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ORIGINAL ARTICLE

Physical and psychological symptom burden in patients and caregivers during follow-up care after curative surgery for cancers in the pancreas, bile ducts or duodenum

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ABSTRACT

Background: The primary aim was to assess Health Related Quality of Life (HRQoL), anxiety and depression in patients and caregivers during follow-up care after curative treatment for cancer in the pancreas, duodenum, or bile ducts. The secondary aim was to assess dyadic coping and the burden of being a caregiver.

Materials and methods: In this prospective observational cohort study, we included patients and caregivers at first follow-up visit to conduct the following: Demographic characteristics, The European Organization for Research and Treatment of Cancer Quality of Life, the pancreas and bile duct module, EQ5D 3L, GAD-7 and PHQ-9 at baseline, and at six and nine-months follow-up visit. Demographic characteristics, Dyadic Coping Inventory and Zarit Caregiver Burden Questionnaire were conducted at baseline and at nine-months of follow-up visit.

Results: The response rate was 42% with 104 of the 248 invited patients completing the questionnaires at baseline: 78 (75% of 104) after six and 69 (66% of 104) after nine months. The median (Q25,75) time for inclusion was 33.6 (13.4, 38) and 29.1 (18.3, 36) weeks after surgery for patients with pancreatic or duodenal cancer, and bile duct cancer, respectively. The response rate of caregivers was 88% with 75 of 85 completing the questionnaires. Fifty percent of patients with pancreatic or duodenal cancer had diarrhea at baseline. After six and nine months, this increased to 75%. Fatigue was the most prominent symptom in patients with bile duct cancer after nine months with 25% of patients scoring this as a clinical symptom.

Conclusions: The study highlights the need to systematically screen physical and psychological symptoms in patients and caregivers during follow-up care after treatment for cancer in the pancreas, duodenum and bile ducts. Symptom management during follow-up care should be prioritized by clinicians.

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KEYWORDS
Follow-up care; cancer; caregivers; burden; QoL; anxiety; depression

Background

Cancers of the pancreas (PC), duodenum (DC) and bile ducts (BDC) all have poor prognosis with a five-year survival rate around 8% at all stages [1,2]. Extensive and advanced surgery followed by adjuvant chemotherapy is the only possible cure, however even after this, the five-year survival rate is low as there is no curative treatment available in case of relapse [1,2].

PC, DC, and BDC are characterized by rapid disease progression and a high physical and psychological symptom burden [3–6] characterized by low health related quality of life (HRQoL) and increased risk of depression and anxiety [3,7,8]

In recent years, cancer-related research has expanded to also embrace the experience of cancer couples. Previous studies show that the cancer patients and caregivers' impact each other's wellbeing. Hence, coping with cancer plays out in patient-partner dyads [9]. We know that PC negatively affects the long-term psychological symptom burden in patients and caregivers [3,4,8]. However, we do not know how PC, DC or BDC affect physical and psychological adjustment and the couples' relationship satisfaction in a dyadic perspective.

Because of the relatively aggressive nature of these cancers and the extensive cancer surgery followed by chemotherapy, follow-up care is complex [6]. Therefore, there is a

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need for knowledge about the physical and psychological impact on patients and caregivers during the specific follow-up period. Expanding this field will contribute important knowledge on areas such as needs or physical or psychological symptoms that could be improved during follow-up care in both patients and caregivers through relevant interventions. The primary aim of this study was therefore to assess the physical and psychological symptom burden (HRQoL, anxiety and depression) in patients and caregivers during the first nine months of attending follow-up care after curative treatment for PC, DC or BDC. The secondary aim was to assess their dyadic coping and the burden of being a caregiver.

Material and methods

This prospective observational cohort study was reported according to the guidelines for reporting observational cohort studies described in The STROBE Statement [10]. The study was conducted at The Department of Surgery and Transplantation, at a university hospital in the Capital Region of Denmark where most of the Danish patients with PC, DC, or BDC are surgically treated. Depending on the specific pathological diagnosis most patients are offered adjuvant chemotherapy. The number of series varies depending on tumor location and the patient's physical condition. Patients therefore embark on routine follow-up care visits at varying timepoints, normally within six months after surgery. In Denmark patients undergoing treatment for PC, DC and BDC attend follow-up care at highly specialized surgical centers. The follow-up care program involves regular visits every third month the first postoperative year and hereafter, the visits are scheduled every six months up to two or five years post-operatively depending on the cancer diagnosis. Traditionally, follow-up care after surgery focusses on detection of recurrence and potential postoperative complications. Further, it involves clinical assessment and evaluation of the individual patients' wellbeing and needs as recommended in clinical guidelines [11]. Patients with BDC or DC attend follow-up care with surgeons; patients with PC attend their first follow-up care visit with a surgeon and if there are no severe surgical side effects, the patients are subsequently seen by specialized outpatient clinic nurses. Due to the varying duration of adjuvant chemotherapy, including potential delays, patients embark on follow-up care at different time-points.

We included patients in connection with their first routine follow-up care visit defined as baseline after radical cancer surgery. Inclusion criteria were: $\geq$18 years old, histological, and clinical diagnosis of PC, DC or BDC, no severe cognitive disability, and sufficient Danish language proficiency. The exclusion criteria were detection of recurrence at baseline. Eligible patients were identified by the outpatient clinic nurse and asked if the primary investigator (KD) could contact the patients regarding participation. Patients who accepted participation defined who their nearest caregiver was, if any. Hereafter, the questionnaires were mailed within one week after the first follow-up care visit and again after six and nine months.

Inclusion took place from March 2017 to July 2020 with nine months follow-up completed in April 2021. This period was chosen because it represents the period when treatment with surgery and chemotherapy is completed and side effects and HRQoL have begun to stabilize [7], and because follow-up care takes place within this timeframe [11]. The primary outcomes for patients and caregivers were physical symptom burden measured by HRQoL, and psychological symptom burden measured by depression, and anxiety. The secondary outcomes were dyadic coping, and the burden of being a caregiver.

