




Research Article

Cancer Patients' Experience of a Patient-Safe Pathway Is Associated with Health Literacy and Support from Relatives: A Cross-Sectional Survey

Maria Leonora Birk Sørensen ^{1,2}, Lotte Linnemann Rønfeldt ²,
and Birgitte Nørgaard ¹

¹Department of Public Health, University of Southern Denmark, Odense, Denmark

²The Danish Cancer Society, Copenhagen, Denmark

Correspondence should be addressed to Maria Leonora Birk Sørensen; mlbsorensen@health.sdu.dk

Received 18 November 2022; Revised 2 June 2023; Accepted 14 July 2023; Published 3 August 2023

Academic Editor: Saskia F. A. Duijts

Copyright © 2023 Maria Leonora Birk Sørensen et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction. The aim was to assess the impact of cancer patients' health literacy (HL) on their experience of patient safety. Furthermore, we investigated whether support from relatives affected cancer patients' experiences of patient safety. **Methods.** A cross-sectional study was conducted using questionnaire data from the Danish National Cancer Patient Survey 2017 among Danish cancer patients ($n = 5,389$) and sociodemographic characteristic data from national registries. **Results.** A low level of HL is associated with increased patient safety errors among cancer patients regarding patient-reported adverse events and an experience of inadequate information. Results also showed increased odds of patient safety risks among patients with no support from relatives. **Conclusion.** Having a low level of HL or no support from relatives has a negative impact on patient safety. Focusing on improvements related to cancer patients' HL and supportive network may increase patients experiencing a high quality and safe health care system and reduce inequalities and inequity in the cancer pathway.

1. Introduction

Studies on patient safety in cancer care have shown that cancer patients and cancer survivors are at a risk of errors and adverse events due to an often long and fragmented diagnostic pathway, complex treatments, and poorly coordinated follow-up care with the absence of responsibility, as well as challenges as to providing patients and their relatives with adequate information whether written or oral [1–3]. In addition, studies indicate that the safety in the cancer pathway is influenced by the patients' opportunities for support from their network and their socio-demographic characteristics such as sex, age, ethnicity, cohabitation status, educational level, income level, the health environment, and their level of health literacy (HL) [4–12].

As described by the Danish health law, adequate information given to patients in contact with the health care system is an obligation. It ensures patients to make decisions

on an informed basis about their own care and treatment [13]. Hence, adequate information is closely connected to the domain of quality and patient safety. Also, described by the Danish health law and the board of patient safety, adverse events are important measurable indicators used for improving patient safety [14, 15]. Therefore, adverse events and inadequate information are typically components of patient safety errors.

HL is increasingly used to describe the ability of patients to interact effectively with health professionals, to navigate in health care systems, and to understand health information at a level enabling the patients to take care of their own health [16]. Patients' HL and sociodemographic characteristics are known risk factors for inequality and inequity in health [10, 17, 18]. Patients with a low level of HL tend to be reluctant to interact with health professionals and to ask health-related questions. They have less contact with the

health care system, are often less skilled at describing symptoms, and are less persistent at following up on their symptoms with negative affect on time to diagnosis, treatment outcome, and health behaviour, affecting their use of the health care system and ability to follow cancer screening programs [6, 10, 12, 19].

A systematic literature review indicates that the patients' level of HL is related to inequity and inequality when meeting the health care system. The literature review points out that patients' HL is an important element to improve the contact between health professionals and patients with low socioeconomic status and thereby may positively affect quality and patient safety. Some studies included in the systematic literature review point out the dimensions of HL as some of the most important elements to socioeconomic differences in health [20], especially relational conditions related to patients' ability to understand health information and their ability to engage with health professionals [20] (as dimensions six and nine in the Health Literacy Questionnaire [16]).

