4.5–12)	<0.0001
	Pain radiating in the foot	2.2 (1.5–3.1)	<0.0001
	Suspicion of red flags	1.9 (1.1–3.1)	0.01
	Being male	1.8 (1.3–2.6)	0.0004
	Functional capacity < 70	1.6 (1.2–2.3)	0.005
MRI ($n = 147$)[a]	Specialist consultation	15 (7.2–31)	<0.0001
	Pain radiating in the foot	1.6 (1.1–2.3)	0.003
	Functional capacity < 70	1.9 (1.3–2.8)	0.0007

Odds ratios derived from a logistic regression models.
CT: computer-tomography, MRI: magnetic resonance imaging.
[a] Number of patients who received this particular form of imaging.
[b] Compared to acute LBP.

lower functional capacity and used more healthcare services than those who were only seen by their GPs. Consulting a specialist remained the strongest predictor for imaging and further therapeutic procedures, whereas disease-related factors were less important for predicting the use of health care services.

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Table 5
Factors predicting the use of health care services ($n = 1342$)

Descriptor	Variable	Adjusted odds ratio (95% CI)	*P*-value
Physiotherapy ($n = 654$)[a]	Specialist consultation	4.4 (3.5–5.6)	<0.0001
	Chronicity[b]		
	Recurrent LBP	1.4 (0.9–1.9)	0.76
	Chronic LBP	1.8 (1.3–2.5)	0.001
	Functional capacity < 70	1.3 (1.1–1.7)	0.03
Massage ($n = 417$)[a]	Specialist consultation	2.8 (2.2–3.7)	<0.0001
	Chronicity[b]		
	Recurrent LBP	1.4 (0.9–2.0)	0.43
	Chronic LBP	1.6 (1.1–2.2)	0.02
	Functional capacity < 70	1.2 (0.9–1.6)	0.07
Manual therapy ($n = 352$)[a]	GP offering manual therapy	5.8 (3.1–10)	<0.0001
	Specialist consultation	5.8 (4.3–7.9)	<0.0001
	Age group[c]		
	Age 40–60	0.7 (0.5–1.1)	0.07
	Age > 60	0.3 (0.2–0.5)	0.0009
Acupuncture ($n = 178$)[a]	Specialist consultation	3.8 (1.6–5.8)	<0.0001
	GP offering acupuncture	3.0 (2.1–4.4)	<0.0001
	Chronicity[b]		
	Recurrent LBP	1.4 (0.8–2.5)	0.63
	Chronic LBP	2.5 (1.4–4.3)	<0.0001
Psychotherapy ($n = 95$)[a]	Specialist consultation	10 (4.4–23)	<0.0001
	Positive depression score	3.5 (2.2–5.6)	<0.0001
	Education[d]		
	10 years	2.3 (1.0–4.7)	0.034
	>10 years	1.7 (0.8–3.6)	0.57
Opiod prescription ($n = 125$)[a]	Functional capacity < 70	2.8 (1.8–4.7)	<0.0001
	Specialist consultation	2.6 (1.5–4.3)	<0.0003
	Pain radiating in the foot	2.0 (1.3–3.1)	<0.0033
	Positive depression score	1.7 (1.1–2.7)	<0.0320

Odds ratios derived from a logistic regression models.
[a] Number of patients who received this particular form of treatment.
[b] Compared to acute LBP.
[c] Compared to age below 40.
[d] Compared to less than 10 years education.

Comparing the proportion of patients who received specialist care for LBP with comparable studies in other countries we find substantial differences. In a Spanish study recruiting patients with LBP in primary care only 9.6% of the patients had a referral to a specialist within two months follow-up (Kovacs et al., 2006). Of those, most patients (55%) were seen by orthopedists. Although that sample included more patients with acute LBP this compares to 38% of our sample within one month. In a Canadian survey 37% of chronic LBP sufferers consulted a specialist within one year (Lim et al., 2006).

Only few of our patients consulted a neurologist mostly as an additional consultant. This confirms the conclusion of Benbadis et al., that neurologist's input does not significantly affect the diagnosis or the management of LBP. Chronic LBP and a positive depression score were associated with seeking specialist care which seems appropriate.

Although we found a significant difference in severity of pain on the visual analogue scale between those who consulted a specialist and those who did not, this does not seem to be meaningful. It is possible that we ignored important factors like comorbid conditions, previous health care experience, patient–physician relationship and training of the GPs (Little et al., 2004). However, the high utilization of specialist care we observed is highly suggestive of inappropriate referrals or inappropriate self-referrals in a health care system with unrestricted access to specialist care. On the other hand, the high use of specialty care is contrasted by a significant proportion of patients with suspicion of red flags (43/108) or low functional capacity (240/533) which did not seek specialty care. This indicates a potential underutilization of health services and a lack of sensitivity and specificity of red flags as for triage. The outcome with regard to serious underlying pathology of our patients was investigated in an other sub-analysis and only four patients were found to have such a condition (Donner Banzhoff et al., 2006). Some patients with chronic LBP or suspected red flags who did not receive

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specialist care or imaging might have had previously extensive evaluation and treatment. After 12 months follow-up 50% of patients who received specialist care had a low functional ability (<70) compared 27% those who did not. Since patients receiving specialist care in our study where significantly more affected by LBP and given that we are presenting a post hoc analysis we cannot only conclude very cautiously that the selection of patients for specialist care indicates over and underutilization.