To assess HRQoL in patients, we used the Danish version of The European Organization for Research and Treatment of Cancer Quality of Life (EORTC QLQ C30) [12]. The questionnaire consists of 30 items: The global health scale, five functional scales (physical, role, emotional, cognitive and social functioning), three symptom scales (fatigue, nausea and vomiting and pain), six single item scales (dyspnea, insomnia, appetite loss, constipation, diarrhea and financial difficulties). This multi item questionnaire is a reliable and valid measure of QoL meeting the minimal standards for reliability (Chronbach's alpha coefficient $>$0.70) [12].

To measure PC and DC patients' specific cancer symptoms, we used EORTC PAN26 questionnaire. It consists of 26 questions, and 7 multiple item scales (pain, digestive symptoms, altered bowel habits, body image, satisfaction with health care and sexuality) To measure BDC patients specific cancer symptoms, we used EORTC BIL21 questionnaire [13]. It consists of 21 questions and eight multiple item scales (eating, jaundice, tiredness, pain, anxiety, treatment side effect, drain and weight loss). As this questionnaire was not available in Danish, we translated this in collaboration with the EORTC Group according to their procedure [14].

All questions are rated on a four-point Likert Scale. Higher scores on the functional scales indicate higher functioning, whereas higher scores on the symptom scales indicate a higher symptom burden. A threshold for clinical importance was set for EORTC QLQ30 [15], however this was not available for the cancer specific symptom scores PAN26 and BIL21. Clinical importance is according to Giesinger et al. [15] any aspect of a health problem that makes it relevant for clinical encounter. We analyzed data, raw scores and missing data as recommended in the EORTC manual [16].

To assess HRQoL in caregivers, we used EuroQol (EQ)-5D3L with three levels of severity. The questionnaire consists of five dimensions: mobility, self-care, usual activities, pain/-discomfort and anxiety/depression, plus a visual analogue scale from 0 to 100 indicating the 'the worst health you can imagine' to 'the best health you can imagine' where 100 is the best imaginable health state. By combining responses to the EQ-5D3L, a numerical summary score was derived by a utility weight. The summary score was computed by a formula that first yields a partial weight score for each dimension separately, depending on the reported level for that dimension, and secondly added these partial utility weights to a score between 0 and 1 commonly. The set of weights per level and per dimension has been derived at an earlier stage from preference data of the Danish population with

Danish norms used [17]. We analyzed data according to EQ-5D3L scoring manual [18].

Depression was measured by the Patient Health Questionnaire (PHQ-9). It consists of 9 items scored as '0' (not at all) to '3' (nearly every day), and a total summed score ranging from 0 to 27 points. Scores of 5, 10, 15, and 20 points, indicate: mild, moderate, moderately severe, and severe depression, respectively [19] In the present study we chose to group mild and moderate into 'normal range' (0–10 points), and moderately severe and severe depression into 'high risk of major depression' (11 points and above) as a result of the small sample size. This item has an high reliability with a Chronbach's alpha coefficient of 0.89 [19].

Anxiety was measured by the and the Generalized Anxiety Disorder questionnaire (GAD-7). It consists of 7 items scored as '0' (not at all) to '3' (nearly every day), and a total summed score ranging from 0–21 points. Scores of 5, 10, and 15 points indicate cutoffs for mild, moderate, and severe anxiety, respectively. The reliability of this item was high with Chronbach Alpha coefficient of 0.92 [20].

Dyadic coping and perceived communication in couples were assessed and analyzed by the Dyadic Coping Inventory (DCI) [21]. The DCI has been validated in several languages [22–24] and has been translated into Danish by backward and forward translation procedures [25]. However, this measure has not yet been validated in Denmark and was not specifically developed for cancer. The patient and caregiver report their stress experience to the other and their general satisfaction of the overall dyadic coping. The items were rated on a 5-point scale from 1 to 5: 1 'very rarely' to 5 'very frequently'. The subscales were scored by addition of item scores. The cutoff values were: total score <111, dyadic coping below average; between 111 and 145, dyadic coping in the normal range; >145 dyadic coping above average. This multi-item questionnaire has a high reliability with a Chronbach alpha coefficients range of 0.71–0.92 [21].

The caregiver burden was measured by The Zarit Caregiver Burden questionnaire (ZCB) [26]. It includes different consequences of caregiving, e.g., guilt, embarrassment, anger, frustration, and personal strain. ZCB is a 22-item five-point Lickert scale with answers from 0 (never) to 4 (nearly always). Scores range from 0 to 88 points, where 88 indicates the maximum perceived burden. The cutoffs were differentiated into two levels: little to moderate burden (<40), moderate to severe burden (>41) [27,28]. This item has a reliability score with a Chronbach alpha coefficient range of 0.89–0.95 [29].

Demographic characteristics, Dyadic Coping Inventory, and Zarit Caregiver Burden Questionnaire were mailed at baseline and at nine months follow-up care. EORTC QLQ 30 PAN26 & BIL21, EQ-5D3L, GAD-7 and PHQ-9 mailed at baseline, at six and nine-months follow-up care. Clinical variables and comorbidity were obtained from medical records after nine months of follow-up. Comorbidity was calculated by Charlson Comorbidity Index and scored as 0, 1, or ≥ 2 [30].

Descriptive statistics were used to assess the distributions of patients and caregivers' characteristics. Data was analyzed using descriptive statistics with means (parametric data) and medians (non-parametric data). The median, 25 and 75% quantiles (Q1,3) were calculated for all endpoints and missing values were excluded. The association between the EQ-5D3L index of the caregivers and the Global Health status (EORTC) of the patients was modeled using linear regression with linear splines. *p*-Values were derived by ANOVA. The relationship between patient and caregiver scores for dyadic coping was also modeled using linear regression with linear splines. Due to a high degree of attrition, we performed two sub-analyses, comparing HRQoL scores between patients who responded and did not respond at 6- and 9-months follow-up. The alpha level was set to 0.05, for a two-tailed test. R version 4.1.3 with splines package was used for the analysis.