Research indicates that relatives are a support to cancer patients and an important collaborating partner, implying that systematic involvement of relatives by health care professionals can improve quality and patient safety in cancer treatment [4, 5]. Thus, understanding patients' HL and support from relatives are important quality indicators in cancer treatment, likewise patient reported treatment outcome.

Patient safety is usually assessed from a health care perspective; nevertheless, patients' perspective on patient safety and patients' experience of safety errors are important too, as patients usually are vigilant observers and possess a unique knowledge of their own cancer pathway, treatment outcome, experienced errors, and safety-related processes [21].

1.1. Objectives. The aim of this study was to assess the impact of the low level of HL on cancer patients' experience of patient safety. Secondly, we investigated whether the absence of support from relatives increased their experience of patient safety errors.

2. Methods

This article was conducted according to the STROBE guidelines for reporting observational studies [22, 23].

2.1. Study Design. We used data from a cross-sectional questionnaire study, the Danish National Cancer Patient Survey 2017 (Survey 2017), performed by The Danish Cancer Society [24, 25], and sociodemographic characteristic data from national registries. The Survey 2017 is nationwide and includes scales from the well-known Health Literacy Questionnaire (HLQ) [16].

2.2. Setting and Participants in Survey 2017. In Survey 2017, patients diagnosed with cancer in Denmark four to seven months earlier were invited to participate between February

and March 2017. The inclusion criteria were age 30–99 years, registration with a notifiable cancer diagnosis (date of diagnosis July–December 2016), and no previous cancer diagnosis. The exclusion criteria were patients with an observational diagnosis, cell change, benign or unspecific tumours, basal cell skin cancer, mesothel and connective tissue cancer, and men with mamma cancer. The study population was invited by a letter. The questionnaire could be answered either via a paper version (and prepaid return envelope) or via an online version. To increase the response rate, a reminder was sent after five weeks. Three weeks after the reminder was sent, the survey closed [24].

2.3. Variables, Data Source, and Measurement in This Study.

This study included five multi-item scales from Survey 2017 in the analysis. Two of the scales originate from the HLQ developed in English in 2013 [16] and later translated and validated [26]. The complete HLQ consists of a robust nine-scale factor model containing 44 items with each scale consisting of four to six items, which measure HL [26]. For this study only, the HLQ scales 6 and 9 were used (10 items). Both scales seek to measure HL by focusing on patients' ability to engage with health professionals by raising difficulties related to different communicative tasks (scale 6, five items) and to patients' ability to understand written and oral medical health information to make an efficient use of it (scale 9, five items) [16, 26]. To assess patient safety, we used two multi-item scales identifying experiences of inadequate information (six items) and adverse events (eight items). To assess the level of support from relatives, a multi-item scale identifying the presence of friends and family (four items) was used [25]. *Potential confounders:* Data regarding sex, age, and cancer diagnosis were obtained from The Danish National Patient Registry. Cohabitation status and region of residence were obtained from the Danish Civil Registration system. Data regarding the educational level and income level were obtained from Statistics Denmark.

Respondents answering minimum one item in the safety multi-item scales and one of the HLQ scales were included in the analysis of HL. In the analysis of support from relatives, respondents answering minimum one item in the support from relatives' multi-item scale were included (Figure 1).

2.4. Bias. In Survey 2017, the face validity of the questionnaire was pilot tested through a patient panel and a reference group to check for correct understanding of the written text and an assessment of the correct overall understanding of its purpose. Drop-out analysis was performed to examine characteristics and differences between responders and nonresponders in Survey 2017 [24] and likewise between responders and nonresponders regarding patient safety. The HLQ [16, 26] is an acknowledged, frequently used, and validated questionnaire, unlike the multiscale on patient safety and relatives. In summary, the goal was to minimize potential bias regarding self-selection, information, and recall bias as common challenges when using self-reported questionnaires [27, 28].

