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ORIGINAL ARTICLE

General practitioners' and occupational health physicians' views on their cooperation: a cross-sectional postal survey

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Abstract
Purpose Prevention, rehabilitation and reintegration into the workplace are examples of overlapping work fields of general practitioners (GPs) and occupational health physicians (OPs). In Germany, however, cooperation between GPs and OPs is often lacking or suboptimal. In this article, we present GPs' and OPs' views on a variety of aspects of their cooperation and differences between them.
Methods Survey questionnaire was developed on the basis of literature research and results of focus group interviews. Cross-sectional postal survey among GPs ($n = 1000$) and OPs ($n = 383$) was performed in the federal state of Baden-Württemberg, Germany. Explorative descriptive and logistic regression analyses were carried out (controlling for potential confounders).
Results Response rates were 31 and 48 %, respectively. Mutual telephone calls were the most frequent contact medium (49 and 91 %, respectively). Both groups considered themselves to have clearly separate areas of responsibility (median = 4, rating scale from 1 "agree not at all" to 5 "agree definitely"). Necessity to cooperate and need to improve cooperation were both rated as 4 (by GPs) and 5 (by OPs), respectively ($p < 0.001$, Wilcoxon test). Several variables were found to be different by logistic regression analysis of answers from the two groups (e.g. in regard to importance of rehabilitation, primary prevention services, caring for chronically ill workers or changing of workplace conditions). Sensitive topics (e.g. concerning mutual rivalry, remuneration or adherence to medical confidentiality) were also found to be rated differently.
Conclusion The data show potential interest of both physicians groups to develop cooperation. As the ratings often differed significantly, particularly in regard to statements presented, answers influenced by social desirability are generally unlikely.

Keywords Cooperation · General practice · Occupational medicine · Cooperative behaviour

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Background

Preventive medicine, rehabilitation and reintegration of workers into the workplace are part of patient-centred care and are examples of overlapping work fields of general practitioners (GPs) and occupational health physicians (OPs) in Germany. Both groups of physicians are engaged in preservation of employability and in health promotion.

There are many differences compared to other countries in terms of organisational issues (e.g. of financing and remuneration of health services and of regulations by law) and physicians' qualification in occupational medicine (e.g. in terms of the length and course contents of occupational medicine education). In particular, the working areas

of OPs may vary from country to country. For instance, in Finland there is a tight junction of diagnostic and therapeutic working areas and employees often choose their OP as their GP. OPs in the Netherlands sometimes refer employees to specialists (e.g. to cardiologists) for diagnostic procedures (e.g. cycle ergometry) if this is strictly necessary to promote work reintegration of the sick listed employee. They also expend an essential part of their work time for counselling in terms of sick leave or judging sick-leave certificates (Albrecht 2011; Berger et al. 2005).

In Germany, the majority of GPs have their own private practices. They treat patients for general illnesses and function as gatekeepers for specialists and other medical disciplines in the primary and secondary healthcare system. GPs are reimbursed for their work mainly through statuary health insurance with fixed specific amounts of allocation. But they are remunerated separately for vaccinations, certain screening analyses and certain other procedures. GPs can work in the fields of both general practice and occupational medicine if they are qualified through a so-called additional training in occupational medicine (duration 12 months) leading to the additional title "industrial medicine" or through a 3-year specialist training in occupational medicine in addition to the specialist training in general medicine (Bundesärztekammer 2013). The contents of these trainings are supervised by the German physicians' chamber. The specialist training is more detailed and does involve more expert witness tasks than the additional training. The specialist training in general practice lasts 5 years and is also supervised by the physicians' chamber.

German OPs are paid by employers, and normally they are not primarily involved in medical treatment of patients. They deal with work-related and general health problems of the employees with a focus on prevention (e.g. vaccinations, screening analyses) and medical counselling. They interact with both employers and employees (e.g. in terms of improvement in working conditions or reintegration after a longer period of sick leave). German individual OPs are employed either by single companies or by occupational medicine service companies. Alternatively, they may be self-employed having their own private practices, but sometimes also working in rooms provided by employer companies.

It is forecast that numbers of elderly workers and of work incapacity cases will increase in Germany (Techniker-Krankenkasse 2013). Against this background, the cooperation of occupational health physicians (OPs) and general practitioners (GPs) becomes more important.

