

## Influence of patient multimorbidity on GP burnout: a survey and register-based study in Danish general practice

### Abstract

#### Background

Patient multimorbidity and GP burnout are increasing problems in primary care and are potentially related.

#### Aim

To examine whether patient multimorbidity was associated with GP burnout in a Danish primary care setting.

#### Design and setting

Questionnaire data from 1676 Danish GPs and register data on their patients.

#### Method

GPs completed the Maslach Burnout Inventory. Patients listed in a national registry with  $\geq 2$  chronic physical diseases from a list of 10 were classified with multimorbidity. For each practice, crude and sex- and age-standardised rates of multimorbidity were calculated, the latter computed as a weighted average with the weights taken from a reference population (5 646 976 Danish citizens). Data were analysed with logistic regression and adjusted analyses included GPs' age and sex, number of GPs in practice, and socioeconomic deprivation among patients as covariates.

#### Results

A high crude rate of patient multimorbidity increased GPs' likelihood of burnout (odds ratio [OR] 1.79, 95% confidence interval [CI] = 1.13 to 2.82), and when adjusting for covariates the association remained significant when comparing GPs in the third highest quartile of the multimorbidity rate against GPs in the lowest quartile (OR 1.64, 95% CI = 1.02 to 2.64). The sex- and age-standardised patient multimorbidity rate was not associated with GPs' likelihood of burnout.

#### Conclusion

A high crude rate of patient physical multimorbidity increased the likelihood of burnout among GPs. The sex- and age-standardised rate of multimorbidity was not related to GPs' likelihood of burnout. Thus, the absolute amount of multimorbidity, and not the relative, affects the GP's burnout risk. GPs with high numbers of patients with complex needs should be supported to prevent suboptimal care and GP burnout.

#### Keywords

burnout, psychological; multimorbidity; primary health care; questionnaire design; reference standards; registries.

### INTRODUCTION

Burnout is a psychological syndrome acquired by prolonged exposure to stressors on the job.<sup>1</sup> The burnout construct has three key dimensions: overwhelming emotional exhaustion (EE), depersonalisation (DP) — also known as 'cynicism', and lack of personal accomplishment (PA).<sup>1</sup> The prevalence of burnout is rising among Danish GPs: in 2004, 3% of Danish GPs reached the criteria for the full burnout syndrome,<sup>2</sup> and this proportion had increased to 11% in 2016.<sup>3</sup> The increase in burnout among GPs has also been observed in other European countries<sup>4</sup> and coincides with a substantial increase in primary care workload.<sup>5</sup>

Multimorbidity, the coexistence of  $\geq 2$  permanent conditions in one patient, is an increasing challenge for primary care.<sup>6</sup> A prevalence of multimorbidity exceeding 20% has been replicated in single studies,<sup>7,8</sup> and in a review of 39 studies.<sup>9</sup> Multimorbidity is associated with higher age and lower socioeconomic status,<sup>7,9</sup> and is present 10–15 years earlier in people living in deprived areas compared with those living in affluent areas.<sup>7</sup> Patients with multimorbidity account for nearly 80% of all consultations in primary care.<sup>6</sup>

Though a coincident rise in patients with multimorbidity and GPs with burnout has been witnessed at a population level, the individual GP's risk of burnout has, to the authors' knowledge, never been examined in relation to the level of multimorbidity among listed patients. Therefore, this study

aimed to examine whether GPs with many registered patients with multimorbidity have higher risk of burnout compared with GPs with few registered patients with multimorbidity.

### METHOD

The authors conducted a questionnaire survey and combined the findings with historical registry-based data to examine the hypothesised association between patients' physical multimorbidity and GPs' burnout status. Mental multimorbidity was not measured because access to information about psychiatric diagnoses would have delayed the study considerably.

### Setting

Danish GPs work as independent contractors for the regional health authorities, which manage a tax-financed public reimbursement system, and are remunerated on a mix of capitation (25%) and fee-for-service (75%). Nearly all citizens (99%) are listed with a specific general practice, which they must consult for free for medical advice. Danish GPs act as gatekeepers to the rest of the healthcare system, except for emergencies. The average list size is approximately 1600 patients per GP. GPs are organised in the Danish Organisation of GPs (PLO).

### Recruitment of GPs

This study is part of a study programme and details of data collection procedure

**AF Pedersen**, PhD, associate professor, Department of Clinical Medicine and Research Unit for General Practice, **P Vedsted**, MD, PhD, professor in primary care, medical director, Research Unit for General Practice, Aarhus University, Aarhus, Denmark.