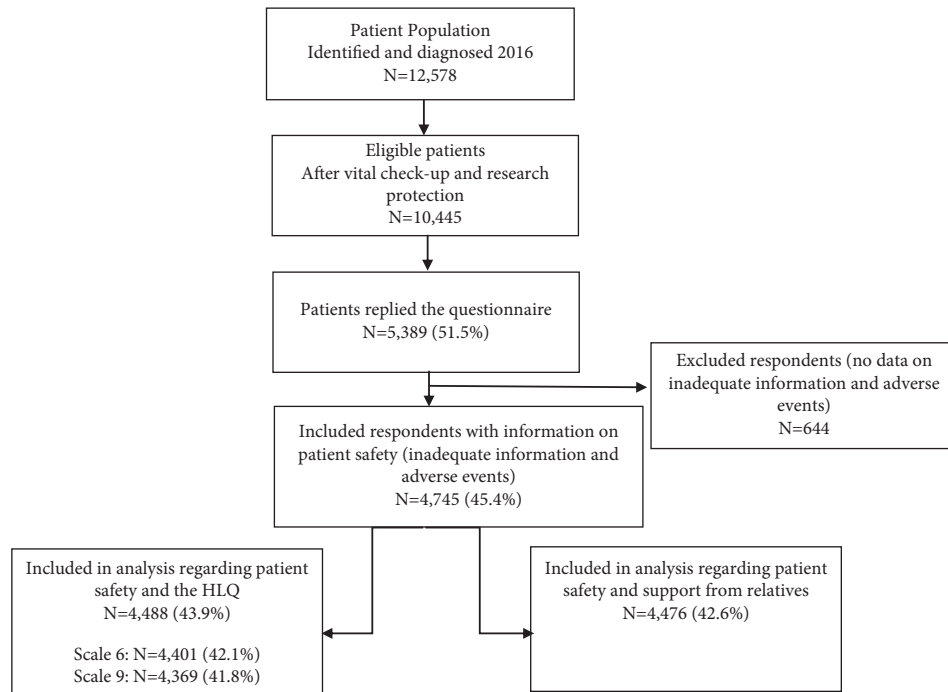


FIGURE 1: Study population.

2.5. Quantitative Variables

2.5.1. Main Variables. Patient safety was subdivided in the categories: Inadequate information and adverse events.

Inadequate information refers to whether information given by health care professionals was experienced as adequate by the patient in different areas of cancer treatment. Patients were given the following five opportunities for response: 1 “Yes, had enough information,” 2 “Lacked a little information,” 3 “Lacked a lot of information,” 4 “Had too much information,” and 5 “Not relevant” [25], p. 8. A total score summarized if respondents experienced adequate or inadequate information (No/Yes). For the analyses, responses were categorised as either 0: No (adequate information, option 1, 5) or 1: Yes (Inadequate information, option 2, 3, 4). If just one of the six items were answered with 2, 3, or 4, the responder was placed in category 1 for analysis.

Adverse events refer to the multi-item scale that measure whether patients experience adverse events in different areas of cancer treatment. Patients were given the following three response options: 1 “No, did not,” 2 “Yes, I did,” and 3 “Not relevant” [25], p. 14. For the analysis, the response options were categorised as either 0: “No adverse events” (option 1, 3) or 1: “Yes, adverse events” (option 2). If just one of the eight items were answered with 2, the responder was placed in category 1 for analysis.

The HLQ scales 6 and 9 included the following five response options: 1 “Cannot do,” 2 “Very difficult,” 3 “Quite difficult,” 4 “Quite easy,” or 5 “Very easy” [26], pp. 6, 7, 8. In the HLQ scales with three out of five items answered, data were converted to an HLQ score and the rest were categorised as missing. These score calculations with response values one to five (coding value five if the response was “Very easy”) were used according to the coding rules from the Danish validation of HLQ [26]. The health literacy level was

grouped into three categories, with a cut-off point of HLQ scores: 1 “High” (score >4-5), 2 “Medium” (score >3-4), and 3 “Low” (score 1-3).