Results

The response rate was 42% with 104 of the 248 invited patients completing the questionnaires at baseline: 78 (75% of 104) at six month and 69 (66% of 104) at nine months of follow-up care. The mean (Q1,3) time for inclusion in the study was 33.6 (13.4, 38) and 29.1 (18.3, 36) weeks after surgery for PC/DC and BDC, respectively. The caregiver response rate was 88% with 75 of the 85 invited caregivers completing the questionnaires. Nineteen patients reported they did not have any caregiver. Seventy percent were couples. Most of the patients were males (51%), and caregivers females (65%). Furthermore, 70% of the patients and 68% of the caregivers were unemployed or pensioners. Most patients were diagnosed with PC (73%) followed by BDC (17%) and DC (10%). The median age of PC/DC patients and caregivers was 71.4 and 71.1 years respectively, and the median age of BDC patients and caregivers was 70.2 and 73.6 years, respectively. Fifty-eight percent of the patients had comorbidity 2+. Twenty-seven (26%) patients had relapse and 12 (12%) patients died within the nine-months follow-up care period. Further characteristics are given in Table 1.

Health related quality of life

The median global health status score in patients with PC/DC was 66.67 (50; 83.33) at baseline; 75 (58.33; 83.33) and 70.83 (58.33; 83.33) at six- and nine-months follow-up care, respectively (Figure 1(a–d)). The corresponding global health status score in patients with BDC was 66.67 (58.33; 91.67) at baseline; 75 (50; 91.67) and 54.17 (50; 72.92) at six-and nine-months follow-up care, respectively. The functional scale scores in both PC/DC and BDC patients were above threshold for clinical importance indicating no clinical important symptoms. This was except from the physical functional score at baseline (81.67 (66.67; 93.33)) where more than 50% of the PC/DC patients scored below threshold for clinical importance (83) indicating clinical symptoms of importance. In BDC patients, the physical functional score even decreased over time from 78.04 (66.67; 93.33) at baseline to 70.48 (66.67; 96.67) after nine months. Most symptom scores in patients with PC/DC were below clinical threshold indicating no important clinical symptoms. However, symptoms as

Table 1. Sociodemographic characteristics of 104 Danish patients diagnosed with cancer in the pancreas, duodenum or bile ducts and 75 caregivers.

Demographic variables		Patients ($N = 104$)	Caregiver ($N = 75$)
Inclusion in study			
Weeks since surgery for pancreatic/duodenal cancer	Median (Q1,3)	33.6 (13.4, 38)	.
Weeks since surgery for bile duct cancer	Median (Q1,3)	29.1 (18.3, 36)	.
Age			
Pancreatic and duodenal cancer	Median (Q1,3)	71.4 (67.0, 75.8)	71.1 (64.4, 76.6)
Bile duct cancer	Median (Q1,3)	70.2 (64.8, 73.8)	73.6 (64.6, 76.0)
Male gender	*n* (%)	53 (51)	26 (35)
Highest completed education			
Basic or high school	*n* (%)	41 (39)	34 (45)
High education	*n* (%)	57 (55)	39 (52)
Missing	*n* (%)	6 (6)	2 (3)
Employment status			
Employed	*n* (%)	26 (25)	24 (32)
Unemployment/pensioners	*n* (%)	73 (70)	51 (68)
Missing	*n* (%)	5 (5)	
Children living at home			
Yes	*n* (%)	9 (9)	.
Missing	*n* (%)	6 (6)	.
Living with a partner			
Yes	*n* (%)	70 (67)	.
Missing	*n* (%)	6 (6)	.
Type of caregiver			
Married	*n* (%)	.	67 (89)
Other	*n* (%)	.	8 (11)
BMI			
BMI at baseline	Mean (SD)	23.09 (4.18)	.
BMI at nine months follow-up	Mean (SD)	23.53 (5.66)	.
Clinical variables			
Diagnosis			
Pancreatic cancer (C241, C250–252, C258)	*n* (%)	76 (73)	.
Duodenal cancer (C170)	*n* (%)	11 (10)	.
Bile duct cancer (C24, C240–41, C248)	*n* (%)	19 (17)	.
Comorbidity (Charlson Score)			.
0	*n* (%)	38–39 (38)	.
1	*n* (%)	<3 (4)	.
2+	*n* (%)	59 (58)	.
Surgery			.
Distal pancreatic resection	*n* (%)	10 (10)	.
Total pancreatic resection	*n* (%)	11 (10)	.
Pancreaticoduodenectomy	*n* (%)	67 (64)	.
Hepatectomy	*n* (%)	9 (9)	.
Other	*n* (%)	7 (7)	.
Length of stay (days)			
Pancreatic and duodenal cancer	Median (Q1,3)	9 (7.0, 17.7)	.
Bile duct cancer	Median (Q1,3)	6 (4.8, 9.2)	.
Pre and post medical treatment			
Medical treatment of depression pre surgery	*n* (%)	2 (2)	.
Medical treatment of depression post surgery	*n* (%)	0 (0)	
Nutritional dysfunction pre surgery, yes	*n* (%)	6 (6)	.
Nutritional dysfunction post surgery, yes	*n* (%)	69 (66)	
Category at pathologic examination			
Tumor			
T1–2	*n* (%)	39 (37)	.
T3	*n* (%)	62 (59)	.
Other (TX/T4)/Missing	*n* (%)	4 (4)	.
Nodal involvement			.
N0	*n* (%)	34 (33)	.
N1–2	*n* (%)	68 (65)	.
Missing	*n* (%)	2 (2)	.
Treatment with adjuvant chemotherapy			
Yes	*n* (%)	69 (66)	.
Number of series	Median (Q1,3)	6 (6,8)	.
Missing	*n* (%)	2 (2)	.
Relapse within nine month of follow-up care	*n* (%)	27 (26)	.
Death within nine month of follow-up care	*n* (%)	12 (12)	.