**KB Nørøxe**, MD, PhD, physician, Centre for Child and Adolescent Psychiatry, Aarhus University Hospital, Aarhus, Denmark.

#### Address for correspondence

Anette Fischer Pedersen, Research Unit for General

Practice, Aarhus University, Bartholins Allé 2, Aarhus C 8000, Denmark.

**Email:** afp@ph.au.dk

**Submitted:** 22 March 2019; **Editor's response:** 11 April 2019; **final acceptance:** 21 May 2019.

#### ©The Authors

This is the full-length article (published online 14 Jan 2020) of an abridged version published in print. Cite this version as: **Br J Gen Pract 2020; DOI: <https://doi.org/10.3399/bjgp20X707837>**

### How this fits in

Patient multimorbidity and GP burnout are increasing problems in primary care. Using Danish national patient registries and questionnaire data from a GP survey, the authors document that GPs with a high rate of registered patients with multimorbidity have higher risk of burnout compared with GPs with a low rate of registered patients with multimorbidity. GPs with high numbers of patients with complex needs should be supported in order to prevent suboptimal care and GP burnout.

and the questionnaire survey are described elsewhere.<sup>10</sup> GPs were invited to participate in May 2016. Eligible GPs had to be independent contractors (owners) with the regional health authorities, excluding locums and trainees, and work in practices with  $\geq 500$  listed patients on the day of study invitation. A total of 3350 GPs were eligible for inclusion.<sup>10</sup> For this particular study, GPs who worked in practices established later than 1 May 2015 were excluded. Such practices were identified as practices with  $< 500$  patients listed in the entire period from 1 May 2015 to 30 April 2016.

### Data collection

In May 2016, all Danish GPs listed with a valid email address at PLO received a link to an electronically administered questionnaire. Non-responders were sent a reminder after 2 weeks and 4 weeks, and data collection was terminated in August 2016.

The link to the questionnaire was personal and contained a unique serial number but no personal identifiers. The PLO distributed the link and the research group collected survey data. The PLO provided administrative data on the GPs, including age, sex, and provider number. Survey data were transferred to Statistics Denmark by the research group and administrative data by the PLO. Statistics Denmark linked data from the research group and the PLO by the unique serial number and matched data with register data on listed patients (through the encrypted provider number and patients' encrypted civil registration number, securing anonymous analysis). All Danish citizens are assigned a unique civil registration number that allows accurate linkage of information from numerous different registers at the individual level.<sup>11</sup>

Patients of included GPs were identified through the Patient List Register. Only patients who had been registered with the

practice for at least 1 year before the GP completed the questionnaire, that is, from 1 May 2015 or earlier, to 30 April 2016 or later, were included.

### Outcome measure

Burnout was measured by the Maslach Burnout Inventory — Human Services Survey (MBI-HSS).<sup>12</sup> This instrument measures three burnout dimensions: EE, characterised by depletion of emotional resources; DP, characterised by emotional detachment from patients; and PA, including perceived value of work and self-efficacy. Subscale sum scores reflect the degree of burnout on each dimension. Based on predefined cut-off values for healthcare workers, each subscale score was defined as low, moderate, or high.<sup>12</sup> Full burnout syndrome was defined as a high score on both EE and DP, and a low score on PA.

### Independent variable

Based on the definition of multimorbidity used in another study,<sup>13</sup> the authors used data on physical diseases from the Danish National Patient Registry (NPR) to assess the rate of patients with physical multimorbidity listed with each practice included in the study.<sup>14</sup> No Danish register holds information of routine treatments in general practice, but since 1995 the NPR has recorded information on all admissions, and outpatient and emergency contacts to Danish hospitals. All contacts are registered with a main diagnosis, that is, action diagnosis, based on ICD-10 codes.<sup>15</sup> The chronic physical diseases of interest were selected based on a literature review<sup>16</sup> and grouped into 10 comprehensive chronic disease groups (CDGs) on which data were drawn from the NPR. The following physical CDGs were included: diabetes, hypertension, cancer, chronic obstructive pulmonary disease (COPD), cardiovascular diseases, chronic arthritis, chronic kidney disease, chronic liver disease, chronic neurological disorders, and chronic bowel disease. Listed patients were categorised with multimorbidity if they were registered with at least two hospital contacts, which were registered under two main diagnoses belonging to two different CDGs to any Danish hospital in the 20-year period from 1 January 1996 to 31 December 2015. The crude rate of patients with physical multimorbidity was calculated for each practice as number of patients classified with multimorbidity per 100 patients in practice, and categorised into one of four groups based on the physical multimorbidity quartile it belonged to.

