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Perceived treatment burden and health-related quality of life in association with healthcare utilisation among patients attending multiple outpatient clinics

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Abstract

Introduction Patients with multimorbidity who frequently require healthcare may experience a higher treatment burden. In this study, we investigated whether high perceived treatment burden and low perceived health-related quality of life (HRQoL) were associated with healthcare utilisation among patients who attended at least two medical outpatient hospital clinics.

Methods Patients who underwent medical treatment in two or more outpatient medical clinics at Silkeborg Regional Hospital in Denmark in August 2018 were included. The patients received a questionnaire containing the Multimorbidity Treatment Burden Questionnaire and the Short Form-12 questionnaire measuring HRQoL in terms of physical and mental health. Information on healthcare utilisation was collected from electronic registers one year prior to receiving the questionnaire. Logistic regression was applied to estimate the odds of 'no/low' and 'high' perceptions of treatment burden and 'low' self-rated HRQoL in relation to healthcare utilisation.

Results In total, 930 patients (59.8%) answered the questionnaire. The degree of patient-assessed treatment burden was not associated with the number of outpatient contacts, hospital admissions or admission days. A high perceived treatment burden was associated with a high number of general practice contacts, whereas a low treatment burden was associated with fewer contacts in general practice, indicating a dose–response pattern. The same pattern of associations was observed for perceived physical and mental health.

Conclusion Patients with high perceived treatment burden and low HRQoL seemed to consult their general practitioner primarily despite hospital involvement. These patients may require frequent primary care attention due to other factors than those being treated at the hospital. However, further research is warranted to explore the mechanisms underlying these associations and strategies for reducing treatment burden and enhancing HRQoL in patients with multiple medical conditions.

Keywords Denmark, Outpatient clinic, Treatment burden, Chronic illness care, Healthcare utilisation, Hospital

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Introduction

Co-occurring chronic conditions (multimorbidity), found in about one-fourth of the general adult population [1, 2], can significantly increase treatment burden [3–5]. Treatment burden has been defined as the workload of health care. It encompasses the demands placed on patients in managing their health conditions and its effect on patient functioning and wellbeing [6, 7], such as health literacy and understanding medical information, adhering to medication regimens, monitoring one's health and interacting with healthcare professionals [8, 9]. When a patient's workload exceeds their available capacity, they may experience a high treatment burden or being overburdened [10], further diminishing both the physical and mental aspects of an individual's health-related quality of life (HRQoL) [3, 11].

Extensive healthcare utilisation, involving various healthcare services to manage chronic conditions [1, 12–15], is a typical result of modern healthcare organisation. This may increase perceived treatment burden with low perceived HRQoL to follow. This may be prompted by the involvement of many healthcare professionals, numerous appointments, repeated referrals and concurrent outpatient trajectories, which can lead to service duplication and complicated treatment regimens that are challenging for patients to manage [1, 7, 14, 16]. A lack of integration and effective coordination among various healthcare providers or organisations can disrupt patients' daily lives and compromise their wellbeing [17–20].

To mitigate the treatment burden, patients may adopt strategies such as routinising and prioritising some treatments while not adhering to others to reduce the workload [9, 10, 21]. E.g., focusing on treatments with immediate risk to their health. The Chronic Care Model by Wagner et al., suggests a collaborative, organised and patient-centred approach to chronic disease management, to improve patient outcomes [22]. However, knowledge of the association between patients' experience of high treatment burden and low HRQoL and healthcare use is lacking.

This study aims to analyse whether distinct measures of healthcare utilisation are associated with high treatment burden and lower HRQoL among patients attending two or more outpatient clinics. Secondary, to analyse how perceived treatment burden levels influence both mental and physical health.

Methods

Setting

The study was conducted at Silkeborg Regional Hospital in Denmark, a hospital with a catchment area comprising approx. 100,000 inhabitants. Denmark provides free and universal access to tax-financed public healthcare. The healthcare system is regulated by the government, and the responsibility for providing services is delegated to the five regions. Hospitals and GPs are managed at a regional level. Danish residents are registered with a GP whom they must consult for medical advice, whereas specialist outpatient services are accessed through GP referrals.

