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ORIGINAL ARTICLE

Health-related quality of life of patients with haematologic cancer during COVID-19 and their opinions on telehealth consultations – a Danish single site cross-sectional survey

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ABSTRACT

Introduction: During the COVID-19 pandemic, high-risk patient groups might have practiced social distancing and sheltering, and hospitals may have changed or postponed treatments and examinations. We aimed to explore health-related quality of life (QoL) in patients with haematological diseases during the early phase of the pandemic and their acceptability of using telehealth.

Patients and methods: We performed a cross-sectional survey among patients at the Department of Haematology, Odense University Hospital, Denmark. Eligible participants were patients receiving either active treatment or survivors in a follow-up program. The survey was open from 22 May to 13 June 2020. The survey contained questions on concerns and the impact of COVID-19 and acceptability on telehealth in addition to the assessment of health-related QoL. The later was assessed by the European Organisation for Research and Treatment of Cancer core QoL (EORTC QLQ-C30) questionnaire with the subdomains Global QoL, emotional functioning (EF) and social functioning (SF) being of primary interest. Further, anxiety during COVID-19 was assessed by use of an adapted version of the generalised anxiety disorder (GAD-7) questionnaire.

Results: 4420 patients were eligible to participate. The response rate was 53% ($n = 2239$) of which 37% where in a treatment program and 63% where in a follow-up program. The majority (80%) of patients were concerned about contracting COVID-19. The global QoL score (69.0, ±SD 22.6) was markedly lower than EF (84.5, ±SD 18.9) and SF (85.0, ±SD 23.4). Regression analysis showed that being concerned (a little, moderately, very, extremely) about contracting COVID-19 correlated with lower scores of global QoL (−3.86 to −22.76), EF (−3.81 to −26.41) and SF (−1.14 to −22.49). The GAD-7 score showed that approximately 20% of patients had symptoms of COVID-19 associated generalised anxiety. Finally, 67% of the patients were positive towards replacing face-to-face consultancies with phone calls, but video consultations were less preferred (47%).

Conclusion: Danish patients with haematological cancer presented with low global QoL during the early phase of COVID-19, and 20% of the patients showed symptoms of generalised anxiety. Patients were overall positive towards the implementation of telehealth consultancies.

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Introduction

In December 2019, the first outbreak of the Severe, Acute Respiratory Syndrome, corona virus-2 (SARS-CoV-2) disease (COVID-19) was detected in China [1,2]. The virus turned out to have a major impact on the healthcare systems worldwide, and in March 2020, the World Health Organisation (WHO) declared a SARS-CoV-2 pandemic [2].

As COVID-19 was a new disease, little was known about the transmission of the virus and the course of the disease. The Danish authorities, therefore, published guidelines for the citizens as a means of limiting the spread of the disease [3]. Suggestions included general advice on hygiene and social distancing. Additionally, the Danish authorities launched a list of persons perceived to be at high risk of complications if they were infected with SARS-CoV-2 and specified precautions for patients and their relatives on how to shield this group of people [4]. Hence, as a means to mitigate the risk of nosocomial transmission of COVID-19, hospital appointments were minimised by converting them to phone-calls or video-consultations or postponing/cancelling

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Supplemental data for this article can be accessed here.

scheduled physical visits [5,6]. Additionally, access for relatives in hospital in-patient wards and outpatient clinics was restricted. The consequences of these precautions and the fact that patients with haematological diseases are immune deficient might have led to increased social distancing and self-isolation. This is cause for concern, as a study performed during the outbreak of corona virus-1 (SARS) showed that fear of SARS and social distancing led to greater anxiety, depression and feeling of loneliness amongst patients [7]. However, a recent survey of Danish oncologic cancer patients' health-related Quality of Life (QoL) during the COVID-19 pandemic [8] showed that global QoL and emotional functioning, as assessed using the European Organisation for Research and Treatment of Cancer (EORTC) core QoL questionnaire (QLQ-C30) [9], were not worse than that of the general Danish cancer population before the outbreak of COVID-19 [10]. Of note, however, the EORTC QLQ-C30 does not explicitly measure general anxiety disorder (GAD), which may explain the absence difference between cancer patients' health-related QoL before and during COVID-19. Briefly, GAD is a construct characterised by persistent and excessive worry, induced by a severe life stressor, such as cancer [11], and in cancer patients, for example, GAD has shown to induce a higher somatic symptom burden, lower adherence to cancer treatment and result in poorer health outcomes [12].