**Table 1. Characteristics of GPs and burnout status according to physical multimorbidity quartiles**

Characteristics	Physical multimorbidity quartiles, n (%)				
	All (N= 1676)	Lowest (N= 422)	Second (N= 416)	Third (N= 419)	Highest (N= 419)
<b>Age of GPs, years</b>					
<45	430 (25.7)	113 (26.8)	126 (30.3)	110 (26.3)	81 (19.3)
45–54	554 (33.1)	147 (34.8)	150 (36.1)	125 (29.8)	132 (31.5)
≥55	692 (41.3)	162 (38.4)	140 (33.7)	184 (43.9)	206 (49.2)
<b>Sex of GPs</b>					
Female	930 (55.5)	281 (66.6)	242 (58.2)	225 (53.7)	182 (43.4)
Male	746 (44.5)	141 (33.4)	174 (41.8)	194 (46.3)	237 (56.6)
<b>GPs in the practice</b>					
1	429 (25.6)	125 (29.6)	72 (17.3)	97 (23.2)	135 (32.2)
2	414 (24.7)	123 (29.1)	93 (22.4)	92 (22.0)	106 (25.3)
3	371 (22.1)	100 (23.7)	103 (24.8)	89 (21.2)	79 (18.9)
≥4	462 (27.6)	74 (17.5)	148 (35.6)	141 (33.7)	99 (23.6)
<b>Emotional exhaustion</b>					
High	510 (30.4)	115 (27.3)	118 (28.4)	118 (28.2)	159 (37.9)
Low to moderate	1166 (69.6)	307 (72.7)	298 (71.6)	301 (71.8)	260 (62.1)
<b>Depersonalisation</b>					
High	350 (20.9)	74 (17.5)	83 (20.0)	100 (23.9)	93 (22.2)
Low to moderate	1326 (79.1)	348 (82.5)	333 (80.0)	319 (76.1)	326 (77.8)
<b>Personal accomplishment</b>					
Low	611 (36.5)	132 (31.3)	145 (34.9)	162 (38.7)	172 (41.1)
Moderate to high	1065 (63.5)	290 (68.7)	271 (65.1)	257 (61.3)	247 (58.9)
<b>Full burnout syndrome</b>					
No	1506 (89.9)	391 (92.7)	379 (91.1)	369 (88.1)	367 (87.6)
Yes	170 (10.1)	31 (7.3)	37 (8.9)	50 (11.9)	52 (12.4)

#### Potential confounders

Based on previous findings,<sup>10</sup> the authors included GPs' sex and age, and number of GPs in practice as potential confounders. The number of GPs in each practice was categorised as 1, 2, 3, and ≥4. GP age was categorised into three age groups: <45, 45–54, and ≥55 years. Since age, sex, and socioeconomic position are well-established determinants of

multimorbidity,<sup>7,9</sup> measurements of these potential confounding variables were also included. Sex and age of practice patient populations were computed as number of registered patients aged ≥65 years per 100 patients in practice, and number of female patients per 100 patients in practice. The socioeconomic burden within the practice population was measured using the Danish Deprivation Index (DADI). The DADI estimates the socioeconomic burden based on eight key variables<sup>17</sup> and has previously been associated with GPs' likelihood of burnout.<sup>18</sup> The index scores a value between 10 and 100, and high numbers indicate more deprived patients in the practice population. For each practice, the DADI score was recorded at the end of 2015.

#### Statistical analysis

Logistic regression analyses tested associations between multimorbidity among registered patients and GPs' likelihood of burnout. Associations were calculated as odds ratios (ORs). Multimorbidity was included as the crude rate and as an overall sex- and age-standardised rate computed as a weighted average of the stratum-specific rates, with the weights taken from a reference population. The reference population consisted of 5 646 976 Danish citizens registered, on 1 May 2015, with the Danish GPs listed with a valid email address at PLO. Associations were calculated as unadjusted as well as adjusted ORs. The adjusted statistical model 1 included the crude multimorbidity rate adjusting for covariates including GPs' age, sex, number of GPs in practice, rate of female patients, and DADI score. Rate of patients aged ≥65 years was not included in the model owing to multicollinearity with rate of multimorbidity (Pearson's  $r=0.76$ ). The adjusted statistical model 2 included the sex- and age-standardised patient multimorbidity