Design

Using a cross-sectional design, we targeted all patients who attended two or more outpatient medical clinics at the Silkeborg Regional Hospital. Eligible subjects were identified via real-time data of open and simultaneous outpatient trajectories. In July–August 2018, a total of 1,555 participants received an invitation letter and a questionnaire about their perceptions of treatment burden and HRQoL.

Study participants

The study population came from ten outpatient clinics within the specialties of cardiology, nephrology, endocrinology, gastroenterology, infectious diseases, pulmonology, haematology, rheumatology, palliative treatment and a medical interdisciplinary clinic. This included both patients undergoing diagnostics and receiving long-term care for a chronic condition, as long as they attended two or more outpatient medical clinics out of the ten. Adults aged 18 years or older were included. Out of 1,555 invited patients, a total of 930 patients (59.8%) answered the questionnaire with at least 50% of the items being completed on each of the included individual questionnaires, as recommended by its developers [4, 23, 24]. These 930 responders formed the study population.

Data collection

Questionnaire data

A questionnaire, including the Danish versions of the Multimorbidity Treatment Burden Questionnaire (MTBQ) and the Short Form 12 questionnaire (SF-12), was sent to patients through REDCap [25], a secure web platform for managing online questionnaires. Alternatively, the invitation was sent by letter with prepaid postage and a return envelope. Up to three reminders were sent to non-responders at a two-week time interval. The third reminder was sent by letter. Digital responses were entered directly into REDCap. Letter responses were typed into REDCap by double data entry to ensure data quality.

The MTBQ measures treatment burden as the effort of looking after one's health [4]. It consists of ten items and uses a five-point response scale extending from 0 (not difficult/does not apply) to 4 (extremely difficult). A global score is generated, ranging from 0 to 100, with four treatment burden groups: high burden (score: ≥ 22), medium burden (score: 10 to < 22), low burden (score: < 10) and no burden (score 0). The global score is calculated as an average score across answered items, then multiplied by 25 for a score ranging from 0 to 100 [4, 26].

The SF-12 instrument measures patients' perceived HRQoL and was used to provide insight into aspects of patients' health. The instrument is divided into two component scores of mental health (the Mental Health Component Summary (MCS)) and physical health (the Physical Health Component Summary (PCS)) based on a weighted scores from 12 items. The scores range from 0 to 100. We used a score of 40 or less on both the PCS and MCS as a cut-off to determine less physical health and mental health, respectively – found as the mean scores minus the standard deviation by the instrument developers and other studies [23, 27].

Register-based data

Healthcare utilisation was measured as independent variables obtained one year prior to the questionnaire data collection. This included information on the number of admissions, days with admission, outpatient contacts and GP contacts. Information on GP contacts included daytime consultations, email and telephone consultations and was collected from the hospital reimbursement system. Information on outpatient utilisation and hospitalisation enters the patient's electronic record during routine clinical work.

The same applies to information on medical conditions, where the count of medical conditions was derived from a pool of 39 conditions [28], identifying the most frequent dyads of these conditions crossing organ systems. Data on age, sex and marital status were collected through the patients' electronic records, uploaded from the civil registration system.

Statistical methods

Descriptive statistics were applied to display characteristics of the study population (Table 1).

Logistic regression analysis was used to estimate associations between perceived treatment burden and healthcare utilisation measures. We dichotomised the MTBQ global score and compared odds of no/low (< 10 points) treatment burden with those with medium/high (≥ 10 points) treatment burden. Also, odds of high (≥ 22 points) treatment burden were compared with no/low/medium (< 22 points) treatment burden (Table 2). The two SF-12 component scores of mental and physical health were dichotomised at ≤ 40 points. The odds of low mental or physical HRQoL were estimated according to the same measures of healthcare utilisation (Table 3). All logistic regression analyses were adjusted for age, sex and number of chronic conditions. Moreover, associations with number of outpatient contacts, admissions and GP contacts were also adjusted for days admitted to hospital.

The abovementioned categories of perceived treatment burden scores (no/low, medium and high) and MCS and PCS scores (low and high) were tested for trends with Spearman's nonparametric correlation of rank sums (Tables 4 and 5). All statistical analyses were conducted in Stata version 18.5.