For years the need for better cooperation between GPs and OPs has been addressed internationally (Moßhammer et al. 2011) and has been the reason for first pilot projects addressing the interface between OPs and GPs (Bertelsmann-Stiftung 2009; van Amstel et al. 2005). Reasons for the necessity for cooperation were the workaday presence in GPs' offices of work-related disorders and the impact of social and psychogenic aspects of those. Changing working conditions, i.e. computer workplaces, increasing workloads and increasing working lifetime, were also mentioned. Further, continuing medical education, quality standards, guidelines and research on this field were also suggested to be important for improvement in cooperation (Buijs et al. 1999; Chamberlain 2007; Knepper 2005; Rijkenberg 2013; Smith 2005; Sng et al. 2008). In focus groups interviews, several cooperation deficiencies (e.g. lack of communication by telephone contacts, insufficient cooperation in regard to sick leave and professional reintegration and lack of knowledge about the specialty) and cooperation barriers (prejudices, competition, mistrust, fear of negative consequences for the patients, lack of legal regulations or limited mutual accessibility) have been identified (Mosshammer et al. 2012) and should be addressed with regard to improvement in cooperation (Mosshammer et al. 2014). The results of the recently published cross-sectional survey among GPs and OPs in France imply potential interests of these groups of physicians in better cooperation (e.g. in terms of preventing exclusion from workplace) (Verger et al. 2014).

Our research team performed the above-mentioned review of the literature and focus groups interviews (Moßhammer et al. 2011; Mosshammer et al. 2012, 2014) as for Germany no data on this topic had been available before. In a next step, we considered our results and insights to perform the present cross-sectional survey among GPs and OPs.

In this paper, we present the quantification of our precedent research results. The aim of this study was to explore quantitatively the differences of GPs' and OPs' views on a variety of aspects of their cooperation.

Methods

Study design and recruitment

Between February and March 2014, we performed a cross-sectional postal survey among GPs ($n = 1000$) and OPs ($n = 383$) in the federal state Baden-Württemberg (BW) of Germany. BW lies in the south-west of Germany and has about 6000 GPs and 400 occupational health physicians.

GPs were selected from the GPs' list ($n = 5430$) of the KVBW (www.kvbawue.de) by choosing every fifth GP from this list. The KVBW is the association of the statutory health insurance practitioners and responsible

for ensuring the primary health care supply (e.g. by regulating the number of physicians per region) and for payout of the GPs' remunerations. Each of the selected GPs was sent a letter with information about the study and was asked to complete the questionnaire enclosed. We considered factors known to increase response rates when surveying physicians. These include, besides others, stamped return envelopes, coloured ink and first-class mailing (Thorpe et al. 2009). We chose the sending of the letters by post because we thought that this method is more personally. We also thought that deleting an invitation email for an online survey is much easier done by the physicians than throwing away a stamped return envelope. Further we have made good experiences with postal surveys among both GPs and OPs showing response rates of about 30–60 % (Moßhammer and Lorenz 2010; Völter-Mahlknecht et al. 2015). In contrast, a recent online-based survey among OPs in Germany resulted in only 22 % response rate (Bitzer et al. 2014).

All OPs aged under 66 years from the register of the VDBW e. V. (German Organisation of Company Physicians, www.vdbw.de) in Baden-Wuerttemberg were asked to participate. The organisation supported us, in contrast to the GPs' organisation, by sending the letters (same as above) to all selected OPs and enclosing a recommendatory letter encouraging the OPs to participate in the study. Information about the study and the questionnaire were the same as for the GPs. A reminder was sent after 4 weeks to both the GPs and the OPs.

Development of the questionnaire

On the basis of reviewing the literature (Moßhammer et al. 2011) and recent results of focus group interviews on GPs' and OPs' cooperation (Mosshammer et al. 2012, 2014), we developed a questionnaire. By means of a pre-test of this questionnaire, 6 teaching GPs of the Institute of General Practice with own practices and 11 teaching OPs of the Institute of Occupational and Social Medicine and Health Services Research, employed and self-employed, were asked to complete the questionnaire in the pre-test. The cognitive probes included response, comprehension and think-aloud/general (Collins 2003). According to the participants, the questions posed and the sense of the questions were generally clear and only minor revisions needed to be done (e.g. posing of a question in a more clear way or correcting grammatical errors). The feedback from the GPs and OPs was considered for the development of the final revised version of the questionnaire sent to both the GPs and the OPs.