As a means to overcome the limited use of face-to-face consultations due to social distancing, the implementation of telehealth solutions may be a valuable asset. Telehealth has shown to be very useful in oncologic settings in enhancing symptom management, improving palliative care and in remote chemotherapy supervision [13]. Although a Danish study has shown that telehealth (video consultations) is feasible and increases the freedom that the patients desire [14], a customised system for patients with haematological diseases has not yet been developed in Denmark. One barrier may be that nearly half of all patients newly diagnosed with a haematological cancer are older than 70 years of age [15,16]. This might cause insecurity on how to implement and use telehealth in clinical settings. Nonetheless, as of January 2021, a second wave of COVID-19 is affecting Denmark. Therefore, alternative means of keeping up outpatient consultations are still required. This calls for a deeper understanding of the facilitators and barriers to using telemedicine, not to mention the impact of social distancing, among elderly, high-risk patient groups.

The aim of this article was to explore the health-related QoL of patients with haematological diseases during the early phase of the COVID-19 pandemic and to investigate patients' acceptability towards the use of telehealth consultations.

Patients and methods

The study was a cross-sectional survey, and it adheres to the EQUATOR guidelines for reporting survey research [17].

Setting and participants

The target population was all patients with haematological diagnoses at the Department of Haematology, Odense University Hospital (OUH), Denmark, who have had contact with the department during the period 13 November 2019 to 13 May 2020. The sampling method included sending the survey electronically through 'e-Boks', a secure electronic mailbox developed for receipt of digital mail from the Danish private and public sectors. The survey was sent to patients' 'e-Boks' on 22 May 2020. Participants received a first reminder seven days later and a final reminder 14 days thereafter, after which the survey link closed on 13 June 2020. Of note, a number of survey links were undeliverable as some patients had declined using 'e-Boks', and other patients were deceased in the period of our data extraction, 13 November 2019 to 13 May 2020. Deceased patients were identified by screening of the electronic patient files and after that a posted letter including the survey in hard copy and a prepaid return envelope were sent to those who were still alive by 12 June 2020. Patients participating through postal survey did not receive any reminders, and postal surveys returned later than 22 June 2020 were excluded. As the surveys retrieved through postal mail had missing data, the total number of respondents (*n*) varied across items. Author CE entered data from all postal questionnaires into the database in the period 29 July 2020 to 12 August 2020. To minimise the risk of data entry bias, all entered data were double checked before upload of data to the database was accepted. Data were filed and stored in a REDCap database, administered by OPEN, a research infrastructure in the Region of Southern Denmark [18].

Questionnaire

In collaboration with the Department of Oncology, OUH, a web-based survey was forwarded to patients using 'e-Boks', as described [8]. The survey items concerned the period of March 2020 where an extensive lockdown due to COVID-19 was enforced. All data were patient-reported and required patients to self-report their diagnosis and whether they were in a follow-up program or received active treatment. Furthermore, the survey contained questions on demographics, concerns regarding COVID-19, impact on the patients' treatment and outpatient clinic visits and acceptability of telehealth in addition to assessment of health-related QoL and anxiety. The electronic version of the survey required that participants answered a question before moving on to the next question, leading to no missing values. For the full survey, please see Supplementary Appendix 1.

The EORTC QLQ-C30 questionnaire

The Danish version of the generic cancer-specific 30-item EORTC QLQ-C30 questionnaire, version 3.0, was used [9]. While this questionnaire is originally developed for use in patients with oncologic cancers, the EORTC QLQ-C30 has shown to be valid also for patients with haematologic

malignancies [19]. Items are rated in accordance with Likert response scales, and all scores are linearly transformed to a 0 to 100 scale. The QLQ-C30 consists of one domain assessing global QoL, five domains assessing physical, role, cognitive, emotional and- social functioning, and nine symptom scales. In the current study, the domains, global QoL, emotional functioning (EF) and social functioning (SF) were the primary constructs of interest as these were hypothesised to be most affected by COVID-19. A higher score on the functioning and the global QoL scales indicates better functioning. The recall period of the EORTC QLQ-C30 is the preceding seven days [20].

GAD-7 scale

The GAD-7 scale is a seven-item questionnaire that uses a four-point Likert scale as response scale (ranging from 'Not at all' (0) to 'Nearly every day' (3)). The total score thus ranges from 0 to 21. The recall period of the GAD-7 is the preceding 14 days. In the current study, the recall period was, however, modified to reflect the period with extensive COVID-19 lockdown in Denmark. Patients were thus asked to complete the GAD-7 based on the following introduction: *'We are interested in knowing about your psychosocial health during COVID-19. Answer as best as you can to the following question: how often have you, as a consequence of the lockdown in the middle of March, 2020, been bothered by the following issues'*.

Statistical analysis

Data analysis was performed in November 2020. Descriptive statistics expressed as means and percentages were used for portraying the responses from the survey.

Calculation of means and standard deviations (SD) were performed for the EORTC QLQ-C30 and GAD-7 questionnaires. The former was calculated in accordance with the EORTC scoring manual, as were missing items [20]. For the GAD-7 scale, the total score was calculated by summing up the responses. Subsequently, responses were separated into groups according to the cut off points of <5, 5–9, 10–15, and >15 points, respectively, representing no, mild, moderate, and severe risk of anxiety according to Spitzer *et al.* [21].