Results

Among the 930 respondents, 45.3% were female, the median age was 69 years (interquartile interval (IQI) 60–74) and 66.0% were married/registered with a partner. The median number of chronic conditions was two (IQI 1–4). Across organ systems, the most frequent disease combination was hypertension and diabetes mellitus type II, which also applied to the subgroup of patients with high perceived treatment burden (n = 161).

Regarding treatment burden, 55.9% perceived their treatment burden as no burden/low, and 17.3% reported it as being high. Regarding SF- 12, 28.6% scored low on the MCS and 51.3% scored low on the PCS. During the 12 months leading up to baseline, the median number of outpatient contacts was 7 (IQI 4–12), admissions 0 (IQI 0–1), days admitted 0 (IQI 0–1) and GP contacts 12 (IQI 7–21) (Table 1).

No variation was observed in the propensity for experiencing a high burden of treatment based on hospital utilisation (Table 2). An association was recorded between experiencing high treatment burden and having ≥ 20 GP contacts (odds ratio (OR) = 2.01 (IQI 1.10–3.66)) and 0–4 GP contacts. No/low perceived treatment burden was less often seen among patients having 10–19 or ≥ 20 GP contacts than among patients with 0–4 contacts (OR = 0.63 (0.41–0.98) and OR = 0.41 (0.25–0.65)).

For both mental and physical HRQoL (SF-12), a similar pattern was recorded with no statistically significant association with hospital utilisation. However, we did record an association between having ≥ 20 GP contacts during the previous year and low mental health (MCS: OR = 2.03 (95%CI: 1.22–3.36)) and having 10–19 or ≥ 20 GP contacts and low physical health (PCS: OR = 1.78 (95%CI: 1.16–2.73) and OR = 2.24 (95%CI: 1.40–3.58)) (Table 3).

Among patients experiencing no/low treatment burden, 81.2% reported a high mental health on the SF-12, whereas 50.9% of the patients with'high'treatment burden reported high mental health (Table 4).

About half of patients (51.3%) perceived their physical health as low. With increasing perceived treatment burden, fewer patients reported high physical health, dropping from 60.2% to 29.2% (Table 5). Tests for trends in

Table 1 Characteristics of the study population included in 2018, their questionnaire scores on the MTBQ, SF-12 and use of healthcare services

	N	**%**
Total	930	100
Females	421	45.3
Age (years)		median 69 (IQI, 60–74)
Number of medical conditions[a]		median 2 (IQI, 1–4)
Dyads of medical conditions across organ systems[a] (most frequent)		
Diabetes mellitus type II – Hypertension	117	12.6
Diabetes mellitus type II – Ischaemic heart disease	78	8.4
Hypertension—Cancer	77	8.3
Marital status		
Married/registered with partner	610	66.0
Widower/divorced/unmarried	315	34.0
		Median (IQI)
Number of outpatient visits[b]		7 (4–12)
Number of admissions[b]		0 (0–1)
Days with admission[b]		0 (0–1)
Number of GP contacts[b]		12 (7–21)
Treatment burden, MTBQ score		
High burden (≥ 22)	161	17.3
Median burden (10—< 22)	249	27.8
Low burden (< 10)	256	27.5
No burden (0)	264	28.4
Overall score		median 7.5 (IQI, 0–17.5)
		Mean (95%CI)
Health-related quality of life, SF-12		
Physical Component Score		39.6 (28.8–48.9)
Mental Component Score		46.6 (38.6–55.1)

Abbreviations: *CI* Confidence Interval, *GP* General Practitioner, *IQI* Interquartile interval, *MTBQ* Multimorbidity Treatment Burden Questionnaire, *SF- 12* Short Form- 12

[a] According to the Danish Multimorbidity Index, which includes 39 conditions [22]

[b] Within the Central Denmark Region, one year prior to 1 August 2018. GP contacts include daytime consultations, emails and telephone calls

proportions showed a correlation coefficient of 0.26 ($p < 0.001$) for the MCS score and 0.24 ($p < 0.001$) for the PCS. Thus, a monotonic relationship between the two variables.