Table 1 Characteristics of the participating physicians [occupational health physicians ($n = 184$) and general practitioners ($n = 313$)]

Variable (*missing values OPs/GPs*)	OPs	GPs
Female gender (*0/3*)	81 (44 %)	123 (40 %)
Years of age [±SD] (*4/14*)	53 ± 8.5	54 ± 7.2
Years on the job as physician [±SD] (*5/11*)	26 ± 9.7	26 ± 8.5
Medical speciality		
Occupational medicine	127 (69 %)	7 (2 %)
Internal medicine	39 (21 %)	66 (21 %)
General Practice	71 (37 %)	228 (73 %)
Additional medical qualifications[a]		
Occupational medicine [12 months training][b]	69 (35 %)	17 (5 %)
Acupuncture	6 (3 %)	24 (8 %)
Complementary and alternative medicine	12 (7 %/)	38 (12 %)
Sports medicine	20 (11 %)	16 (5 %)
Emergency medicine	34 (19 %)	36 (12 %)
Environmental medicine	30 (16 %)	8 (3 %)
Social medicine	13 (7 %)	3 (1 %)

GPs general practitioners, *OPs* occupational health physicians, *SD* standard deviation

[a] Listed are rates >5 %

[b] In contrast to 5-year occupational medicine specialist training

The questionnaire composed of 45 single-item questions addressing the different aspects of the interface/cooperation of GPs and OPs by Likert scale (see Tables 2, 3, 4, 5, 6) and socio-demographic variables (see Table 1). Space was left for comments after each aspect. These aspects are:

- General statements concerning their cooperation
- Importance of common working areas
- Importance of organisational areas involving their cooperation
- Importance of framework conditions of their cooperation
- Statements concerning their working fields.

Ethical approval

The ethics committee of the Faculty of Medicine at the University of Tübingen approved the study protocol.

Data analysis

All analyses were done in an exploratory fashion. In a first step, we calculated absolute and relative numbers of categorical variables, and means and standard deviation as well as medians and interquartile range for the metric data (as there may be expected both normally and not

Table 2 Ratings by OPs ($n = 184$) and GPs ($n = 313$) of general statements concerning their cooperation (OPs/GPs)

Statement (*missing values OPs/GPs*)	OPs Med [IQR] *M* [SD]	GPs Med [IQR] *M* [SD]	*p***
OPs and GPs have clearly separate areas of responsibility (*0/8*)	4 [3–4] 3.5 ± 1.2	4 [3–5] 3.6 ± 1.1	0.362
Cooperation between OPs and GPs is necessary (*0/7*)	5 [5–5] 4.9 ± 0.4	4 [4–5] 4.2 ± 0.9	<0.001
Cooperation between OPs and GPs needs to be improved (*0/9*)	5 [4–5] 4.6 ± 0.7	4 [4–5] 4.2 ± 0.9	<0.001

Likert scale from 1 "agree not at all" to 5 "agree definitely"

GPs general practitioners, *IQR* interquartile range, *Med* median, *M* mean, *SD* standard deviation, *OPs* occupational health physicians

** Wilcoxon Mann–Whitney test

Table 3 Ratings by OPs ($n = 184$) and GPs ($n = 313$) on importance of potential common working areas (OPs/GPs)

Working areas (*missing values OPs/GPs*)	Ops Med [IQR] *M* ± SD	GPs Med [IQR] *M* ± SD	*p***
1. Inability to work (*4/14*)	3 [2–4] 2.8 ± 1.0	3 [2–4] 2.8 ± 1.0	0.501
2. Stepwise reintegration into work (*0/10*)	4 [4–4] 3.8 ± 0.5	3 [3–4] 3.3 ± 0.8	<0.001
3. Rehabilitation (*0/14*)	4 [3–4] 3.5 ± 0.7	3 [2–4] 2.9 ± 0.8	<0.001
4. Primary prevention topics (e.g. vaccinations) (*1/11*)	2 [2–3] 2.2 ± 0.9	2 [1–3] 2.4 ± 1.0	0.003
5. Dealing with remarkable medical findings (*0/12*)	3 [3–4] 3.3 ± 0.8	3 [2–4] 2.9 ± 0.9	<0.001
6. Addictive disorders in employees (*0/12*)	4 [3–4] 3.6 ± 0.7	4 [3–4] 3.4 ± 0.7	0.001
7. Caring for chronically ill employees (*1/10*)	3 [3–4] 3.3 ± 0.7	3 [2–4] 2.9 ± 0.9	<0.001
8. Absenteeism from work (*2/13*)	3 [2–3] 2.7 ± 0.9	3 [2–3] 2.6 ± 0.9	0.14 7
9. Dealing with conspicuous workers (*1/12*)	3 [3–4] 3.0 ± 0.8	3 [2–3] 2.8 ± 0.9	0.003
10. Planning of changes of working conditions (*2/14*)	2 [2–3] 2.3 ± 0.9	3 [2–4] 3.0 ± 0.9	<0.001

Likert scale from 1 "very unimportant" to 4 "very important"

GPs general practitioners, *IQR* interquartile range, *Med* median, *M* mean, *SD* standard deviation, *OPs* occupational health physicians

** Wilcoxon Mann–Whitney test

normally distributed data among the variables with Likert scales). The associations between the target variable (GPs/OPs) and categorical or metric variables were analysed by Chi-square and Wilcoxon Mann–Whitney tests, respectively.