Multiple regression analyses were performed to explore the impact of COVID-19 on the global QoL, EF and SF domains concerning the following variables: haematological diagnosis, refraining from consulting a doctor or hospital due to fear of COVID-19, and being concerned about contracting COVID-19.

Chi-square test was used to test differences between the following groups: (1) patients who expressed 'a little' to 'extreme' concern of contracting COVID-19 versus patients who were not concerned at all, (2) patients who were for versus against replacing a doctor's appointment by telephone or video consultation, and (3) patients with no (GAD-7 score $<$ 5 points) versus mild to severe (GAD-7 score $\geq$ 5 points) symptoms of anxiety. The limit for statistical significance was set at a p-value below 0.05. Adjustment for multiple testing was not performed. Stata version 16 (StataCorp 2019) was used to perform the statistical analyses.

Ethical considerations

Informed electronic consent was obtained from all participants. Given the nature of the study (non-invasive/non-treating), this study was exempted from registration with the Regional Ethics Committee. The project was registered in the Region of Southern Denmark's record of data processing activities (J.nr. 20/21708) and at www.clinicaltrials.gov (NCT04389996). The study was approved by the Danish Data Protection Agency (File number: 31-1521-335).

Results

A total of 4439 patients were registered during the screening period and were thus eligible for participation. Among those, 19% ($n=859$) of the patients were not able to receive the invitation through 'e-Boks'. Of these, 25% ($n=219$) were deceased, and the remaining 640 patients received a postal survey invitation. Hence, 4220 patients in total were invited to participate. The final response rate was 53% ($n=2239$) of which 9% ($n=199$) participated through postal survey. Online supplemental Figure S1 shows the flow of participants.

Table 1 shows demographic and clinical characteristics. The mean age of all participants (responders) was 67 years (±SD 13.3) with the vast majority (>75%) being older than 60 years, and 57% of the respondents were males. The most frequent diagnoses were lymphoma (26%, $n=582$), leukaemia (19%, $n=435$) and multiple myeloma (MM) (13%, $n=291$). A total of 63% ($n=1416$) reported to be part of a control follow-up program, whereas 37% ($n=811$) were part of a treatment program. A full list of demographic and clinical characteristics is provided in the online supplemental material, Table S1. The mean age of the group of non-responders was 69 (±SD 16.7) and 53% were males. No information on the reason for non-response was available.

Regarding the patients' experiences with COVID-19, most patients (80%, $n=1793$) reported not to have had symptoms of COVID-19, and the same proportion, ≈80% ($n=1794$), indicated concerns of contracting COVID-19. Nine percent ($n=199$) reported to have refrained from consulting a doctor or hospital due to fear of contracting COVID-19. Overall, 12% ($n=256$) were emotionally affected by the restricted access to the hospital for their relatives, and 12% ($n=271$) were unable to assess this. Approximately 20% of the patients in the treatment programme ($n=811$) had experienced cancellation or postponement of their scheduled hospital activities. In the control follow-up programme ($n=1416$), 22% and 27% of the patients experienced cancellation or postponement of their scheduled hospital activities (haematological examinations and control follow-up, respectively) (further details in online supplemental material, Table S2).

Patients' acceptability of the use of telehealth are presented in Table 2. Overall, 78% ($n=1752$) had internet access at home. Approximately 67% ($n=1485$) reported to be

Table 1. Patient characteristics.

	n (%)
Gender *(n = 2236)*	
Male	1268 (57)
Female	966 (43)
I do not identify myself with a specific gender	2 (<1)
Age *(n = 2226)*	
18–29	49 (2)
30–39	62 (3)
40–49	108 (5)
50–59	283 (13)
60–69	594 (27)
70–79	831 (37)
80–89	277 (12)
90+	22 (1)
Marital status *(n = 2237)*	
Married/cohabiting	1612 (72)
Involved, not cohabiting	71 (3)
Divorced	94 (4)
Widow/widower	224 (10)
Single	234 (10)
Other	2 (<1)
Number of persons in the household *(n = 2235)*	
1	564 (25)
2	1405 (63)
3	132 (6)
4	98 (4)
>4	36 (2)
Education *(n = 2236)*	
Elementary school	447 (21)
Vocational basic course	325 (15)
General upper secondary education	53 (2)
Business upper secondary education	36 (2)
Short higher education (<3 years)	303 (14)
Medium higher education (3–4 years)	599 (27)
Long higher education (>4 years)	269 (12)
Other	113 (5)
I don't want to answer/I don't know	61 (2)
Haematological diagnosis *(n = 2239)* ->[a]	
Essential thrombocythemia	85 (4)
Leukaemia	435 (19)
Lymphoma	582 (26)
Multiple myeloma	291 (13)
Myelodysplasia	59 (3)
Myelofibrosis	39 (2)
Polycythemia vera	112 (5)
Other	438 (20)
I don't want to answer/I don't know	273 (12)
Haematological disease status *(n = 2212)*	
Curable	625 (28)
Chronic?	1214 (55)
I don't want to answer/I don't know	373 (17)
Comorbid conditions *(n = 2239)*[a]	
Hypertension	797 (36)
Cardiovascular disease	272 (12)
Diabetes	202 (9)
Chronic obstructive pulmonary disease/Asthma	249 (11)
Kidney disease	85 (4)
Liver disease	32 (1)
None of the above	1008 (45)
I do not wish to answer/don't know	105 (5)