There are several possible reasons for the comparatively high proportion of specialist care. The hypothetical naïve back pain patient assumed by guidelines presenting for the first time with LBP in general practice seems to be rather exceptional since most of our patients had recurrent or chronic LBP (Table 2). Another reason for the shift of care from primary care to specialist care may be the easy access and availability of ambulatory specialist care which has lowered patients' and GPs' threshold for seeking specialists' advice. In the absence of a list system there is no incentive and no instrument for GPs to work as ''gate keepers''.

Specialist care was the strongest predictor for receiving imaging, physiotherapy, massage or any other kind of health care services (Tables 4 and 5). Clinical data were comparatively weaker and socio-demographic characteristics virtually not at all associated with it. This was particularly pronounced for imaging studies, although we are slightly overestimating specialists' contribution to imaging studies, since few patients might have been referred for imaging by their GPs.

For adults younger than 50 years with no signs or symptoms of systemic disease, symptomatic therapy without imaging is considered appropriate (Jarvik and Deyo, 2002).

Although imaging was associated with reasonable clinical predictors, like low functional capacity or pain radiating to the foot suggesting possible nerve root irritation, the high proportion of patients receiving imaging and the high dependence on providers suggests inadequate use. Orthopedists in Germany own and draw profit from imaging facilities. The observed weak association with clinical factors might be due to economic incentives and perceived pressure to intensify diagnostics, since all patients in our study had consulted a GP for LBP before.

Since GPs have to manage a budget for physiotherapy, the purpose of a referral of patients in need of physiotherapy might be solely to avoid exceeding the own budget. The high proportion of physiotherapy (654; 49%) suggests some inadequate prescriptions since physiotherapy is considered an ineffective treatment for acute LBP (Hayden et al., 2005).

Offering acupuncture or manual therapy (chiropractics) requires special training. Unlike in other countries with non-medical chiropractors, practice of manual therapy including manipulation is restricted to physicians in Germany. Most ambulatory orthopedists have training in manual therapy and frequently also in acupuncture but only few GPs do. Receiving manual therapy and acupuncture depended mainly on specialist consultation or consulting a GP with special training. A more detailed report on the use of acupuncture in our sample has been published elsewhere (Chenot et al., 2006). Older individuals were significantly less likely to receive manual therapy which seems reasonable since they are more likely to have contraindications for manipulations, like osteoporosis.

Massage for LBP is popular among patients in Germany and more often applied than in other European countries (Breivk et al., 2006). However, massage is considered only effective for chronic LBP (van Tulder et al., 2005). Although chronic LBP was related to massage prescription, of those who received it within the first four weeks 13% had acute and 40% recurrent LBP.

Unlike in a recent cross-sectional survey, socio-economic status in our sample was not significantly associated with either higher consultation rates to specialist or higher use of health care services (Latza et al., 2004). This might be explained by the different methods of sampling, since this survey included patients who bypassed GPs.

To our knowledge this is the largest prospective cohort study on LBP in primary care in Germany collecting clinical and longitudinal data on health care service utilization. The sample size and the demographic baseline data of participating GPs and patients make us confident that the collected data are representative of current clinical practice in Germany. The higher proportion of female patients in our sample reflects the higher burden of LBP in women in Germany (Schneider et al., 2006).

Unfortunately, we do not know if specialist consultations were initiated by GPs or by patients since patients in the German health care system do not need a referral. It is possible that we are ignoring other important factors like, e.g., comorbidity that trigger specialist care (Ritzwoller et al., 2006).

Another limitations to the generalizability of our results might be the fact that less than half of the patients asked for participation agreed to participate and they might have been more impaired then those who did not. This might have led to an overestimate of the proportion of primary care patients seeking specialist care. Moreover, it is unclear how recall bias influenced the data provided by patients.

Our results suggest that the high use of specialist care in Germany is due to the absence of a functioning primary care gate keeping system for patient selection. This might reflect a low threshold for patients to seek specialist care or for GPs to refer patients. The strong dependence of health care service utilization on providers

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rather than clinical factors indicates an unsystematic and probably inadequate management of LBP which is not concordant with current guideline recommendations. This confirms the assumption that there is inadequate utilization of health care services for LBP in Germany (Advisory Council on the Assessment of Developments in the Health Care System, 2001). The role of primary care providers as gate keepers needs to be strengthened to promote rational allocation of healthcare resources in accordance with evidence based guidelines.

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