Q: Quantile.

diarrhea, dyspnea, nausea, and vomiting were above clinical threshold during the nine months follow-up period indicating clinical symptoms of importance. Fifty percent of the PC/DC patients had baseline scores above clinical threshold for diarrhea, and after six and nine months of follow-up care 75% of all patients indicated symptoms of importance with respect to diarrhea. Furthermore, more than 25% of the patients had dyspnea symptoms above threshold for clinical importance at

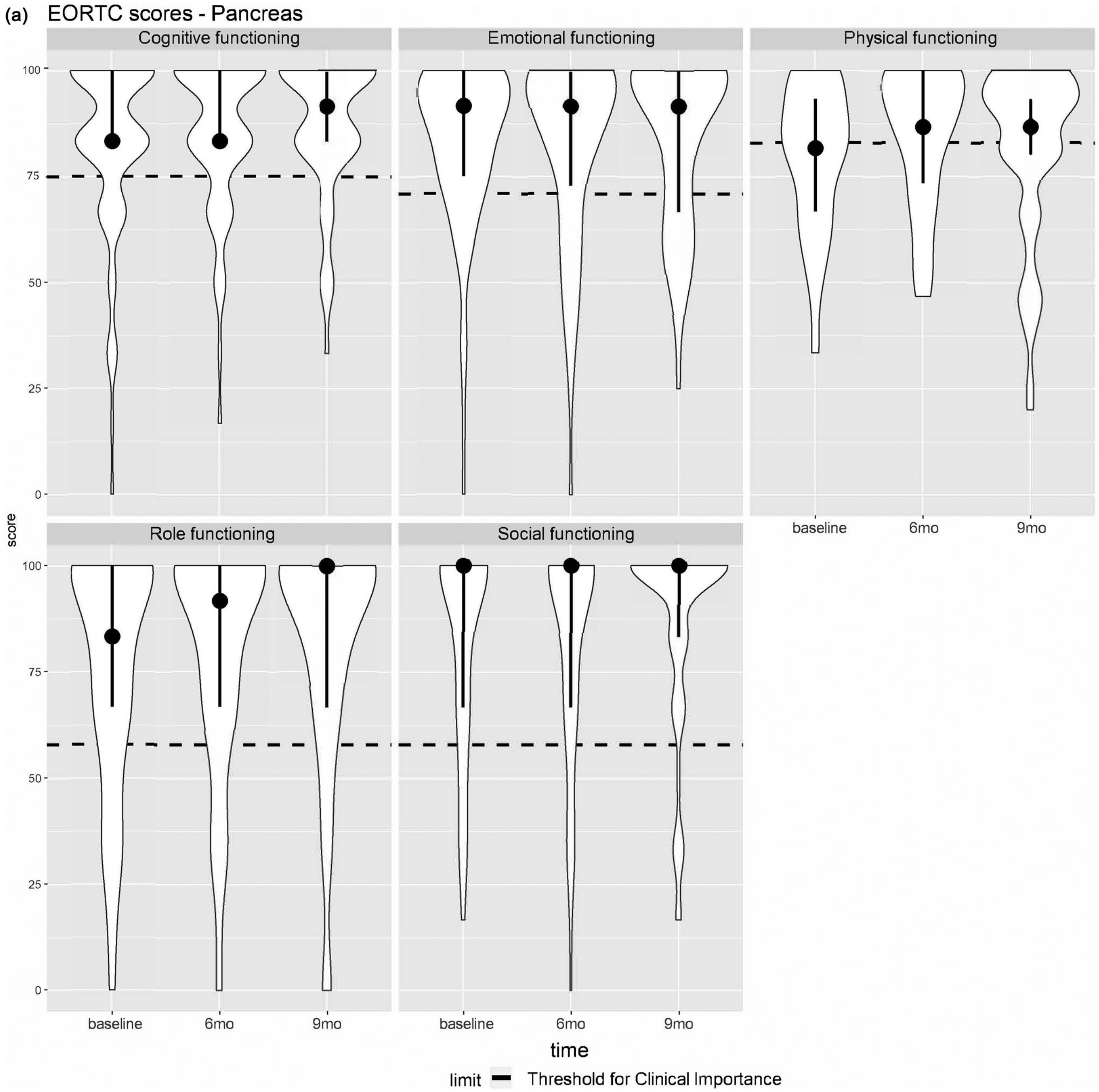


Figure 1. Functioning and symptom scales of EORTC QLQ-C30 in Danish patients after radical treatment with surgery and chemotherapy for cancer in the pancreas, duodenum ($n = 87$) or bile ducts ($n = 17$) measured when attending first follow-up (baseline) and after six and nine months.

baseline and at six months also indicating this as an important clinical symptom. In BDC patients, fatigue was a prevalent symptom at nine months with 25% of patients scoring this as a clinical symptom (38.89 (2.78; 61.11)).

From the PAN26 module, we found stable scores for weight loss concern throughout the follow-up period (33.33 (33.33; 66.67)). Further, satisfaction with health care was also stable with a median score of 66.67 (33.33; 100) at nine months. From the BIL21 module, we found that fatigue increased throughout the follow-up period with a median score at baseline of 22.22 (00; 36.11) to 33.33 (22.22; 66.67) (Supplementary Material, Figure 1a,b).

An association between patients higher HRQoL scores and caregivers higher HRQoL score was found at six months of follow-up care ($p = .004$). However, this association was not significant at baseline or at nine months follow-up (Figure 2).

Finally, results of the subgroup analyses showed a trend for patients not responding at six and nine-months follow-up care having a poorer HRQoL scores as diarrhea and dyspnea at baseline and at six months, compared to patients answering at six- and nine-months follow-up (data not shown).

Depression and anxiety

Most patients and caregivers had depression and anxiety scores within normal range throughout follow-up care. However, patients' anxiety scores increased at nine months,