Values are numbers (*n*) and percentages (%). [a]Possible to check more than one box, resulting in totals of more than 100%.

willing to replace physical appointments with a telephone consultation, whereas 44% ($n = 997$) would accept the use of video consultations. Overall, more than 50% of all patients, irrespective of whether they were in control follow-up or treatment, indicated that they were willing to answer an electronic questionnaire about symptoms and side effects prior to a scheduled doctor's consultation.

The EORTC QLQ-C30 global QoL, EF and SF domains showed mean scores of 69.0 (±SD 22.6), 84.5 (±SD 18.9) and 85.0 (±SD 23.4), respectively. The mean score of the GAD-7 was 2.3 (±SD 3.6). The majority of the patients (79%, $n = 1748$) presented with low symptoms of anxiety (GAD-7 score < 5 points), 16% ($n = 345$) had mild symptoms of anxiety (GAD-7 score 5–9 points), and 5% ($n = 112$) had moderate to severe symptoms of anxiety (GAD-7 score $>$ 10 points).

Lymphoma was chosen as the index disease for the multivariate regression analyses, since this was the largest subgroup in our study. Having MM was significantly correlated with lower global QoL compared to lymphoma (−5.50, 95% CI: −8.69; −2.30; $p = 0.001$) and SF (−4.05 95% CI: −7.36; −0.74, $p = 0.02$). Having multiple haematological diseases were also significantly correlated with lower global QoL (−7.3, 95% CI: −12.19; −2.41; $p = 0.003$) compared to lymphoma. Having refrained from consulting a doctor or hospital due to fear of contracting COVID-19 was significantly correlated with lower scores of global QoL (−4.29, 95% CI: −7.54; −1.03), EF (−4.68, 95% CI: −7.36; −2.01) and SF (−3.69, 95% CI: −7.08; −0.30). Being 'Concerned about contracting COVID-19' was correlated with lower global QoL, EF and SF. Compared with 'Not concerned', the coefficients for global QoL and EF ranged from −3.86 to −22.76 and −3.81 to −26.41, respectively for 'A little concerned' to 'Extremely concerned', whereas for SF significant correlations were found only for those being 'Moderately concerned' to 'Extremely concerned'. Compared to 'Not concerned' the coefficients ranged from −3.80 to −28.68, respectively, for 'Moderately concerned' to 'Extremely concerned'. No interactions between covariates were found in the multivariate regression analyses. All results from the multivariate regression analysis can be seen in Table 3.

Table 4 shows the associations of sociodemographic and disease-related parameters for patients who were *for* vs. *against* the future use of telehealth. For the use of telephone consultations, the level of education was the only characteristic that had a statistically significant impact, with an increased acceptance among those with a higher level of education, compared with elementary school education ($p < 0.001$, Table 4). Concerning the use of video consultations, several of the investigated factors had a statistically significant impact. A lower level of acceptance was found among females, singles, people living alone, those with elementary school as highest educational level or having comorbid conditions.

Table 5 shows the associations of sociodemographic and disease-related parameters for patients with *no* (GAD-7 score < 5) vs. *mild to severe* (GAD-7 score ≥ 5) symptoms of anxiety and patients who were *not concerned* vs. *concerned* with contracting COVID-19. Factors significantly associated with symptoms of mild to severe anxiety were female gender, in addition to having received medical treatment or blood transfusions within the last two months. Factors significantly associated with being concerned with contracting COVID-19 were female gender, being married/cohabiting, not living alone, having comorbid conditions or having received medical treatment within the last two months.