In the multi-item scale assessing the need of support from relatives, the respondents were given the following five response options: 1 “Yes, to a great extent,” 2 “Yes, to some extent,” 3 “To a lesser extent,” 4 “No, not at all,” or 5 “No need” [25], p. 19. For the analysis, the responder was grouped as either 0: “Yes, support from relatives/No need” (option 1, 2, 5) or 1: “No support from relatives but need” (option 3, 4).

2.5.2. Covariate Variables. Sex was categorised as “Male” or “Female.” Cohabitation status was dichotomized as either “Married/cohabitation” or “Living alone” depending on registrations as married or widow, divorced, and single. Age/years were categorised as a categorical variable into the following five age categories: “<50,” “≥50-<60,” “≥60-<70,” “≥70-<80,” and “≥80.” The region of residence was categorized as follows: “North Jutland,” “Central Jutland,” “Southern Denmark,” “The capital,” and “Sealand.” The five most common cancer diagnoses were presented individually as “Breast cancer,” “Prostate cancer,” “Colon cancer,” “Lung cancer,” “Malignant melanoma,” or “Others.” The educational level was categorised as “Elementary school/short higher,” “Medium higher,” and “Long higher”. The income level was categorised as “High,” “Medium”, or “Low” using a data-driven cut-off point at the 33 and 66 percentiles. A directed acyclic graph (DAG) was used to explain how to handle covariate variables in the analyses as potential confounders and predictors on the exposures and outcomes exist.

TABLE 1: Characteristics of study participants according to patient safety shown by inadequate information and adverse events.

	Inadequate information				Adverse events			
	No		Yes		No		Yes	
	N	(%)	N	(%)	N	(%)	N	(%)
Total (n = 4,745)	2,934	(61.83)	1,811	(38.17)	3,114	(65.63)	1,631	(34.37)
Age/years (n = 4,745)								
<50	234	(46.43)	270	(53.57)	273	(54.17)	231	(45.83)
50-<60	423	(49.07)	439	(50.93)	510	(59.16)	352	(40.84)
60-<70	997	(64.91)	539	(35.09)	1,056	(68.75)	480	(31.25)
70-<80	988	(68.56)	453	(31.44)	987	(68.49)	454	(31.51)
≥80	292	(72.64)	110	(27.36)	288	(71.64)	114	(28.36)
Sex (n = 4,745)								
Male	1,441	(63.45)	830	(36.55)	1,501	(66.09)	770	(33.91)
Female	1,493	(60.35)	981	(39.65)	1,613	(65.20)	861	(34.80)
Cohabitation status (n = 4,745)								
Married/cohabitation	1,997	(63.14)	1,166	(36.86)	2,088	(66.01)	1,075	(33.99)
Living alone	937	(59.23)	645	(40.77)	1,026	(64.85)	556	(35.15)
Educational level (n = 4,660)								
Elementary school/short higher	2,096	(65.77)	1,091	(34.23)	2,147	(67.37)	1,040	(32.63)
Medium higher	598	(53.63)	517	(46.37)	698	(62.60)	417	(37.40)
Long higher	186	(51.96)	172	(48.04)	208	(58.10)	150	(41.90)
Income level (n = 4,745)								
High	998	(54.65)	828	(45.35)	1,135	(62.16)	691	(37.84)
Medium	954	(63.56)	547	(36.44)	990	(65.96)	511	(34.04)
Low	982	(69.25)	436	(30.75)	989	(69.75)	429	(30.25)
Diagnoses (n = 4,745)								
Breast cancer	637	(61.67)	396	(38.33)	710	(68.73)	323	(31.27)
Prostate cancer	371	(63.20)	216	(36.80)	429	(73.08)	158	(26.92)
Colon cancer	352	(63.65)	201	(36.35)	349	(63.11)	204	(36.68)
Lung cancer	231	(60.95)	148	(39.05)	240	(63.32)	139	(36.68)
Malignant melanoma	282	(69.29)	125	(30.71)	296	(72.73)	111	(27.27)
Other cancers	1,061	(59.41)	725	(40.59)	1,090	(61.03)	696	(38.97)
Region of residence (n = 4,745)								
North Jutland	347	(64.98)	187	(35.02)	369	(69.10)	165	(30.90)
Central Jutland	660	(61.51)	413	(38.49)	716	(66.73)	357	(33.27)
Southern Denmark	738	(63.13)	431	(36.87)	792	(67.75)	377	(32.25)
The capital	729	(58.84)	510	(41.16)	778	(62.79)	461	(37.21)
Sealand	460	(63.01)	270	(36.99)	459	(62.88)	271	(37.12)