Then, variables found to be significant ($p < 0.1$) were analysed by the following steps.

1. Controlling for multicollinearity (assuming Spearman rank correlation coefficient $r > 0.6$, condition index >30

Table 4 Ratings by OPs ($n = 184$) and GPs ($n = 313$) on importance of specific organisational areas involving their cooperation (OPs/GPs)

Organisational areas (*missing values OPs/GPs*)	OPs Med [IQR] $M \pm SD$	GPs Med [IQR] $M \pm SD$	p**
1. GPs know patients' OPs (*5/16*)	3 [3–4] 3.1 ± 0.8	3 [2–3] 2.7 ± 0.9	<0.001
2. Good accessibility of GPs (e.g. by telephone) (*0/18*)	3 [3–4] 3.2 ± 0.7	3 [3–4] 3.2 ± 0.8	0.131
3. Good accessibility of OPs (e.g. by telephone) (*1/10*)	3 [3–4] 3.2 ± 0.7	3 [3–4] 3.1 ± 0.8	0.012
4. Communication regarding medical findings (e.g. laboratory results) (*0/13*)	3 [3–4] 3.2 ± 0.7	3 [3–4] 3.2 ± 0.8	0.855
5. Short medical reports (*1/12*)	3 [3–4] 3.0 ± 0.7	3 [2–3] 2.8 ± 0.9	0.009
6. Oral communication regarding medical findings (*1/11*)	3 [3–4] 3.0 ± 0.8	3 [2–3] 2.7 ± 0.8	<0.001
7. Coordination concerning further procedure of employee care (*1/11*)	4 [3–4] 3.4 ± 0.7	3 [3–4] 3.1 ± 0.8	<0.001
8. Clear definitions of areas of responsibility (*1/13*)	2.7 ± 1.0 3 [2–4]	3 [2–4] 2.9 ± 1.0	0.116

Likert scale from 1 "very unimportant" to 4 "very important"

GPs general practitioners, *IQR* interquartile range, *Med* median, *M* mean, *SD* standard deviation, *OPs* occupational health physicians

** Wilcoxon Mann–Whitney test

Table 5 Ratings of OPs ($n = 184$) and GPs ($n = 313$) on the importance of variables concerning framework conditions of their cooperation (OPs/GPs)

Variable (*missing values OPs/GPs*)	OPs Med [IQR] $M \pm SD$	GPs Med [IQR] $M \pm SD$	p**
1. Remuneration of GPs for communication with OPs (*0/12*)	3 [2–3] 2.6 ± 1.0	3 [2–3] 2.8 ± 1.0	0.591
2. Statutory regulation of participation of OPs in stepwise reintegration process into work (*0/11*)	4 [3–4] 3.4 ± 0.8	3 [2–3] 2.7 ± 0.9	<0.001
3. Structured care pathways (*0/9*)	3 [2–4] 3.0 ± 0.8	3 [2–3] 2.8 ± 0.9	0.008
4. Remuneration of OPs for communication with GPs(*2/17*)	2 [2–3] 2.4 ± 1.0	3 [2–3] 2.5 ± 1.0	0.994
5. Adherence to medical confidentiality (*0/12*)	4 [4–4] 3.8 ± 0.6	4 [4–4] 3.7 ± 0.7	0.013

Likert scale from 1 "very unimportant" to 4 "very important"

GPs general practitioners, *IQR* interquartile range, *Med* median, *M* mean, *SD* standard deviation, *OPs* occupational health physicians

** Wilcoxon Mann–Whitney test

and proportion of variance >0.5 as relevant) and controlling for influential observations (assuming Pearson-statistic difchisq >100 as relevant) were performed.

2. Prior to including variables with p values <0.1 into multivariate logistic regression analysis with stepwise backward selection (significance level 0.05) (Hosmer and Lemeshow 2000), missing values were replaced by a single imputa-

Table 6 Agreement of OPs ($n = 184$) and GPs ($n = 313$) on statements concerning their working fields (OPs/GPs)