**Table 2. Crude, sex- and age-standardised patient multimorbidity rate, DADI score, rate of older patients, and rate of female patients according to physical multimorbidity quartiles**

Variables	Physical multimorbidity quartiles, median (IQR)				
	All (N= 1676)	Lowest (N= 422)	Second (N= 416)	Third (N= 419)	Highest (N= 419)
Crude rate of patients with multimorbidity, per 100 patients	4.4 (3.7 to 5.2)	3.1 (2.6 to 3.4)	4.1 (3.8 to 4.2)	4.8 (4.5 to 5.0)	5.9 (5.5 to 6.4)
Sex- and age-standardised multimorbidity rate, per 100 patients	4.5 (4.0 to 5.0)	4.1 (3.7 to 4.8)	4.2 (3.8 to 4.6)	4.4 (4.1 to 5.0)	4.9 (4.5 to 5.4)
DADI score	26.0 (22.0 to 30.8)	24.3 (20.0 to 30.3)	24.3 (19.8 to 28.0)	26.1 (22.8 to 30.0)	29.4 (25.0 to 33.5)
Rate of patients aged ≥65 years, per 100 patients	18.8 (14.6 to 22.5)	12.2 (8.8 to 15.4)	17.5 (15.0 to 20.0)	20.5 (17.7 to 22.9)	23.4 (21.1 to 26.4)
Rate of female patients, per 100 patients	50.6 (48.9 to 53.1)	52.9 (50.0 to 56.9)	50.7 (49.4 to 52.4)	50.0 (48.5 to 52.0)	49.7 (47.3 to 51.4)

DADI = Danish Deprivation Index. IQR = interquartile range.

**Table 3. Summary of logistic regression analyses with full burnout syndrome used as outcome (N = 1664)<sup>a</sup>**

Variables	Unadjusted		Model 1: crude multimorbidity rate as exposure		Model 2: standardised multimorbidity rate as exposure	
	OR (95% CI)	P-value	Adjusted for covariates		Adjusted for covariates	
			OR (95% CI)	P-value	OR (95% CI)	P-value
<b>Age of GPs, years</b>						
<45 (Ref)						
45–54	1.59 (1.04 to 2.42)	0.031	1.64 (1.08 to 2.50)	0.021	1.66 (1.08 to 2.54)	0.020
≥55	0.94 (0.61 to 1.47)	0.796	0.84 (0.53 to 1.34)	0.460	0.87 (0.55 to 1.39)	0.572
<b>Sex of GPs</b>						
Female (Ref)						
Male	1.28 (0.94 to 1.74)	0.120	1.29 (0.89 to 1.86)	0.174	1.42 (1.02 to 1.98)	0.038
<b>GPs in the practice</b>						
1 (Ref)						
2	1.31 (0.85 to 2.02)	0.215	1.13 (0.71 to 1.79)	0.601	1.21 (0.77 to 1.90)	0.412
3	0.77 (0.48 to 1.24)	0.284	0.63 (0.37 to 1.09)	0.100	0.70 (0.43 to 1.15)	0.156
≥4	0.88 (0.57 to 1.35)	0.547	0.63 (0.38 to 1.05)	0.078	0.76 (0.48 to 1.22)	0.258
<b>DADI, quartiles<sup>b</sup></b>						
Lowest (Ref)						
Second	0.91 (0.57 to 1.46)	0.705	0.86 (0.53 to 1.40)	0.546	0.93 (0.57 to 1.51)	0.763
Third	1.36 (0.88 to 2.09)	0.165	1.22 (0.76 to 1.94)	0.408	1.37 (0.87 to 2.15)	0.178
Highest	1.03 (0.65 to 1.62)	0.908	0.92 (0.57 to 1.48)	0.727	1.01 (0.61 to 1.69)	0.969
<b>Rate of patients aged ≥65 years, per 100 patients, quartiles</b>						
Lowest (Ref)				Omitted <sup>c</sup>		Omitted <sup>d</sup>
Second	2.48 (1.51 to 4.07)	<0.001				
Third	1.78 (1.06 to 3.00)	0.030				
Highest	2.24 (1.36 to 3.70)	0.002				
<b>Rate of female patients, per 100 patients, quartiles</b>						
Lowest (Ref)						Omitted <sup>d</sup>
Second	1.16 (0.76 to 1.76)	0.500	1.46 (0.92 to 2.32)	0.108		
Third	0.88 (0.56 to 1.38)	0.581	1.14 (0.68 to 1.91)	0.625		
Highest	0.65 (0.41 to 1.03)	0.069	0.86 (0.51 to 1.45)	0.578		
<b>Crude rate of patients with multimorbidity, per 100 patients, quartiles</b>						
Lowest (Ref)						
Second	1.23 (0.74 to 2.05)	0.423	1.19 (0.72 to 1.98)	0.496	—	—
Third	1.71 (1.08 to 2.71)	0.023	1.64 (1.02 to 2.64)	0.043	—	—
Highest	1.79 (1.13 to 2.82)	0.013	1.60 (0.99 to 2.60)	0.056	—	—
<b>Sex- and age-standardised rate of patients with multimorbidity per 100 patients, quartiles</b>						
Lowest (Ref)						
Second	1.28 (0.80 to 2.04)	0.307	—	—	1.27 (0.78 to 2.06)	0.341
Third	1.37 (0.86 to 2.18)	0.179	—	—	1.37 (0.85 to 2.21)	0.203
Highest	1.16 (0.72 to 1.88)	0.547	—	—	1.07 (0.63 to 1.80)	0.808