Table 2. Patients' **opinions on the use of telehealth as a means to conduct future clinician consultations.**

	n (%)
Access to electronic devices *(n = 2239)*[a]	
Smartphone/cellphone	2054 (92)
Desktop or laptop computer	1707 (76)
Tablet/Ipad	1237 (55)
Internet access at your home	1752 (78)
Landline phone	606 (2)
I don't want to answer/I don't know	18 (1)
Could you imagine turning up for an appointment at the department of haematology if it was replaced by a telephone consultation? *(n = 2227)*	
Yes	403 (18)
Yes, but not every time	1082 (49)
No	691 (31)
I do not wish to answer/I don't know	51 (2)
Could you imagine turning up for an appointment at the department of haematology if it was replaced by a video consultation? *(n = 2224)*	
Yes	316 (14)
Yes, but not every time	663 (30)
No	1174 (53)
I do not wish to answer/I don't know	71 (3)
Is it important for you that contact with the department go through your primary care clinician? *(n = 2218)*	
Yes	1150 (52)
No	692 (31)
Yes, but not necessarily every time	290 (13)
Do not wish to answer/I don't know	86 (4)
Treatment group (*n* = 811)	
If you could choose a time for treatment, which would suit you best?[a]	
8–12	579 (71)
12–16	270 (33)
16–20	67 (8)
I do not wish to answer/I don't know	40 (5)
Could you imagine answering an electronic questionnaire about your symptoms and side effects prior to your scheduled treatment? (*medical treatment, n = 763)*	
Yes	392 (51)
No	256 (34)
I do not wish to answer/I don't know	115 (15)
Could you imagine answering an electronic questionnaire about your symptoms and side effects prior to your scheduled treatment? *(radiotherapy treatment, n = 44)*	
Yes	28 (64)
No	11 (25)
I do not wish to answer /I don't know	5 (11)
Could you imagine answering an electronic questionnaire about your symptoms and side effects prior to your scheduled treatment? *(blood transfusion treatment, n = 117)*	
Yes	63 (54)
No	34 (29)
I do not wish to answer / I don't know	20 (17)
Control follow-up group (*n* = 1416)	
If you could choose a time for control follow-up, which would suit you best?[a]	
8–12	965 (68)
12–16	483 (34)
16–20	155 (11)
I do not wish to answer/I don't know	66 (5)
Could you imagine answering an electronic questionnaire prior to your scheduled control follow-up? *(n = 1400)*	
Yes	823 (59)
No	430 (31)
I do not wish to answer /I don't know	147 (11)

Values are numbers (*n*) and percentages (%). [a]Possible to check more than one box resulting in totals of more than 100%

Discussion

Our study shows that the majority of patients with haematological diseases were concerned with contracting COVID-19 during the early stages of the disease. Further to this, during the first Danish COVID-19 lockdown, the patients' global QoL scores proved to be rather poor and one out of five patients presented with at least mild symptoms of generalised anxiety. Finally, most patients showed positive towards the use of telehealth as a replacement for face-to-face hospital appointments.

Our analyses indicated that concerns about contracting COVID-19 correlate with the patients' health-related QoL, as being 'moderately to extremely concerned' about contracting COVID-19 were associated with lower global QoL, EF and SF

Table 3. Multivariable regression analysis of the emotional functioning, social functioning and Global Quality of Life domains of the EORTC QLQ-C30 questionnaire.

	Global QoL, $n = 2211$			EF, $n = 2208$			SF, $n = 2211$		
	Coefficient	95%CI	*p*-Value	Coefficient	95%CI	*p*-Value	Coefficient	95%CI	*p*-Value
Haematological diagnose									
Lymphoma	0			0			0		
Essential thrombocythemia	0.24	−5.18; 5.66	0.93	0.05	−4.39; 4.49	0.98	−1.39	−7.02; 4.24	0.63
Leukaemia	−0.63	−3.49; 2.24	0.67	2.16	−0.19; 4.51	0.07	0.42	−2.56; 3.40	0.78
Multiple myeloma	−5.50	−8.69; −2.30	0.001	−0.84	3.45; 1.78	0.53	−4.05	−7.36; −0.74	0.02
Myelodysplasia	−1.98	−8.58; 4.61	0.56	−4.05	−9.40; 1.30	0.14	−0.29	−7.08; 6.50	0.93
Myelofibrosis	−1.30	−9.23; 6.63	0.75	−0.40	−6.89; 6.10	0.91	−3.33	−11.57; 4.91	0.43
Polycythemia vera	−1.93	−6.53; 2.67	0.41	0.48	−3.29; 4.25	0.80	0.67	−4.11; 5.45	0.78
Multiple of the diagnoses listed	−7.30	−12.19; −2.41	0.003	−2.29	−6.27; 1.70	0.26	−3.36	−8.42; 1.69	0.19
None of the above diseases/others	−1.60	−4.40; 1.20	0.27	−0.42	−2.72; 1.88	0.72	−0.01	−2.92; 2.91	0.10
I don't want to answer/I don't know	−3.50	−6.76; −0.24	0.04	−2.35	−5.02; 0.33	0.09	1.75	−1.64; 5.15	0.31
Have you refrained from consulting a doctor or the hospital due to fear of contracting COVID-19? *(n = 2232)*									
No	0			0			0		
Yes	−4.29	−7.54; −1.03	0.01	−4.68	−7.36; −2.01	0.001	−3.69	−7.08; −0.30	0.03
I do not wish to answer / I don't know	−9.28	−19.05; 0.49	0.06	−5.77	−13.77; 2.23	0.16	−12.28	−22.43; −2.13	0.02
Are you concerned about contracting COVID-19? *(n = 2235)*									
Not concerned	0			0			0		
A little concerned	−3.86	−6.47; −1.25	0.004	−3.81	−5.95; −1.67	<0.001	−1.14	−3.86; 1.57	0.409
Moderately concerned	−7.45	−10.17; −4.73	<0.001	−6.75	−8.98; −4.52	<0.001	−3.80	−6.63; −0.97	0.008
Very concerned	−13.45	−16.60; −10.30	<0.001	−15.12	−17.71; −12.54	<0.001	−12.92	−16.20; −9.64	<0.001
Extremely concerned	−22.76	−28.73; 16.80	<0.001	−26.41	−31.29; −21.52	<0.001	−22.49	−28.68; −16.29	<0.001
I do not wish to answer/I don't know	−13.35	−27.21; 0.52	0.06	−12.04	−23.40; −0.69	0.04	−19.03	−33.44; −4.62	0.010
_cons	77.64			91.73			90.02		
R^2	0.07			0.11			0.07		