Discussion

This study investigated the association between high perceived treatment burden, low perceived HRQoL and different independent measures of healthcare utilisation (outpatient contacts, admissions and GP contacts). Among patients attending two or more hospital outpatient clinics, 17.3% perceived having high treatment burden, 28.6% perceived having low mental health and 51.3% perceived their physical health as low. These aspects were not associated with hospital healthcare utilisation but with an increasing number of GP contacts. An inverse relationship was observed, as patients with high treatment burden also experienced low physical or mental health.

Existing evidence

The novelty of this study lies in its comprehensive assessment of perceived treatment burden and HRQoL assessed among patients attending several outpatient clinics. We extend previous research by investigating these concepts in association with healthcare utilisation for this patient group. In a recent study by Morris et al., both having three or more outpatient appointments and three or more GP appointments within the past six months were associated with treatment burden among older adults with multimorbidity registered at a GP practice [8]. Although healthcare utilisation has previously been used as a proxy for assessing treatment burden [29], we did not find higher odds of high treatment burden across any level of hospital healthcare utilisation.

Table 2 Healthcare utilisation and associated odds of perceived treatment burden as no/low or high

MTBQ		No/low perceived treatment burden *(score < 10 points)*					High perceived treatment burden *(score ≥ 22 points)*				
N total = 930		***N* = 520**	***Unadjusted* OR with 95%CI**	***p*-value**	***Adjusted* OR with 95%CI***	***p*-value**	***N* = 161**	***Unadjusted* OR with 95%CI**	***p*-value**	***Adjusted* OR with 95%C***	***p*-value**
Outpatient contacts											
0–4	293	159	1	-	1	-	49	1	-	1	-
5–9	318	186	1.19 (.86–1.64)	0.29	1.27 (0.91–1.78)	0.16	55	1.04 (0.68–1.59)	0.85	0.96 (0.62–1.49)	0.97
10–19	236	127	.98 (.70–1.39)	0.92	1.02 (0.72–1.47)	0.90	43	1.11 (0.71–1.74)	0.65	1.03 (0.64–1.65)	0.92
≥ 20	83	48	1.56 (.71–1.89)	0.57	1.20 (0.71–2.00)	0.50	14	1.01 (0.53–1.94)	0.98	0.98 (0.50–1.91)	0.91
Number of admissions											
0	622	341	1	-	1	-	109	1	-	1	-
1	169	101	1.22 (.87–1.73)	0.25	1.22 (0.87–1.73)	0.25	26	0.86 (0.54–1.36)	0.51	1.01 (0.62–1.64)	0.98
2	65	36	1.02 (.61–1.71)	0.93	1.02 (0.61–1.71)	0.93	13	1.18 (0.62–2.24)	0.62	1.36 (0.67–2.77)	0.39
≥ 3	74	42	1.08 (.67–1.76)	0.75	1.08 (0.67–1.76)	0.75	13	1.03 (0.53–1.89)	0.99	1.07 (0.47–2.42)	0.88
Days with admission											
0	622	341	1	-	1	-	109	1	-	1	-
1–4	185	105	1.08 (.78–1.51)	0.64	0.98 (0.70–1.39)	0.93	33	1.02 (0.67–1.60)	0.92	1.18 (0.76–1.84)	0.47
5–9	59	34	1.12 (.65–1.92)	0.68	1.12 (0.64–1.96)	0.69	9	0.85 (0.41–1.77)	0.66	0.86 (0.40–1.84)	0.70
≥ 10	64	40	1.37 (.81–2.33)	0.24	1.25 (0.72–2.16)	0.43	10	0.87 (0.43–1.77)	0.70	1.02 (0.49–2.09)	0.97
GP contacts											
0–4	146	98	1	-	-	-	22	1	-	1	-
5–9	199	122	0.78 (.50–1.22)	0.27	0.81 (0.50–1.29)	0.37	23	0.74 (0.39–1.38)	0.34	0.70 (0.36–1.35)	0.29
10–19	329	**187**	**0.65 (0.43–0.97)**	**0.04**	**0.63 (0.41–0.98)**	**0.04**	52	1.06 (0.62–1.82)	0.84	1.13 (0.64–2.00)	0.68
≥ 20	256	**113**	**0.39 (0.25–0.59)**	**< 0.001**	**0.41 (0.25–0.65)**	**< 0.001**	**64**	**1.88 (1.10–3.21)**	**0.02**	**2.01 (1.10–3.66)**	**0.02**