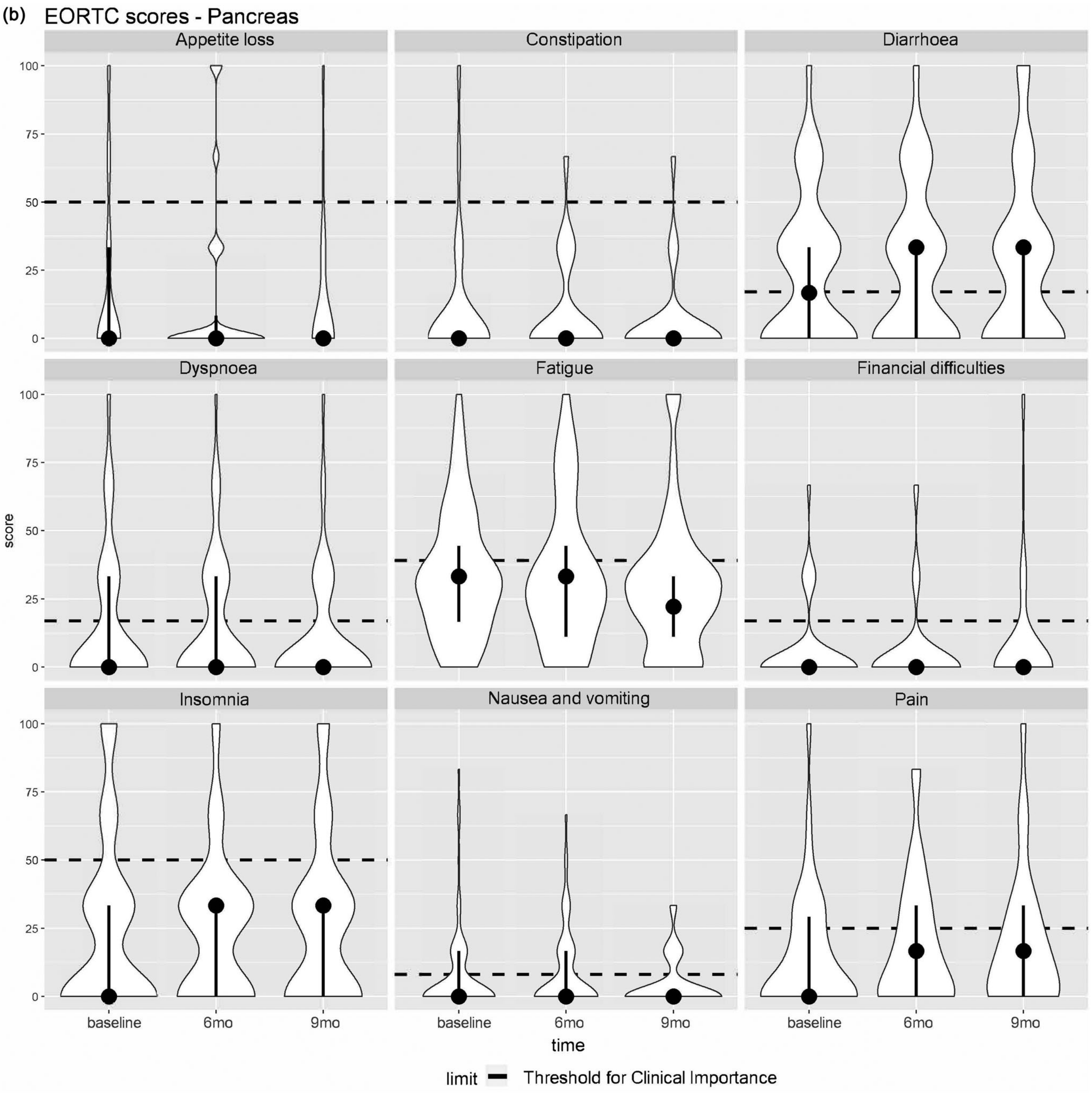


Figure 1. (Continued).

while 25% of caregivers reported mild anxiety scores at baseline and at nine-month follow-up (Figure 3).

Dyadic coping in patients and caregivers living as couples

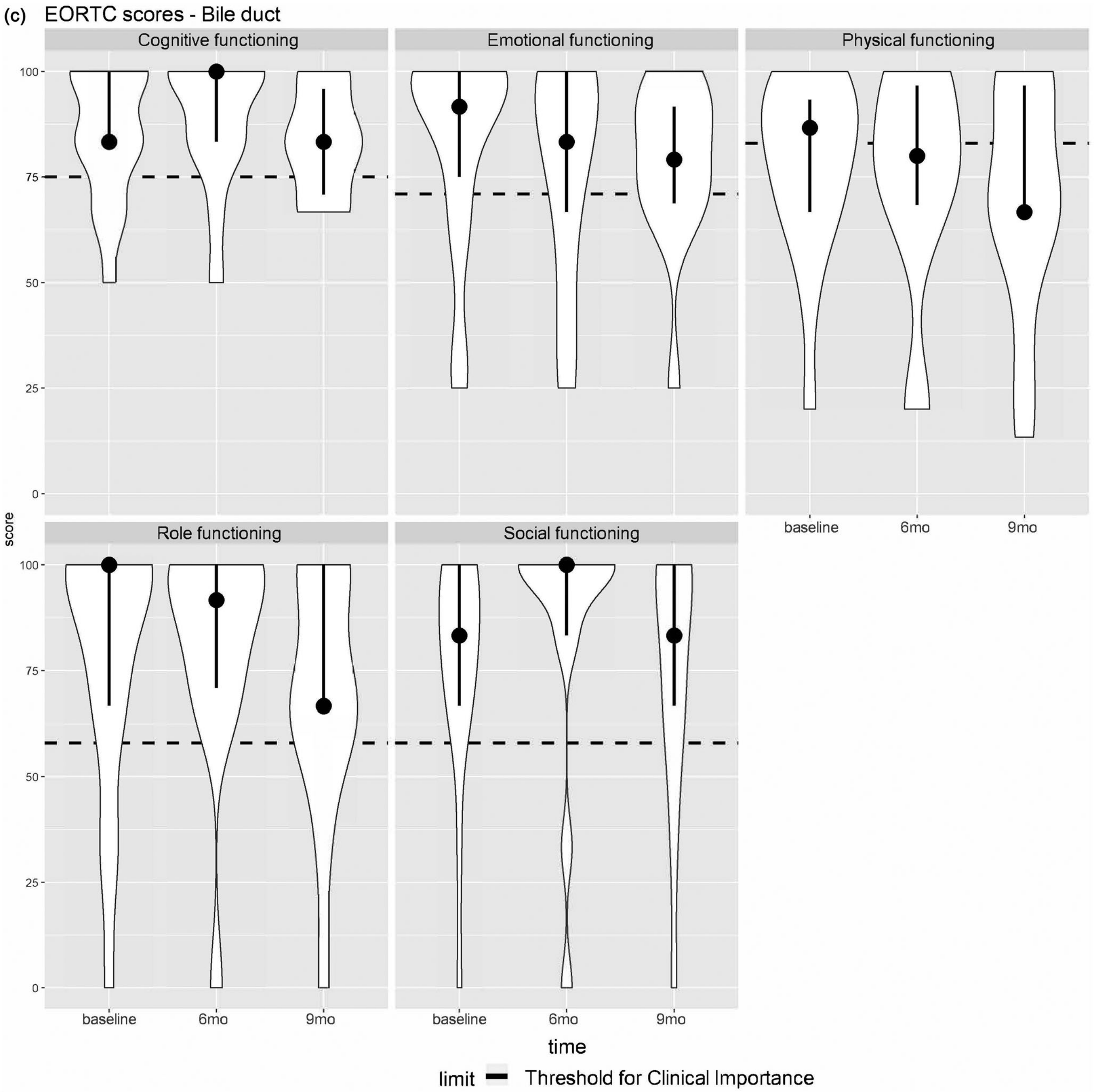
Analysis of DCI in patients and caregivers ($n = 69$) showed that the patients and caregivers tend to both cope within normal range at baseline ($p = .001$) and below normal range at nine months ($p < .001$) (Figure 4). The total DCI scores are visualized in Supplementary Table 1.