Statement (*missing values OPs/GPs*)	OPs Med [IQR] $M \pm SD$	GPs Med [IQR] $M \pm SD$	p**
1. OPs' care focuses more likely on employer's well-being than on worker's well-being (*2/11*)	1 [1–2] 1.6 ± 0.9	3 [2–4] 2.7 ± 1.2	<0.001
2. GPs tend to protect their patients from work (*2/12*)	3 [2–4] 2.9 ± 1.2	2 [1–3] 2.4 ± 1.1	<0.001
3. GPs interfere in OPs' area of responsibility (*3/10*)	2 [1–2] 1.9 ± 1.0	1 [1–2] 1.5 ± 0.8	<0.001
4. GPs see OPs as competition (*3/11*)	2 [2–3] 2.5 ± 1.2	1 [1–2] 1.5 ± 0.9	<0.001
5. There is high risk that OPs do not adhere to medical confidentiality towards employers (*2/19*)	1 [1–2] 1.6 ± 1.3	3 [2–4] 2.8 ± 1.2	<0.001
6. GPs find OPs' work helpful (*5/11*)	3 [2–4] 3.0 ± 1.0	4 [3–4] 3.6 ± 1.0	<0.001
7. GPs feel criticised by OPs when OPs communicate remarkable medical findings to GPs (*4/10*)	2 [1–3] 2.3 ± 1.1	1 [1–2] 1.5 ± 0.8	<0.001
8. OPs find GPs' work helpful (*2/43*)	4 [4–5] 4.2 ± 0.9	3 [3–4] 3.6 ± 1.0	<0.001
9. OPs perform too many services that belong to the area of responsibility of GPs (*3/17*)	1 [1–2] 1.8 ± 1.0	2 [1–3] 2.3 ± 1.2	<0.001
10. GPs often lack knowledge of employee's work necessary for certifying sick-leave (*2/10*)	4 [3–5] 3.8 ± 1.0	2 [1–4] 2.5 ± 1.2	<0.001
11. GPs often do not consider employers' needs when certifying extension of sick leaves (*4/16*)	4 [3–4] 3.6 ± 1.1	3 [2–4] 2.8 ± 1.3	<0.001
12. Workplace-related medical certificates often do more harm than benefit (*3/23*)	4 [3–4] 3.7 ± 1.0	2 [1–3] 2.1 ± 1.0	<0.001
13. In regard to addictive disorders, there is high risk that OPs inform employers without employees' permission (*2/31*)	1 [1–2] 1.4 ± 0.8	3 [2–3] 2.8 ± 1.1	<0.001
14. OPs should be involved in stepwise reintegration into work (*2/14*)	5 [5–5] 4.7 ± 0.7	4 [3–5] 3.8 ± 1.0	<0.001
15. OPs interfere in GPs' area of responsibility	2 [1–2] 1.8 ± 1.0	2 [1–3] 2.1 ± 1.1	0.038
16. Close cooperation between GPs and OPs can shorten times of work disability (*2/12*)	5 [4–5] 4.5 ± 0.8	4 [3–5] 3.7 ± 1.1	<0.001
17. OPs should get remuneration for preventive services from the statutory health insurance (*4/19*)	4 [3–5] 3.7 ± 1.3	1 [1–3] 2.0 ± 1.3	<0.001

Likert scale RS 1 to 5 from 1 "agree not at all" to 5 "agree definitely"

GPs general practitioners, *IQR* interquartile range, *Med* median, *M* mean, *SD* standard deviation, *OPs* occupational health physicians

** Wilcoxon Mann–Whitney test

tion method (MCMC method) using pre-existing SAS macros (Little and Rubin 2002; Muche and Ring 2005).

Odds ratios with Wald 95 % confidence intervals were calculated for the final model. For better readings, positive associations (OR > 1) of the target variable (i.e. OPs/GPs) with the variables are presented. With regard to rating scales (RS), an OR of 2 signifies that one group of physicians rated one scale unit higher two times more often than the other (Muche and Ring 2005).

The null hypothesis (i.e. "no variable associates with target variable") was tested by the likelihood ratio test (significance level was set at 0.05).

Sample size estimation

A certain number of variables that are not significant in the bivariate analysis were anticipated not to be included in the logistic regression analysis (LRA). So, we roughly assumed 20–40 variables left to be included in the LRA (the questionnaire contained 50 variables including socio-demographic variables).

We considered the usual ratio of cases and variables to be included for the performance of LRA that may be in the range of 10:1 and 5:1 (Hosmer and Lemeshow 2000; Muche and Ring 2005). According to these numbers, about 350–400 participants were roughly assumed to be needed for LRA. Expecting a response rate between 20 and 30 %, we chose 1000 GPs and all of 400 OPs to send the questionnaire to.

Logistic regression analysis was performed by controlling for age, gender and for potential confounding by the variable "qualification in occupational medicine" (see Table 1), as about 5 % of GPs were qualified additionally in occupational medicine and were working in both fields (see under "Background" section). By doing so, we kept these three variables constant in the model. Data analyses were performed with SAS software version 9.1 and pre-existing SAS macros (Muche and Ring 2005).

Results

The response rate was 48 % in the OPs group and 31 % in the GPs group. All questionnaires returned had only few missing values (not exceeding 5 missing values per questionnaire) and were included for analysis. The gender distribution of the non-responder and responder groups was comparable. The information from the few commentaries given in the questionnaires is not relevant to be reported here.