Data on healthcare utilisation are collected one year prior to responding to the questionnaire. *) Adjusted for age, sex and number of conditions. Outpatient contacts, number of admissions and GP contacts were also adjusted for days with admission. GP contacts include daytime consultations, emails and telephone calls

CI Confidence Interval, *MTBQ* Multimorbidity Treatment Burden Questionnaire, *OR* Odds ratio

Table 3 Healthcare utilisation and associated odds of low perceived mental and physical health

SF-12		**Low perceived mental health** *(MCP < 40 points)*					**Low perceived physical health** *(PCS ≤ 40 points)*				
N total = 930		***N* = 266**	***Unadjusted*** **OR with 95%CI**	***p*-value**	***Adjusted*** **OR with 95%CI**[*]	***p*-value**	***N* = 477**	***Unadjusted*** **OR with 95%CI**	***p*-value**	***Adjusted*** **OR with 95%C***	***p*-value**
Outpatient contacts											
0–4	293	85	1	-	1	-	150	1	-	1	-
5–9	318	89	0.95 (0.67–1.35)	0.19	0.93 (0.65–1.33)	0.69	165	1.03 (0.75–1.41)	0.86	1.02 (0.73–1.43)	0.91
10–19	236	72	1.07 (0.74–1.56)	0.64	1.04 (0.71–1.52)	0.84	128	1.13 (0.80–1.59)	0.49	1.01 (0.71–1.47)	0.92
≥ 20	83	20	0.78 (0.44–1.36)	0.34	0.72 (0.41–1.28)	0.27	34	0.66 (0.40–1.08)	0.10	0.60 (0.35–1.02)	0.06
Number of admissions											
0	622	171	1	-	1	-	319	1	-	1	-
1	169	54	1.24 (0.81–1.65)	0.26	1.39 (0.94–2.05)	0.10	87	1.01 (0.72–1.42)	0.96	1.01 (0.70–1.47)	0.96
2	65	20	1.17 (0.67–1.94)	0.58	1.38 (0.75–2.52)	0.30	37	1.26 (0.75–2.10)	0.39	1.43 (0.80–2.55)	0.23
≥ 3	74	21	1.05 (0.60–1.65)	0.87	1.37 (0.67–2.79)	0.39	34	0.81 (0.50–1.30)	0.39	0.99 (0.51–1.89)	0.97
Days with admission											
0	622	171	1	-	1	-	319	1	-	1	-
1–4	185	62	1.33 (0.94–1.89)	0.11	1.40 (0.98–2.00)	0.07	93	0.96 (0.69–1.33)	0.81	0.96 (0.67–1.36)	0.81
5–9	59	17	1.07 (0.59–1.93)	0.83	1.09 (0.60–1.98)	0.77	33	1.21 (0.70–2.06)	0.50	1.25 (0.70–2.21)	0.45
≥ 10	64	16	0.87 (0.49–1.59)	0.67	0.94 (0.52–1.70)	0.84	32	0.95 (0.57–1.59)	0.85	0.99 (0.58–1.70)	0.97
GP contacts											
0–4	293	85	1	-	-	-	150	1	-	1	-
5–9	318	89	0.90 (0.53–1.54)	0.71	0.83 (0.49–1.42)	0.50	165	0.95 (.60–1.48)	0.80	0.83 (0.52–1.33)	0.45
10–19	236	72	**1.61 (1.02–2.57)**	**0.04**	1.51 (0.94–2.42)	0.09	128	**2.34 (1.56–3.50)**	**< 0.001**	**1.78 (1.16–2.73)**	**0.008**
≥ 20	83	20	**2.23 (1.39–3.56)**	**< 0.001**	**2.03 (1.22–3.36)**	**0.006**	34	**4.10 (2.66–6.31)**	**< 0.001**	**2.24 (1.40–3.58)**	**0.001**

Data on healthcare utilisation are collected one year prior to responding to the questionnaire. *) Adjusted for age, sex and number of conditions. Outpatient contacts, number of admissions and GP contacts were also adjusted for days with admission. GP contacts include daytime consultations, emails and telephone calls