The burden of being a caregiver

The number of caregivers who experienced a high burden was low, with <3 of 73 caregivers and 5 of 59 caregivers at baseline and at nine months of follow-up care, respectively. The median score was 15.1 (7–19) and 12.5 (7–20) at baseline and at nine month of follow-up care, respectively.

Discussion

In the present prospective cohort study, we found that physical and psychological symptom burden in patients and caregivers lasted up to nine months after termination of treatment for cancer in the pancreas, duodenum, or bile ducts. Even up to nine months after treatment, more than 50% of the patients had poor physical function and symptoms as diarrhea, dyspnea, nausea, and vomiting, which negatively impacted patients. Especially, diarrhea was a prominent symptom with 75% of the PC/DC patients scoring



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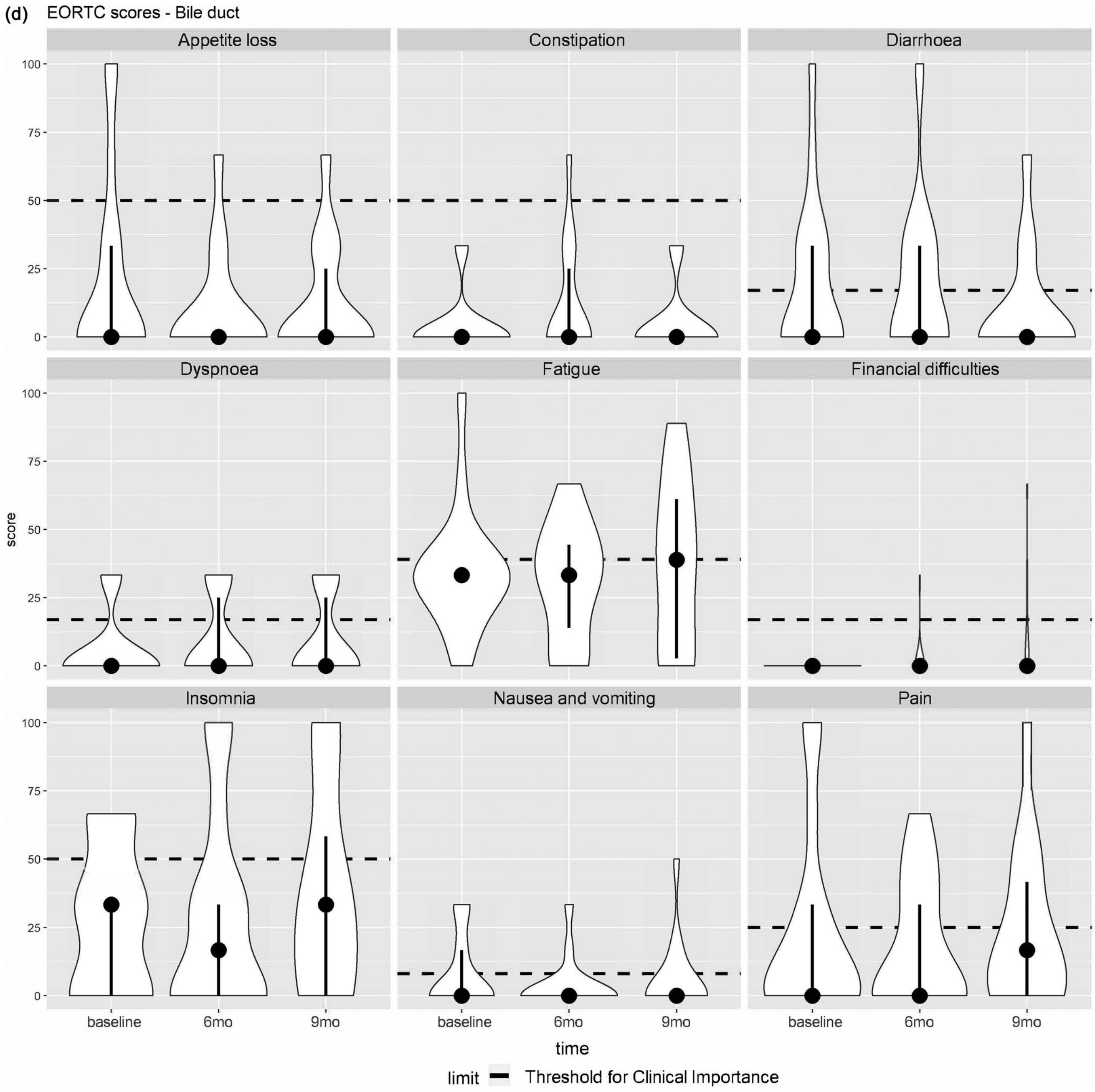
this as a clinical problem despite 66% of the patients receiving treatment with pancreatic enzyme replacement. Despite cachexia being a prominent symptom and 69% of the patients experiencing post-operative nutritional dysfunction, we did not find a decrease in the patients' BMI. This may be due to the small sample size at nine months. The relatively low physical functioning reported by patients throughout the study may be attributed to 58% of patients having a comorbidity score of 2+ pre-surgery.