Characteristics of the two groups are listed in Table 1.

Bivariate analysis

Mutual telephone calls were the most often contact medium (91 % of OPs and 49 % of GPs, respectively), followed by medical short letters (45 and 18 %, respectively) and postings of clinical findings (58 and 30 %, respectively).

Table 2 presents the results of the ratings by the physicians of the three general statements concerning their cooperation. Both GPs and OPs agreed on these statements, with slightly higher ratings among OPs. All in all, according to their ratings, OPs and GPs had separate areas of responsibility; cooperation of OPs and GPs was necessary and would need to be improved.

The results of the ratings on the importance of several potential common working areas (see Table 3) were similar, and eight of the ten working areas were significantly different. In general, both groups agreed on the importance of almost all listed potential common working areas with exception of the topics "primary prevention (e.g. vaccinations)" and "planning of changes of working conditions".

The specific organisational areas involving their cooperation (see Table 4) were also rated as important. Also, these ratings were very similar to a trend to be slightly higher among OPs.

Both groups agreed with the importance of variables concerning framework conditions of their cooperation except for the topic "remuneration of OPs for communication with GPs" (higher importance in GPs) (Table 5).

In contrast, statements concerning the working fields of both groups resulted more often in differing and controversial ratings (Table 6).

Testing for multicollinearity and influential observations

The variables "age" and "professional years" correlated highly ($r = 0.9$). Therefore, we removed the variable "professional years" from further analysis. No influential observations were identified.

Multivariate logistic regression modelling

According to above predefinitions and test results, logistic regression modelling entering 41 variables was performed in order to detect possible differences between OPs and GPs. Convergence criterion for the model was met. Overall test (likelihood ratio) showed $p < 0.001$, indicating that at least one variable in the model has statistically significant association with the target variable (i.e. being GP or OP). Table 7 lists the variables remaining in the final model. For instance, OPs rated the necessity of their cooperation 12 times more often one scale unit higher than GPs did. Or, OPs rated the need for improvement in their cooperation about three times more often one scale unit higher than GPs did.

Discussion

According to the GPs and OPs participating in this study, cooperation between them is necessary and needs to be improved. These findings confirm the internationally mentioned broad agreement with this topic by both GPs and OPs and relativise the findings of the qualitative data analysis (Mosshammer et al. 2012, 2014). The quantitative data presented here focused on the exploration of their differing

Table 7 Variables in the logistic regression model associated with general practitioners and occupational health physicians (GPs as reference) with adjusted[a] odds ratios

Variable	*p* value	OR (95 % CI)
A. Potential confounding variables[a] (fix in the model)		
Age in years	0.08	0.9 (0.9–1.1)
Gender ("male" as reference)	0.37	0.5 (0.1–2)
Occupational medicine ("no" as reference)	<0.01	7.1 (1.7–29)
B. Had mutual telephone contact ("no" as reference)	<0.01	17 (2.7–101)
C. (Variables from Table 2)		
1. Overall statement on the necessity of cooperation between both groups of physicians[b]	<0.01	12 (2–73)
2. Overall statement on need for improvement in cooperation between both groups of physicians	0.05	3.3 (1–11)
D. (Variables from Tables 3, 4, 5)		
1. Importance of rehabilitation	0.03	2.6 (1.1–6.2)
2. Importance of primary prevention topics	0.01	0.4 (0.2–0.8)
3. Importance of caring for chronically ill employees	0.02	3.5 (1.3–9.5)
4. Importance of planning of changes of working condition(s)	<0.01	0.1 (0.03–0.25)
5. Importance of communication by means of medical short letters	0.03	0.4 (0.15–0.9)
6. Importance of oral communication about clinical findings	<0.01	2.7 (1.3–5.8)
E. (Variables from Table 6)		
1. Agreement that OPs are seen by GPs as competition	0.02	2.6 (1.2–5.9)
2. Agreement that there is high risk that OPs do not adhere to medical confidentiality towards employers	0.01	0.4 (0.2–0.8)
3. Agreement that GPs feel criticised by OPs when OPs reveal remarkable medical findings	<0.01	3.3 (1.4–7.6)
4. Agreement that OPs find that the GPs' work is helpful	0.02	3.1 (1.2–8)
5. Agreement that in terms of sick-leave certificates. GPs often lack knowledge about the employees' work	<0.01	3.1 (1.6–6.0)
6. Agreement that medical certificates from GPs often do more harm than benefit	<0.01	3.4 (1.8–6.6)
7. Agreement that there is high risk that OPs inform the employers without permission of the employee in the case of addictive disorders	<0.01	0.2 (0.06–0.4)
8. Agreement that OP should be remunerated by statutory health insurance for medical preventive services	<0.01	2.0 (1.2–3.2)

GPs general practitioners, *OR* odds ratio with 95 % confidence interval, *OPs* occupational health physicians

[a] Adjusted for age, gender and 12-month qualification in occupational medicine

[b] Example OR = 12 indicates that OPs rated necessity of cooperation between OPs and GPs about 12 times more often one scale unit higher than GPs

answers to a variety of aspects of their cooperation. These data add further insights into the cooperation between GPs and OPs, in particular for Germany.