EORTC QLQ-C30: the European Organisation for Research and Treatment of Cancer quality of life; QoL: quality of life; EF: Emotional functioning; SF: Social functioning.

scores. Additionally, refraining from consulting a doctor or hospital due to concerns of contracting COVID-19 also showed negative correlations with global QoL, EF and SF. These results are identical to our findings in our recent, similar Danish study including patients with solid cancers [8]. This negative correlation might be explained by patients experiencing fear of not receiving adequate treatment due to a perceived high demand on the healthcare care system, as seen in many European countries [22]. However, this is speculative, since our data do not allow for causal inference.

When looking at the number of patients who were 'very concerned' or 'extremely concerned' about contracting COVID-19, our findings indicate that 18% (out of 2235) of the patients were very concerned or extremely concerned about contracting COVID-19. While we are not able to relate this number to an age-matched Danish general population, the proportion of very to extremely concerned patients in our study was somewhat lower compared to a similar Dutch study (18% out of 2235 vs. 47% out of 5302 patients, respectively) [23]. The reason for this difference is not clear. However, one explanation may be that data were collected at different time points, with the Dutch study collecting data during the Dutch lockdown from 29 March to 18 April 2020 [23], compared to our data collection, which was 22 May to 22 June 2020, after the Danish lockdown. The lower proportion of concerned patients in our study may also be a reflection of the precautions taken at our department, e.g., increased use of telehealth and cancellation or postponement of scheduled appointments. However, on a positive note, these precautions were found to be acceptable by most (>74%) patients, indicating that the measures taken to ensure alternative appointments seemed to have created a sense of safe and adequate care.

In regard to the EF and SF scores, the current data correspond well with findings from a Danish survey (the 'barometer study') from 2019 [10] conducted before COVID-19. 'The barometer study' is a Danish, nationwide cohort study aiming to elucidate the experience of patients with cancer in the Danish healthcare system. However, compared to 'the barometer study', the EORTC QLQ-C30 global QoL score in our study was somewhat lower (5.4 points). Although a possible causal relation is elusive, this may indicate that COVID-19 negatively impacts the patients' overall QoL. Furthermore, a difference of 5.4 points may be of clinical relevance, as changes in EORTC QLQ-C30 scores of 5 to 10 points have been suggested as clinically important [24]. However, as our study population contained a small proportion of patients with non-malignant haematological diseases, and as 'the barometer study' included patients with both solid tumours and haematological cancers [10], direct comparison should be done with caution.

Concerning COVID-19-associated anxiety, the current GAD-7 scores show that only 5% ($n = 112$) exceeded the cut-off (>10 points out of 21) for moderate to severe risk of generalised anxiety. Importantly, our study also shows that >20% of patients present with some degree of COVID-19-associated anxiety. While this proportion may seem high, it is somewhat lower than the findings of a similar survey study among Chinese patients with cancer during the outbreak of COVID-19 [25]. This study demonstrated the presence of at least mild symptoms of anxiety or depression in 69 out of 129 patients. A likely explanation for the higher number in the study by Qian et al. described above may be that their findings were based upon responses from patients with cancer in Wuhan where the outbreak of COVID-19 was first detected. This may have created a greater sense of

Table 4. Sociodemographic and disease-related parameters for patients who were ***for* vs. *against* the use of telehealth as a means to conduct future hospital consultations.**