CI Confidence Interval, *MCS* Mental Component Score, *OR* Odds ratio, *PCS* Physical Component Score, *SF- 12* Short Form- 12

Table 4 Study participants'perception of treatment burden (MTBQ) according to health-related mental health (SF-12)

Perceived treatment burden	**Perceived mental health**	
N (%)*	**Low** *(MCS < 40 points)*	**High** *(MCS ≥ 40 points)*
High *(score ≥ 22 points)*	79 (49.1%)	82 (50.9%)
Medium *(score 10—< 22)*	89 (35.7%)	160 (64.3%)
No/Low *(score < 10 points)*	89 (18.9%)	422 (81.2%)

MCS Mental Component Score, *MTBQ* Multimorbidity Treatment Burden Questionnaire, *SF-12* Short Form-12

* Row percentages. Test for trend in proportions = 0.26 (*p*-value: < 0.001)

Table 5 Study participants'perception of treatment burden (MTBQ) according to health-related physical health (SF-12)

Perceived treatment burden	**Perceived physical health**	
N (%)*	**Low** *(PCS < 40 points)*	**High** *(PCS ≥ 40 points)*
High *(score ≥ 22 points)*	114 (70.8%)	47 (29.2%)
Medium *(score 10—< 22)*	156 (62.7%)	93 (37.4%)
No/Low *(score < 10 points)*	207 (39.8%)	313 (60.2%)

MTBQ Multimorbidity Treatment Burden Questionnaire, *PCS* Physical Component Score, *SF-12* Short Form-12

* Row percentages. Test for trend in proportions = 0.24 (*p*-value: < 0.001)

Previous studies have associated a high number of hospital admissions, GP consultations and outpatient visits with poor continuity of care and care fragmentation [20, 30, 31]. These interrelated concepts may add to the burden of treatment, particularly if they impact the patient's time and effort. In a cohort with multimorbidity, Herzig et al. found that increasing treatment burden correlated with more pharmacological treatments and with an increasing number of chronic conditions, which may also be seen as markers of patient workload [11].

Our findings are congruent with previous studies investigating treatment burden in association with HRQoL. The developers of the MTBQ tool reported a positive change over time in HRQoL associated with a reduction in treatment burden [4]. In agreement, Herzig et al. and Gebreyohannes et al. showed that treatment burden was inversely associated with HRQoL [3, 11]. Patients with several chronic health conditions experience burden not only from their illness. The amount of effort they must put into managing their diseases can be experienced as overwhelming [7] and can impact everyday life and the patient's sense of identity [10]. It significantly affects HRQoL by imposing physical, emotional, social, and financial strains on individuals managing medical conditions due to all the workload and psychological impact associated with being a patient [3, 32].

Our findings may indicate that while hospital utilisation primarily focuses on disease control, the use of general practice may align more closely with patients' perceived needs, i.e. treatment burden and HRQoL. This is underpinned by the lower propensity towards perceiving low treatment burden among patients often attending general practice, highlighting a distinction in patient groups based on their specific demands.

Systemic barriers and patient preferences

Systemic barriers and patient preferences can significantly influence assessments of treatment burden and HRQoL, as they shape how patients experience and engage with healthcare [7, 10, 11, 22]. Systemic barriers may include care coordination. If care coordination is lacking, fragmentation across healthcare services can lead to duplicated tests, conflicting medical advice, and poor communication, overwhelming patients. Complicated medication regimes, frequent follow-ups, or unclear instructions can increase treatment burden, especially for patients with multimorbidity. Access to healthcare may also be an influencing factor. Moreover, even in publicly funded systems, such as the Danish welfare system, patients may face personal costs, such as transportation expenses and lost income, which can add to their overall treatment burden [7, 11, 33].

A person-centred approach, as suggested in the Chronic Care Model, includes patient preferences because leaving this out could affect both the experience of treatment burden and HRQoL [22]. For example, preferences regarding consultation type, location, level of care and treatment strategies. However, patient preferences may hinge on a multitude of factors: the person's age, health and wellbeing, capabilities, physical and cognitive abilities, level of support from the patient's social network, environment, workload and financial status. These factors are closely connected to patients' perception of treatment burden and HRQoL [5, 8, 34–36]. Managing one's health may require health literacy to understand medical information, and the capacity to manage complex care requirements must be balanced with the level of healthcare support suggested [32, 33].