<sup>a</sup>Due to missing values on covariates, the number of included GPs are reduced from 1676 to 1664 in the full model. <sup>b</sup>Data missing for 12 GPs. <sup>c</sup>Omitted owing to multicollinearity with multimorbidity. <sup>d</sup>Omitted as rate of patients with multimorbidity is sex- and age-standardised. CI = confidence interval. DADI = Danish Deprivation Index. OR = odds ratio.

rate adjusting for covariates including GPs' age, sex, number of GPs in practice, and DADI score. All analyses were adjusted for clusters among GPs using robust variance estimation. The 95% confidence intervals (CIs) for ratios were calculated and *P*-values of ≤5% were

considered statistically significant. Data were analysed using Stata (version 14.2).

## RESULTS

Out of 3350 eligible GPs, 1697 (50.7%) responded. A detailed dropout analysis is published elsewhere.<sup>10</sup> For this particular

study, a further 21 GPs were excluded as they worked in practices established later than 1 May 2015. Thus, the number of included GPs was 1676 (50.0%) working in 1107 individual practices. The median number of patients per GP registered for at least 1 year before May 2016 was 1465 (interquartile range [IQR] 1272 to 1634). Among the 1676 GPs, 170 (10.1%) reached criteria for the full burnout syndrome (Table 1). The median rate of patients with physical multimorbidity in practice was 4.4% (crude rate, IQR 3.7% to 5.2%) and 4.5% (sex- and age-standardised rate, IQR 4.0% to 5.0%) (Table 2).

Among GPs with a crude rate of patient multimorbidity belonging to the highest quartile, 52 (12.4%) were burned out. Among GPs with a crude rate of patient multimorbidity belonging to the lowest quartile, the proportion was 7.3% ( $n = 31/422$ ) (Table 1).

As shown in Table 3, the crude rate of registered patients with multimorbidity was significantly associated with likelihood of burnout in the unadjusted analysis (highest versus lowest quartile [unadjusted model] OR 1.79, 95% CI = 1.13 to 2.82). In the adjusted analyses, GPs in the third quartile of the crude patient multimorbidity rate had significantly increased likelihood of burnout compared with GPs in the lowest quartile [(model 1) OR 1.64, 95% CI = 1.02 to 2.64]. For GPs in the highest quartile of the crude patient multimorbidity rate, the odds of being burned out were 60% higher than the odds of GPs in the lowest quartile, but the difference was not statistically significant [(model 1) OR 1.60, 95% CI = 0.99 to 2.60].

As shown in Table 3, the sex- and age-standardised rate of patients with multimorbidity was not associated with likelihood of burnout, neither in the unadjusted nor in the adjusted analyses (highest versus lowest quartile [unadjusted model] OR 1.16, 95% CI = 0.72 to 1.88; highest versus lowest quartile [model 2] OR 1.07, 95% CI = 0.63 to 1.80). Rate of female patients, number of GPs in practice, and DADI score were not associated with likelihood of burnout. Rate of patients aged  $\geq 65$  years was associated with increased likelihood of burnout (highest versus lowest quartile [unadjusted model] OR 2.24, 95% CI = 1.36 to 3.70).