	Could you imagine turning up for a clinician appointment at the department if it was replaced by a:					
	Telephone consultation			Video consultation		
	Yes	No	*p*-Value	Yes	No	*p*-Value
Gender						
Male	857 (69)	388 (31)		588 (48)	648 (52)	
Female	626 (67)	302 (33)	0.50	391 (43)	523 (57)	0.03
Age						
18–29	39 (80)	10 (20)		27 (59)	19 (41)	
30–39	46 (78)	13 (22)		42 (71)	17 (29)	
40–49	76 (72)	29 (28)		67 (64)	38 (36)	
50–59	217 (78)	62 (22)		187 (68)	90 (32)	
60–69	400 (69)	180 (31)		302 (53)	273 (47)	
70–79	522 (64)	291 (36)		290 (36)	510 (64)	
80–89	166 (63)	96 (37)		61 (23)	200 (77)	
90+	14 (74)	5 (26)		3 (15)	17 (85)	
Marital status						
Married/cohabiting	1083 (68)	501 (32)		769 (49)	798 (51)	
Involved/divorced/widow/widower/single	402 (68)	190 (32)	0.84	210 (36)	376 (64)	<0.001
Household						
I live alone	357 (67)	177 (33)		173 (33)	359 (67)	
I do not live alone	1128 (69)	512 (31)	0.41	806 (50)	813 (50)	<0.001
Education						
Elementary school	272 (61)	177 (39)		122 (27)	324 (73 s)	
Higher level of education (secondary education, short, medium and long higher education)	1117 (72)	444 (28)	<0.001	808 (52)	734 (48)	<0.001
Haematological diagnosis						
Essential thrombocythemia	59 (83)	12 (17)		34 (49)	36 (51)	
Leukaemia	289 (76)	89 (24)		192 (51)	183 (49)	
Lymphoma	316 (59)	223 (41)		207 (39)	324 (61)	
Multiple myeloma	174 (65)	93 (35)		129 (48)	140 (52)	
Myelodysplasia	35 (76)	11 (24)		22 (50)	22 (50)	
Myelofibrosis	24 (77)	7 (23)		16 (52)	15 (48)	
Polycythemia vera	74 (73)	28 (27)		49 (49)	52 (51)	
Multiple of the listed diagnoses	62 (70)	27 (30)		39 (46)	46 (54)	
None of the above diseases/others	292 (72)	111 (28)		203 (51)	196 (49)	
I don't want to answer/I don't know	154 (64)	88 (36)		87 (36)	154 (64)	
Comorbid conditions						
0	731 (68)	343 (32)		530 (50)	534 (50)	
≥1	754 (68)	348 (32)	0.86	449 (41)	640 (59)	<0.001
Disease status[a]						
Curable	416 (68)	197 (32)		288 (47)	319 (53)	
Incurable	841 (70)	354 (30)	0.27	557 (47)	632 (53)	0.81

Values are numbers (*n*) and percentages (%). [a]The answer option 'I don't know/I don't want to answer' was left out of the analysis.

uncertainty amongst the Chinese patients. Another difference between ours and the Chinese study was the questionnaire used (GAD-7 versus Hospital Anxiety and Depression Scale (HADS)) [25]. Nonetheless, based on the current anxiety levels and the fact that patients with haematological cancer are particularly vulnerable to COVID-19 infections [26], we encourage health care personnel to work to counteract any vicious emotional health circles derived from COVID-19.

In terms of telehealth consultancy, 67% of patients were positive towards phone calls instead of on-site hospital appointments, whereas 44% were optimistic about the use of video consultations, most pronounced in younger patients. This may reflect that not all older patients are comfortable with electronic devices and/or that younger patients need flexibility in face-to-face consultancies. Altogether, this might indicate a need for developing a customised system for conducting haematological telehealth consultations. Our findings are in line with the Transatlantic Telehealth Research Network [27], stating that there is no *one-size-fits-all* approach when it comes to the use of telemedicine. Importantly though, one must not overlook that virtual consultations with patients with critical diseases may come at a cost. The fact that physical examinations are impossible and that there is less opportunity to pick up on the patient's body language might lead to a delayed cancer diagnosis or misunderstandings between the patient and the health care personnel [28].

Although our study base included an unselected population in follow-up, our study has some limitations. Firstly, the lack of baseline data on the patients' health-related QoL prior to the outbreak of COVID-19 made the interpretation of the current findings difficult. However, as we were able to compare our findings to similar data obtained prior to COVID-19, we do not believe this to have had a major impact. Secondly, as this survey was conducted two months after the COVID-19 lockdown in Denmark, the current findings may be influenced by recall bias and thus not accurately reflect the patients' health-related QoL during the first period of the COVID-19 pandemic. Thirdly, as the GAD-7 was used in an adapted version, to match the research context of our study, and that the continuous data of the GAD-7 were reduced to categorical data, potentially compromising

Table 5. Sociodemographic and disease related parameters for patients who reported none vs. mild to severe symptoms of anxiety and for patients who were not concerned vs. concerned about contracting COVID-19.