In the following, we set the focus of discussion on the variables left in the final multivariate analysis (controlled for confounders, see Table 7). We consider also the raw data in Tables 3, 4, 5 and 6 (not controlled for confounders).

Table 3 lists the variables with regard to the importance of potential common working areas. Almost all of these variables were rated to be at least "important". Exceptions are "primary prevention topics" and "planning of changes of working conditions". The multivariate analysis revealed a slight tendency among GPs to rate "primary prevention topics" as more important (OR 0.4) (see Table 7, D2). In contrast to OPs, GPs rated "planning of changes of working conditions" as an important topic for their cooperation (see Table 7, D4). Similarly, in a recent telephone cross-sectional survey in France, a vast majority of several hundreds of OPs and GPs agreed that discussing working conditions with patients also belongs to the GPs' area of responsibility. Yet, in the same study about 50 % of GPs declared that they had never requested information from OPs on patients' working conditions (Verger et al. 2014). Perhaps this might be the reason for the low ratings of this topic by the OPs in our survey.

In our previous qualitative study (Mosshammer et al. 2012, 2014), GPs raised doubts about adherence to medical confidentiality among OPs towards employers in general and especially in terms of addictive disorders. In the present study, both OPs and GPs rated addictive disorders in employees to be very important for their cooperation (see Table 3, 4, 5, 6). Also, both groups rated adherence to medical confidentiality as very important (see Table 5). However, similar to the results in the study cited above, GPs seem to mistrust OPs: they assumed a high risk of lack of medical confidentiality in OPs in general and especially

in regard to addictive disorders in employees (see Table 7, E2 and E7). For OPs, adherence to medical confidentiality seems not to be a problem, rather to be normal. These results are in concordance with the results of the above-mentioned telephone survey: almost 60 % of GPs indicated that GPs had some misgivings about OPs (Verger et al. 2014).

Rehabilitation as a potential common working area was rated to be important with a tendency to be rated more important among OPs (OR = 2.6, see Table 7, D1). In the above study (Verger et al. 2014), 59 per cent of OPs and 56 per cent of GPs perceived that helping with return to work is also a GPs' role in occupational health. Also, OPs and primary health care physicians (including specialists other than GPs) that participated in a recent online survey in Austria mentioned mutual contact in the field of rehabilitation as meaningful, but they also indicated that there is seldom cooperation between them in this area (Rijkenberg 2013). According to a recent review on rehabilitation and reintegration into work, suboptimal patient care is probably being caused by an inefficient cooperation between players involved in the reintegration process (Volter-Mahlknecht and Rieger 2014). Rehabilitation process and reintegration concern mainly chronically ill patients/employees. Accordingly, both OPs and GPs rated caring for chronically ill employees as important with a tendency among OPs to rate this variable more often as important (OR = 3.5, see Table 7, D3).

Variables concerning professional rivalry were considered in our questionnaire because it was mentioned by physicians working in both fields in our previous qualitative study. According to the results of the present study, it seems not to be a problem—both OPs and GPs did not consider themselves to be competitors. A slight difference of rating of the respective statement "GPs see OPs as competition" (see Table 6, statement 4, median 2 in OPs and 1 in GPs) was significant in the final regression model (OR 2.6, see Table 7, E1). The rivalry with regard to vaccinations in primary prevention services described in our previous study may also be reflected in the present study by the ratings in regard to remuneration (see Table 7, E8): OPs agreed with the statement that they should be remunerated for primary prevention services from the statutory health insurance, whereas GPs did not agree with remuneration of OPs in this situation. On one hand, this could be seen monetarily, namely that GPs might not feel any problems with OPs being active in the field of primary prevention as long as OPs will not be paid for this by statutory insurances. On the other hand, GPs might think primary prevention is chiefly their area of responsibility, resulting in a feeling of rivalry.

OPs and GPs mutually rated each other's work as helpful and both did not think that GPs felt criticised by OPs in terms of communicating remarkable medical findings of employees (see Table 6). Differences in these variables may reflect slightly differing perceptions between the two groups (Table 7, E3 and E4).