2.6. *Statistical Methods.* Descriptive statistical analysis was used to present the study participants' characteristics and the distribution between the groups of patients who experienced inadequate information and adverse events. Chi-square tests and logistic regression analysis were used for analysing the data. The level of HL and support from relatives' association with patient safety were analysed separately. Multiple logistic regressions were performed when associations between the level of HL and patient safety were found. Likewise, they were performed when the association between support from relatives and patient safety was found. Adjusted analyses were performed with the following potential confounders: Age, sex, cohabitation status, educational level, income level, cancer diagnosis, and region of residence. Pearson's goodness-of-fit test was used to confirm the fitted model [27]. The associations are reported as odds ratio (OR), and a p value of <0.05 was considered significant. Complete case analysis was made. Descriptive and analytic statistical analyses were performed using Stata Corp. 2019 (Stata Statistical Software: Release 16. College Station, TX: Stata Corp LLC).

2.7. *Ethics.* Data for this study were already obtained and available from the Research Unit for General Practice (FEAP) after having applied as per The General Data Protection Regulation (GDPR). Approval by the Committee on Health Research Ethics was not required [29].

3. Results

3.1. *Participants.* A total of 12,578 patients were diagnosed with cancer between July and December 2016 in Denmark. Of those, 10,445 were eligible for receiving the questionnaire and 5,389 (51.5%) responded the questionnaire in Survey 2017 (Figure 1).

Respondents most likely to experience inadequate information were characterized by being <60 of age, females, living alone, long higher educated, high income, living in the capital region, diagnosed with lung cancer, or grouped in "other cancers." The same trend was seen regarding adverse events. The details are shown in Table 1.

When patients experience safety errors such as adverse events or inadequate information, infection (15.95%) and lack of information on late adverse effects, e.g., fatigue and mental reactions (29.67%), were most frequently reported by cancer patients. The details are presented in Table 2.

Statistically significant results on characteristics on responders and nonresponders according to patient safety showed that nonresponders were mostly older ≥ 80 years (25.14%), men (15.32%), having an elementary school/short higher educational level (13.35%), low income (16%), and diagnosed with prostate cancer (29.45%) (data not shown).

Overall, cancer patients who reported experiences with patient safety errors were more likely to have a low level of HL compared to those with a high level of HL (scales 6 and 9). Among cancer patients with a low level of HL (scale 6), 61.25% of cancer patients ($n=343$) report experienced inadequate information and 47.32% ($n=265$) experienced adverse events. The same trend was seen with the HLQ scale 9, however less pronounced (Table 3).

Overall, cancer patients with no support from relatives were more likely to report experiences with patient safety errors compared to cancer patients with support from relatives. The results revealed that cancer patients without support from relatives were more likely to experience inadequate information (53.73%) and 42.34% experienced adverse events without support from their relatives (Table 3).

3.2. Association Analyses. The associations between cancer patients with a low level of HL and their experience with inadequate information and adverse events were pronounced. No support from relatives was also associated with patients experiencing inadequate information and adverse events.