	Symptoms of anxiety (GAD-7)			Concerns of contracting COVID-19		
	None	Mild to severe	*p*-Value	Not concerned	Concerned	*p*-Value
Gender						
Male	1040 (83)	217 (17)		277 (22)	985(78)	
Female	705 (75)	239 (25)	0.001	152 (16)	807 (84)	<0.001
Age						
18–29	37 (76)	12 (24)		12 (24)	37 (76)	
30–39	40 (65)	22 (35)		14 (23)	47 (77)	
40–49	70 (65)	38 (35)		17 (16)	91 (84)	
50–59	202 (72)	80 (28)		56 (20)	224 (80)	
60–69	471 (79)	122 (21)		103 (17)	489 (83)	
70–79	686 (83)	136 (17)		151 (18)	677 (82)	
80–89	215 (83)	45 (17)		67 (24)	209 (76)	
90+	20 (91)	2 (9)		9 (45)	11 (55)	
Marital status						
Married/cohabiting	1284 (80)	319 (20)		285 (18)	1321 (82)	
Involved/divorced/widow/widower/single	462 (77)	138 (23)	0.11	145 (23)	473 (77)	0.002
Household						
I live alone	422 (78)	117 (22)		136 (24)	422 (76)	
I do not live alone	1322 (80)	340 (20)	0.53	294 (18)	1370 (82)	0.001
Education						
Elementary school	357 (78)	101 (22)		100 (21)	374 (79)	
Higher level of education (secondary education, short-cycle, medium-cycle, and long-cycle higher education)	1260 (80)	317 (20)	0.36	292 (18)	1287 (82)	0.21
Haematological diagnosis						
Essential thrombocythemia	55 (80)	14 (20)		17 (24)	54 (76)	
Leukaemia	34 (74)	12 (26)		75 (20)	307 (80)	
Lymphoma	218 (81)	51 (19)		98 (18)	451(82)	
Multiple myeloma	312 (82)	68 (18)		42 (16)	228 (84)	
Myelodysplasia	426 (78)	122 (22)		4 (9)	43 (91)	
Myelofibrosis	25 (81)	6 (19)		4 (13)	27 (87)	
Polycythemia vera	83 (80)	21 (20)		20 (19)	84 (81)	
Multiple of the listed diagnoses	69 (77)	21 (23)		13 (14)	79 (86)	
None of the above diseases/others	319 (78)	90 (22)		89 (22)	323 (78)	
I don't want to answer/I don't know	200 (80)	51 (20)		66 (26)	190 (84)	
Comorbid conditions						
0	871 (79)	226 (21)		231 (21)	866 (79)	
≥1	877 (79)	231 (21)	0.89	199 (18)	928 (82)	0.04
Disease status[a]						
Curable	500 (80)	122 (20)		124 (20)	500 (80)	
Incurable	943 (79)	257 (21)	0.37	220 (18)	989 (82)	0.38
Radiotherapy within last 2 months						
Yes	30 (68)	14 (32)		7 (16)	38 (84)	
No	1715 (80)	442 (20)	0.07	421 (19)	1751 (81)	0.52
Medical treatment within last 2 months						
Yes	583 (77)	174 (23)		123 (16)	642 (84)	
No	1161 (81)	280 (19)	0.05	305 (21)	1146 (79)	0.005
Blood transfusion within last 2 months						
Yes	78 (68)	36 (32)		19 (16)	98 (84)	
No	1667 (80)	418 (20)	0.003	409 (19)	1690 (81)	0.39

GAD-7: General Anxiety Disorder 7-item questionnaire. Values are numbers (*n*) and percentages (%). [a]The answer option 'don't know/I don't want to answer' was left out of the analysis.

statistical power, the current findings based on the GAD-7 questionnaire should be interpreted with caution. Forth, as this study was a single site study, results need to be confirmed in other sites, settings and countries.

The strength of the study is the efforts to reduce selection bias by ensuring that patients could participate either electronically or *via* hard copy postal mail. This led to the inclusion of a broader group of patients in terms of age, thereby increasing the generalisability. However, although the response rate was above 50%, the current findings should be interpreted with caution, as those who chose to participate might have more mental and emotional resources. Finally, validated patient-reported outcome instruments for use in patients with cancer were used to evaluate the health-related QoL.

In conclusion, Danish patients with haematological disease had lower global QoL compared to EF and SF and also lower than reference data on Danish patients with cancer before the outbreak of COVID-19. Further, symptoms of generalised anxiety during COVID-19 were frequent. In addition, this study showed positivity towards the implementation of telehealth as a replacement for some face-to-face appointments. How this is best implemented should be investigated in future studies.

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