Strengths and limitations

With this study, we provide novel research on the perceptions of treatment burden and HRQoL in a large cohort of outpatient attenders. These concepts were based on the patient's self-assessment, which may vary depending on a wide range of factors. The use of validated questionnaires translated into Danish to capture the concepts of treatment burden and HRQoL limits interference from information bias [26, 37]. All aspects of treatment burden are included in the MTBQ questionnaire, as identified in a comprehensive evidence-based framework [4, 26]. Both the MTQB and the SF-12 are efficient tools for assessing treatment burden and HRQoL and have shown correlations with related measures, respectively [26, 37]. The questionnaires have been validated across various populations, ensuring reliability and consistency [27]. Using questionnaire responses may result in selection bias. Furthermore, a limitation of this study is that we were unable to analyse information about non-responders. Still, the response rate (59.8%) was high, considering that this was a population affected by or undergoing diagnostics for multiple medical conditions [38]. Because questionnaire data and healthcare utilisation data were collected during the same time intervals, causality cannot be argued. Healthcare utilisation was restricted to public hospitals and GPs, whereas including private practising physiotherapists and chiropractors, private hospitals, home nursing and trips to the pharmacy could have strengthened our study. However, including these sectors would likely not have changed our conclusion.

Many high-income countries, like Denmark, face a rising number with multimorbidity with increasing need for healthcare services [13]. Studying these factors can provide insights into whether care demands are balanced with patient wellbeing. We argue that this study is generalisable to a broad population of medical outpatients in settings similar to Danish healthcare, where healthcare is universally available and free at the point of use.

Perspectives

We observed a noteworthy but counterintuitive lack of association between treatment burden on one hand and HRQoL and hospital utilisation and the strong association with higher GP utilisation on the other. The patients included in this study showcased a diversity of multimorbidity and medical needs and were all identified at the hospital with two or more outpatient clinic trajectories. The organisation of hospital care, which focuses on single diseases, may mean that the care is more standardised and not tailored to the patients'perceived demands for care. In general practice, however, heightened patient-perceived demand and medically assessed needs may prompt an upscaling of the utilisation of these services.

Our interpretation is that individuals experiencing a high treatment burden require frequent GP contact and more attention due to many other issues than those being treated at the hospital. Despite support and treatment, these patients remain the most severely affected and therefore attend more GP consultations than other groups.

In a setting with universal access to hospital and specialist care, we hypothesised that the association between high treatment burden versus GP and hospital utilisation would be similar. The number of involved healthcare providers, provider transitions and hospital trajectories were previously found to rise with increasing morbidity levels [20]. Future studies are warranted to explore the mechanisms underlying these association and to uncover whether a positive effect is associated with coordinating the number of medical contacts among patients with high perceived treatment burden and low HRQoL.

Conclusion

High perceived treatment burden and low perceived HRQoL were associated with a high number of GP contacts but not with hospital use. Thus, patients with high healthcare needs seem to use general practice more rather than hospitals.

Acknowledgements

Information about this is provided within the manuscript

Authors' contributions

CB made the execution, acquisition of data, analysis and drafted the manuscript. All authors contributed to the work reported, including conception, study design, interpretation or critically reviewing the article. All authors gave their final approval of the version to be published, agreed on the journal to which the article has been submitted and acknowledged being accountable for all aspects of the work.

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Data availability
Information about this is provided within the manuscript.

Declarations

Ethics approval and consent to participate
According to the Committee on Health Research Ethics of Central Denmark Region, the Danish Act on Research Ethics Review of Health Research Projects did not apply. This research was conducted in accordance with the Declaration of Helsinki. Patients who participated gave their consent, and permission to retrieve data from the administrative hospital systems was obtained from the legal department of Central Denmark Region. We de-identified the data while performing the analyses and stored the questionnaire data from REDCAP data and the register-based data in MidtX, a digital platform suitable for secure storage.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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