## DISCUSSION

### Summary

The results revealed an association between a high crude rate of registered patients with physical multimorbidity and increased likelihood of burnout among GPs. The odds

of being burned out for GPs with a crude rate of patient multimorbidity belonging to the highest quartile was 1.8 times that of GPs belonging to the lowest quartile (Table 3). When adjusting for possible confounders, the strength of the association was reduced, but the odds of being burned out for GPs with a crude rate of patient multimorbidity belonging to the third quartile was still significantly greater than that of GPs belonging to the lowest quartile. Though the difference was not statistically different, the odds of being burned out for GPs with a crude rate of patient multimorbidity belonging to the highest quartile was 60% higher than the odds of GPs belonging to the lowest quartile.

Patient demography in the practices varied greatly. When standardising the rate of patients with multimorbidity, the association between physical multimorbidity and likelihood of burnout was no longer seen (Table 3). Despite the ageing of populations in developed countries, people aged  $\geq 65$  years still represent a rather small proportion of the total population.<sup>19</sup> As a consequence, the crude rate of multimorbidity in the oldest age categories is assigned a relatively low weight when used for computing the overall standardised rate of multimorbidity. This means that GPs working in practices with a high rate of older patients will have a high crude multimorbidity rate, but, since their burden of multimorbidity originates from older patients, it will be assigned relatively low weight in the standardised rate of multimorbidity. This adjustment of age and sex means that the actual work pressure from complicated older patients with multimorbidity is removed. Future studies must be careful not to adjust for patients' age and sex as it will induce an underestimation of the burden of patient multimorbidity.

### Strengths and limitations

This nationwide survey is, to the authors' knowledge, the first to examine an individual GP's likelihood of burnout in relation to the level of physical multimorbidity among listed patients and has several strengths. The unique Danish registers allowed for precise linkage of information on listed patients. The identification of GPs through PLO membership minimised the risk of sampling bias. The assessment of physical multimorbidity was based on a nationwide registry containing information on all hospital-related contacts in Denmark,<sup>13</sup> and the validity of the register has been established for a number of the included diseases.<sup>14</sup>

### Funding

This study is funded by the Danish National Research Foundation for Primary Care and by the Danish Health Foundation. The funding sources had no role in the design of the study, in the collection, analysis, and interpretation of data, or the writing of the article.

### Ethical approval

The project was approved by the Danish Data Protection Agency (J.no. 2016-41-4648). The project has been approved and is registered in the Record of Processing Activities at the Research Unit of General Practice in Aarhus (reference number: 190) in accordance with the provisions of the General Data Protection Regulation (GDPR). According to Danish law, approval by the Danish National Committee on Health Research Ethics was not required for this study as no biomedical intervention was performed. Responders gave their consent to participate by responding to the questionnaire. Personally identifiable information on GPs and patients were recoded and anonymised at Statistics Denmark before data analysis.

### Provenance

Freely submitted; externally peer reviewed.

### Competing interests

The authors have declared no competing interests.

### Acknowledgements

The authors would like to thank the Danish Organisation of GPs and the GPs who took part in this study.

### Open access

This article is Open Access: CC BY-NC 4.0 licence (<http://creativecommons.org/licenses/by-nc/4.0/>).

### Discuss this article

Contribute and read comments about this article: [bjgp.org/letters](http://bjgp.org/letters)

A number of study limitations have been identified: first, no Danish register contains information on routine treatments in general practice, so patients with  $\geq 2$  diseases who are diagnosed and treated in general practice only will appear as patients without multimorbidity in this study. The same limitation applies to patients with mental morbidity, which was not assessed. The non-registration of patients treated solely in primary care and patients with mental morbidity may explain why the crude rate of patient multimorbidity was low (4%) compared with what has been reported previously in international studies<sup>6,7</sup> and in one Danish study,<sup>20</sup> and may have led to an underestimation of the association between patient multimorbidity and GP burnout. Second, the relatively low rate of patients with multimorbidity obtained in this study might also be explained by the exclusion of patients who died in the period from 1 May 2015 to 30 April 2016. As multimorbidity increases mortality, it is likely that there would be an abundance of patients with multimorbidity among deceased patients. However, the authors assumed that deceased patients with multimorbidity were distributed among GPs according to their multimorbidity rate and will, as such, not influence the results of the study. Third, in group practices where GPs share the patient list, it was assumed that all GPs were exposed to the same patient population. This may be problematic as patients may cluster around a specific GP in a practice owing to the personal characteristics and professional interests of the GP.<sup>21,22</sup> Fourth, the design of the study is correlational. Though several possible confounders were adjusted for, including patient deprivation, which has been previously reported to be associated with multimorbidity<sup>6,7</sup> as well as GPs' risk of burnout,<sup>23</sup> residual confounding or reverse causality cannot be excluded.