The most prominent symptom in BDC patients was fatigue throughout the study period. These findings are in line with a previous study [31] and call attention to intervene on fatigue during follow-up care. Yeo et al. [32] found significant benefit of a home-walking program regarding fatigue, physical functioning, and HRQoL in PC patients, an easy intervention to implement in follow-up care. Gupta et al. recently investigated physical exercise on feasibility and adherence for PC patients during treatment [33]. They found that physical exercise was feasible and it improved PC patients' physical function, HRQoL and muscle mass. In relation to the negative impact of cachexia in PC/DC patients, Gupta et al. argue that improving muscle mass and strength *via* exercise could benefit this cancer population. However, more rigorous research is needed to develop precise exercise protocols to determine the physical and psychological impact.

We found that 25% of the caregivers had mild anxiety scores. We have in a previous study similarly reported that



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11% of partners of PC patients (all stages) had anxiolytics prescribed within the first year after the patients' diagnosis [4]. Findings from our study indicate that caregivers deal with major caregiving tasks even after the patient has ended cancer treatment. Bauer et al. [34] who investigated QoL in patients with PC and their caregivers found that the psychological burden in PC patients often exceeds that in patients with other cancers. Likewise, Bauer et al. [34] found that caregivers reported more negative emotions than patients, and that more caregivers than patients reported anxiety. Our findings further highlight the need for systematic monitoring during follow-up care of caregivers' psychological symptom burden as also recommended by American College of Surgeons [35] and Institute of Medicines' [36]. In recent years, the scope of cancer research has expanded to also include the experience of cancer couples, indicating that both the patients and their caregiver are under cancer-related stress [9]. It is further known that dyadic coping influences couples' adaptation to cancer, and there is an association between communication and dyadic outcomes [9]. To the best of our knowledge this study is the first to explore dyadic coping after surgery in PC/DC/BDC patients. Our findings indicate decreased dyadic coping through follow-up care. Chen et al. [9] argue that negative dyadic coping is detrimental to adaptation to cancer. As PC/DC/BDC are characterized by rapid disease progression, non-adaptation

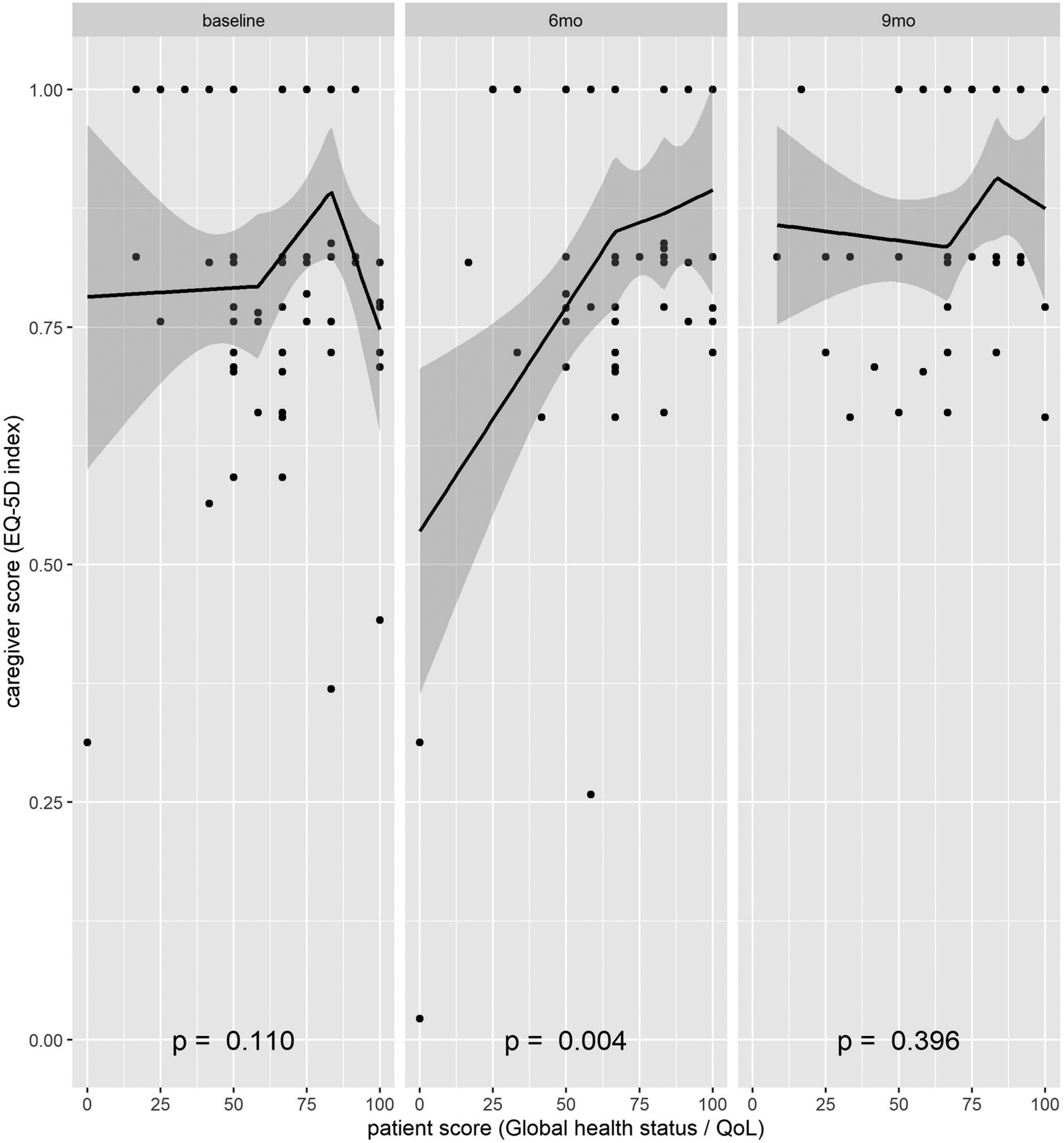

Figure 2. Association of QoL (EORTC Global Health score versus EQ5D3L index score) in Danish patients after radical cancer treatment with surgery and chemotherapy for cancer in the pancreas, duodenum or bile ducts ($n = 104$) and their caregivers ($n = 75$) measured at baseline and after six and nine months of follow-up care.

or insufficient adaptation may further worsen HRQoL and the psychological symptom burden. Previous studies highlight the fact that caregivers often view their own needs secondary to the patients [37], and that caregivers seek to balance their own feelings with the needs of the patient [38]. This might potentially affect the dyadic coping and the adaptation to the cancer diagnosis. A more comprehensive understanding of dyadic dynamics in cancer couples is needed as well as interventions focusing on the couples' needs during follow-up care.