In addition to remuneration, the ratings of the following two variables were diametrical: firstly, OPs agreed to the statement that in terms of sick leaves GPs often lacked knowledge about patients' work (see Table 7, E5). Secondly, OPs thought that work-related medical certificates issued by GPs more often cause harm than benefit for the employees (see Table 7, E6). GPs did not agree. GPs function as gatekeepers in the German healthcare system. Issuing sick-leave certificates belongs to their everyday tasks. International data reveal that GPs usually do look carefully into their patients' situations in this area (Letrilliart and Barrau 2012; Wynne-Jones et al. 2010). But it needs to be considered that handing out a certificate to the employer, which includes statements of restriction in terms of specific working tasks, might be problematic for the employee. In such a case, the employer may argue that alternative tasks may not exist, meaning that the employee is in danger of losing his or her job. Indeed, GPs may sometimes not be aware of this problem.

Strengths and limitations

We obtained quite good response rates. The clearly higher response rate among OPs than GPs may be due to the commendatory letter from their professional organisation VDBW. Another reason may be that OPs are more sensitive to the importance of the interaction with GPs: OPs agreed more with the necessity to cooperate and the need to improve the cooperation between OPs and GPs than GPs did (OR 12 and 3, respectively, see Table 7, C1 and C2). Moreover, OPs reported more often to have had telephone contacts with GPs (OR 17, see Table 7, B) than vice versa. Indeed, it remains uncertain who took initiative for the telephone calls because we did regrettably not ask who took initiative for the calls; 91 % of OPs and 49 % of GPs reported mutual telephone contacts. Empirically, many employees do not know their OP, but many people have a GP. Therefore, we suppose that mainly OPs took initiative.

These data may indicate a higher interest in the survey's topics among OPs which has been described as factor increasing response rates to questionnaires (Edwards et al. 2002, 2007). The lower participation rate among GPs may rise the possibility of selection bias. Published data on the proportion of GPs having additional qualification in occupational medicine (OM) and more detailed information about the proportion of GPs working in both fields are not available for Germany. So, it remains unclear whether the proportion of 5 % in this study is representative for BW. However, from surveys among the

teaching physicians of our Institute of General Practice and according to our register data of them, we know that about 5 % have additional qualification or specialist training in OM.

Since the ratings often differed significantly, particularly in regard to statements presented in Table 6, answers influenced by social desirability are generally unlikely.

As mentioned in the background section, OPs and GPs working areas vary from country to country, e.g. due to differing health systems, remunerations and regulations by law. So, the results of this study are not generalisable because differing working areas may result in differing interfaces of the two groups of physicians.

Conclusion

Response rates in the study were high. Overall, OPs and GPs see their respective working field responsibilities as clearly separated from each other, but are interested in intensifying their cooperation. Both physicians' groups rated many variables of potential interfaces to be important. Overall, no competition or even rivalry seems to exist between OPs and GPs in Germany according to the present results. But in terms of remuneration in the field of primary prevention services there may be a competition: GPs do not want to share certain resources with OPs. Some diametrical attitudes between the two physicians groups may exist: OPs accused GPs of lacking knowledge of employees' working conditions when issuing sick-leave certificates. According to OPs, work-related medical certificates issued by GPs often cause more harm than benefit. In addition, GPs seem to have misgivings about OPs, especially in terms of non-adherence to medical confidentiality towards employers in general, especially in cases of addictive disorders of employees. In contrast, OPs think themselves that they adhere to medical confidentiality.

Thus, a mutual better understanding between the both groups of physicians seems crucial for a better cooperation. According to our data, the following actions/interventions are prior ranking for the German situation:

- To create transparency, the both groups consider the employees'/patients' working condition, workability and employability (e.g. by (common) further education in the field of work-related disorders, by strengthening the aspects of workability and employability in the training of general practitioners, or by implementing pathways of care designed to support cooperation of OPs, GPs and physicians with other specialities).
- To reduce or even clear mistrust, transparency is necessary in terms of issuing sick-leave certificates and dealing with work inability (e.g. by interdisciplinary quality circles to discuss concepts for reintegration of employees with reduced workability, by information on tools and services offered by the social security system to support the return to work process within (common) presentations or courses as, e.g. practiced in the Netherlands, or by remuneration GPs for the interaction with OPs).
- To reduce or even clear mistrust, communication is necessary that the both groups adhere of course to medical confidentiality, for instance in terms of employees with addictive disorders (e.g. by concise information about the work of OPs already during medical studies).
- For the development of these interventions, above-mentioned projects already performed in Germany or neighbouring countries should also be considered (Bertelsmann-Stiftung 2009; van Amstel et al. 2005).

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Compliance with ethical standards

Conflict of interest No conflicts of interest exist.

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