### Comparison with existing literature

A number of mechanisms may explain the revealed relationship between patient multimorbidity rate and GP burnout. First, hospitals are becoming increasingly specialised, treating each condition in isolation, and often GPs have to coordinate care based on conflicting medical advice from different specialists.<sup>24</sup> Second, most guidelines are developed from research in selected patients without comorbidities<sup>25</sup> and good evidence for best care of every possible combination of conditions will never be obtained,<sup>26</sup> making it challenging to balance competing medical priorities when managing patients with multimorbidity.<sup>27</sup>

Third, despite people with multimorbidity having higher consultation rates,<sup>6</sup> patients with multimorbidity have been shown to have less continuity of care,<sup>6,28</sup> shorter clinical encounter length, and be less enabled by consultations compared with patients with less complex healthcare needs.<sup>27,29</sup> One of the key components of Danish primary care is a mixed capitation and fee-for-service system, and general practice funding does not often compensate GPs for addressing complex healthcare needs. To keep up the annual income level and reduce waiting time, patients with multimorbidity tend to be managed in the same limited consultation time as applied to patients without multimorbidity. This appears to be one of the most important challenges identified concerning the use of shared decision making in patients with multimorbidity,<sup>24,30,31</sup> and may explain why GPs often report more stress after consultations with patients with complex needs than after consultations with patients with less complex health needs.<sup>27</sup> Taking care of patients with multimorbidity within a remuneration system benefiting uncomplicated health issues may add to preservation of the inverse care law, according to which '*the availability of good medical care tends to vary inversely with the need for it in the population served*'.<sup>32</sup>

### Implications for practice

This study revealed an association between the crude rate of registered patients with physical multimorbidity and increased likelihood of burnout among GPs. The results did not support an association between a sex- and age-standardised rate of patient multimorbidity and GPs' likelihood of burnout, which means that it is the actual number of patients with multimorbidity in a practice that affects the GP. The authors propose that the observed association between patients' multimorbidity and GPs' increased risk of burnout could be explained by formerly identified problem areas, such as increased workload, fragmented specialised care, inadequacy of guidelines for patients with  $>1$  condition, and no additional funding to GPs managing a high number of patients with complex healthcare needs. The findings of this study call for actions to reduce the future workload from an ageing population, which will possibly increase the number of patients with multimorbidity, and to prevent the sickest patients with the most complex health needs having their needs met by burned-out GPs who may perform suboptimally.<sup>33</sup>