Strengths and limitations

A strength of the study is the longitudinal prospective design and the focus on patients' and caregivers' physical and psychological symptom burden during the follow-up care period. Only few studies have prospectively investigated patients and caregivers' symptom burden [34,39]. However, no study has to the best of our knowledge focused on the burden during follow-up care after radical treatment. Furthermore, this study is to our knowledge the largest

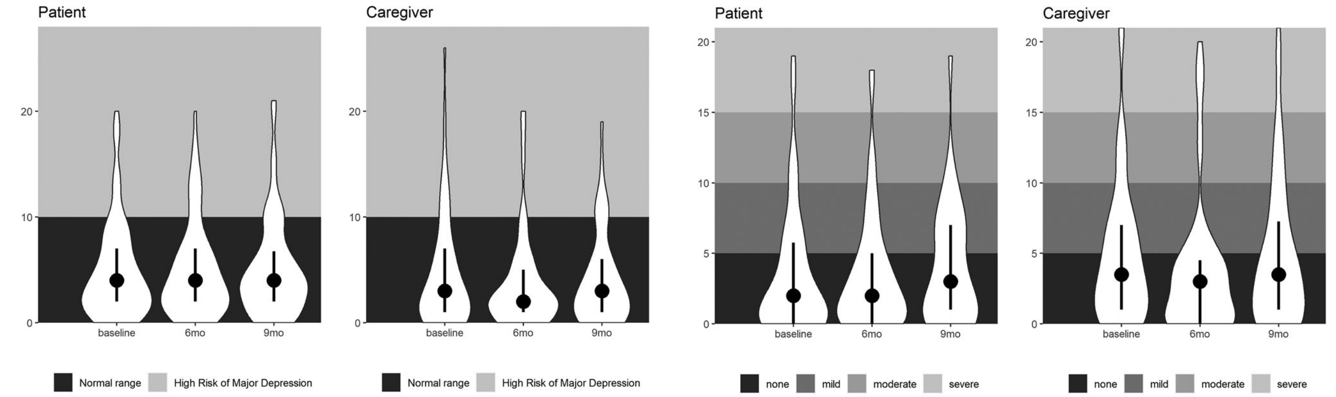

Figure 3. Depression and anxiety score distribution in Danish patients ($n = 104$) and caregivers ($n = 75$) after radical cancer treatment with surgery and chemotherapy for cancer in the pancreas, duodenum or bile ducts measured when attending first follow-up (baseline) and after six and nine months.

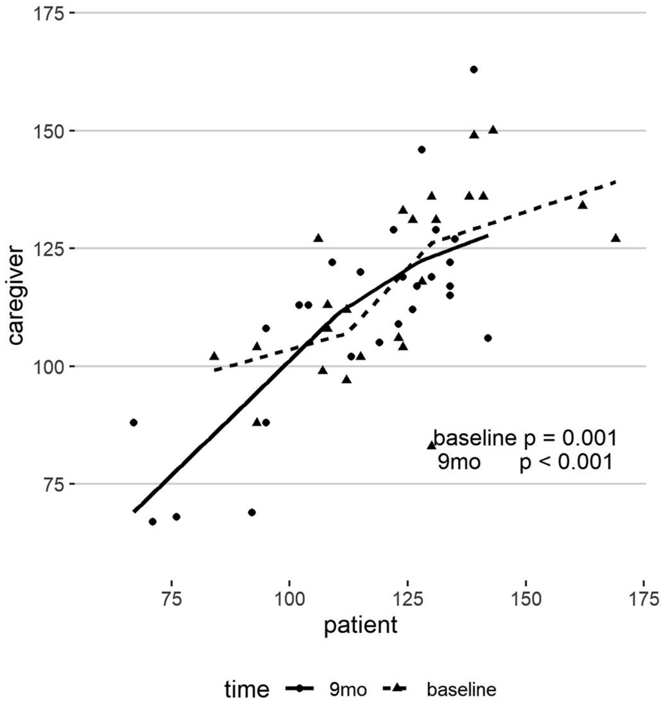

Figure 4. Dyadic coping (median scores) in Danish patients versus caregivers ($n = 69$) after radical cancer treatment with surgery and chemotherapy for cancer in the pancreas, duodenum or bile ducts measured when attending first follow-up (baseline) and after nine months.

longitudinal Danish study of PC/DC/BDC patients and caregivers attending follow-up care. It is also the first to use PROMS and the first to measure the cancer specific module for patients with BDC.

The statistical power is limited by the small sample sizes as these cancers are relatively rare in Denmark, especially BDC. In comparison with similar studies [8,34] the response rate was low with 42% answering the questionnaires. We do not have reasons for drop out in our study, and at 9 months follow-up, 44% of participating patients did not respond 12 due to death and 23 due to unknown reasons. However, the sub-analysis performed on non-responders (at six and nine months of follow-up), clearly indicates that the patients who dropped out of the study were sicker than those completing the study and our results may therefore be biased toward better physical and psychological outcomes. Even though we did not perform a sub-analysis for the missing data in caregivers these results might be similarly biased.

Clinical implications

The present study highlights the need for systematic screening of physical and psychological symptom burden in patients and caregivers during follow-up care after radical treatment for cancer in the pancreas, duodenum, and bile ducts. Furthermore, focus on symptom management and systematic screening for physical and psychological symptoms during the follow-up care period should be prioritized by clinicians at the specialized centers that offer follow-up care.

Conclusion

Patients and their caregivers attending follow-up care after radical treatment for cancer in the pancreas, duodenum or bile ducts are at risk of physical and psychological symptoms. Especially symptoms as diarrhea, dyspnea, nausea, vomiting, and fatigue are prominent during follow-up care.

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Ethical approval

The study was performed in compliance with the Helsinki Declaration. The Central Science Ethics Committee evaluated the study protocol and deemed the further approval necessary (16020895). The Danish Data protection Agency approved the study (RH-2016-132, I-Suite number 04662). We obtained written informed content from the patients and their caregivers.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

Data cannot be made open because of the relatively small sample size. Data can be shared on reasonable request.

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