## REFERENCES

1. Maslach C, Leiter MP. Understanding the burnout experience: recent research and its implications for psychiatry. *World Psychiatry* 2016; **15**(2): 103–111.
2. Brøndt A, Sokolowski I, Olesen F, Vedsted P. Continuing medical education and burnout among Danish GPs. *Br J Gen Pract* 2008; DOI: <https://doi.org/10.3399/bjgp08X263767>.
3. Nørøxe KB, Pedersen AF, Bro F, Vedsted P. Mental well-being and job satisfaction among general practitioners: a nationwide cross-sectional survey in Denmark. *BMC Fam Pract* 2016; **19**(1): 130.
4. Soler JK, Yaman H, Esteve M, *et al*. Burnout in European family doctors: the EGPRN study. *Fam Pract* 2008; **25**(4): 245–265.
5. Hobbs FD, Bankhead C, Mukhtar T, *et al*. Clinical workload in UK primary care: a retrospective analysis of 100 million consultations in England, 2007–14. *Lancet* 2016; **387**(10035): 2323–2330.
6. Salisbury C, Johnson L, Purdy S, *et al*. Epidemiology and impact of multimorbidity in primary care: a retrospective cohort study. *Br J Gen Pract* 2011; DOI: <https://doi.org/10.3399/bjgp11X548929>.
7. Barnett K, Mercer SW, Norbury M, *et al*. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet* 2012; **380**(9836): 37–43.
8. Pefoyo AJK, Bronskill SE, Gruneir A, *et al*. The increasing burden and complexity of multimorbidity. *BMC Public Health* 2015; **15**: 415.
9. Violan C, Foguet-Boreu Q, Flores-Mateo G, *et al*. Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. *PLoS One* 2014; **9**(7): e102149.
10. Nørøxe KB, Pedersen AF, Bro F, Vedsted P. Mental well-being and job satisfaction among general practitioners: a nationwide cross-sectional survey in Denmark. *BMC Fam Pract* 2018; **19**(1): 130.
11. Schmidt M, Pedersen L, Sørensen HT. The Danish civil registration system as a tool in epidemiology. *Eur J Epidemiol* 2014; **29**(8): 541–549.
12. Maslach C, Jackson SE, Leiter MP. *Maslach burnout inventory manual*. 3rd edn. Palo Alto, CA: Consulting Psychologists Press, 1996.
13. Jensen LF, Pedersen AF, Andersen B, *et al*. Non-participation in breast cancer screening for women with chronic diseases and multimorbidity: a population-based cohort study. *BMC Cancer* 2015; **15**: 798.
14. Lynge E, Sandegaard JL, Rebolj M. The Danish National Patient Register. *Scand J Public Health* 2011; **39**(7 Suppl): 30–33.
15. World Health Organization. *International statistical classification of diseases and related health problems: 10th revision. Volume 2 Instruction manual*. Geneva: WHO, 2010.
16. Diederichs C, Berger K, Bartels DB. The measurement of multiple chronic diseases — a systematic review on existing multimorbidity indices. *J Gerontol A Biol Sci Med Sci* 2011; **66**(3): 301–311.
17. Vedsted P, Olesen F, Hollnagel H, *et al*. *General medical practice in Denmark*. [In Danish]. Copenhagen: Monthly Journal for Practical Medicine, 2005.
18. Pedersen AF, Vedsted P. Understanding the inverse care law: a register and survey-based study of patient deprivation and burnout in general practice. *Int J Equity Health* 2014; **13**: 121.
19. Christensen K, Doblhammer G, Rau R, Vaupel JW. Ageing populations: the challenges ahead. *Lancet* 2009; **374**(9696): 1196–1208.
20. Schiøtz ML, Stockmarr A, Høst D, *et al*. Social disparities in the prevalence of multimorbidity — a register-based population study. *BMC Public Health* 2017; **17**(1): 422.
21. Charles J, Britt H, Valenti L. The independent effect of age of general practitioner on clinical practice. *Med J Aust* 2006; **185**(2): 105–109.
22. Harrison CM, Britt HC, Charles J. Sex of the GP — 20 years on. *Med J Aust* 2011; **195**(4): 192–196.
23. Pedersen AF, Vedsted P. Understanding the inverse care law: a register and survey-based study of patient deprivation and burnout in general practice. *Int J Equity Health* 2014; **13**: 121.
24. Sinnott C, Mc Hugh S, Browne J, Bradley C. GPs' perspectives on the management of patients with multimorbidity: systematic review and synthesis of qualitative research. *BMJ Open* 2013; **3**(9): e003610.
25. Salisbury C. Multimorbidity: redesigning health care for people who use it. *Lancet* 2012; **380**(9836): 7–9.
26. Guthrie B, Payne K, Alderson P, *et al*. Adapting clinical guidelines to take account of multimorbidity. *BMJ* 2012; **345**: e6341.
27. Mercer SW, Watt GCM. The inverse care law: clinical primary care encounters in deprived and affluent areas of Scotland. *Ann Fam Med* 2007; **5**(6): 503–510.
28. Mason B, Nanton V, Epiphaniou E, *et al*. 'My body's falling apart.' Understanding the experiences of patients with advanced multimorbidity to improve care: serial interviews with patients and carers. *BMJ Support Palliat Care* 2016; **6**(1): 60–65.
29. Mercer SW, Guthrie B, Furler J, *et al*. Multimorbidity and the inverse care law in primary care. *BMJ* 2012; **344**: e4152.
30. Bower P, Macdonald W, Harkness E, *et al*. Multimorbidity, service organization and clinical decision making in primary care: a qualitative study. *Fam Pract* 2011; **28**(5): 579–587.
31. Stokes T, Tumilty E, Doolan-Noble F, Gauld R. Multimorbidity, clinical decision making and health care delivery in New Zealand primary care: a qualitative study. *BMC Fam Pract* 2017; **18**(1): 51.
32. Hart JT. The inverse care law. *Lancet* 1971; **1**(7696): 405–412.
33. West CP. Physician well-being: expanding the triple aim. *J Gen Intern Med* 2016; **31**(5): 458–459.