Unadjusted analysis showed a significantly higher risk for patients with a low level of HL to experience inadequate information (OR 4.89 (95% CI 3.98–6.02)). When adjusting for sociodemographic characteristics, the association between a low level of HL (scale 6) and experienced inadequate information was stronger (OR 5.55 (95% CI 4.46–6.91)). The same trend was seen in patients who report adverse events (OR 2.26 (95% CI 1.83–2.78)). Moreover, the adjusted analysis showed an association between cancer patients with a low level of HL (scale 9) and having higher odds of experiencing inadequate information and adverse events (Table 4).

Analyses on the impact of support from relatives on experienced patient safety in cancer patients showed higher odds to report experiences of inadequate information and adverse events when patients did not have support from relatives (Table 4).

3.3. Post Hoc Analyses. Because of the statistically significant association between patients with support from relatives and patient safety, the results according to HLQ scales 6 and 9's impact on patient safety were analysed again in a subanalysis adjusting also for support from relatives; however, no findings of significance were found (data not shown).

TABLE 2: Distribution of inadequate information and adverse events.

Distribution	Inadequate information	
	N	(%)
Total ($n=4,745$)		
Cancer diagnoses	550	(11.59)
The severity of the disease and possibilities for a cure	688	(14.50)
Treatment options	561	(11.82)
Postcomplications	777	(16.38)
Side effects of medicine	605	(12.75)
Late adverse effects	1,408	(29.67)
Distribution	Adverse events	
Total ($n=4,745$)		
Problems with chemotherapy	175	(3.69)
Problems with other medicine	298	(6.28)
Missing information (e.g., test results, in journal)	371	(7.82)
Inadequate pain relief	333	(7.02)
Infection	757	(15.95)
Blood clot	137	(2.89)
Decubitus (pressure ulcers)	76	(1.60)
Problems with operation wound	422	(8.89)

4. Discussion

4.1. Key Results. We found that low HL and a lack of support from relatives increased the experience of patient safety errors when asking cancer patients.

In line with our results, similar studies have found an association between a low level of HL and patient safety errors in terms of a prolonged care interval, to follow treatment, absence from cancer screening programs, medication adherence, and information challenges [9–12]. A Danish cross-sectional questionnaire study ($n=29,473$) found that between 8.8% and 20.2% of the adult population had extensive difficulties understanding HL tasks [30].

As a low level of HL (scale 6) is associated with difficulties regarding ability to actively interact with health professionals [16] and our results presents a strong association between HLQ scale 6 and experienced inadequate information, this aspect of care should be taken into account when discussing patient safety improvements. Another study emphasizes that patient-centered communication (PCC) contributes directly or indirectly to health care outcomes and if PCC as a goal is not achieved, it can have a significant negative influence on patient safety [3]. In a qualitative study using focus group interviews ($n=11$), cancer patients were asked about important factors in their health care environment. The results showed that safety was one of the three main factors, while the other factors were partnership with the health professionals and physical space. Safety was a recurring theme to cancer patients and was defined by individualized communication and shared decision-making, both promoting a feeling of being listened to and understood by the health professionals [31]. Two systematic reviews and one cross-sectional questionnaire study using HLQ as measurement indicate that patients' level of HL could be used to improve the communication

TABLE 3: Distribution of inadequate information and adverse events according to health literacy questionnaire scales 6 and 9 and support from relatives.

	Inadequate information				Adverse events			
	No		Yes		No		Yes	
	N	(%)	N	(%)	N	(%)	N	(%)
Total (n = 4,488)								
Scale 6 (n = 4,401)								
High	1,130	(75.59)	365	(24.41)	1,067	(71.37)	428	(28.63)
Medium	1,308	(55.75)	1,038	(44.25)	1,485	(63.30)	861	(36.70)
Low	217	(38.75)	343	(61.25)	295	(52.68)	265	(47.32)
Scale 9 (n = 4,369)								
High	691	(67.81)	328	(32.19)	702	(68.89)	317	(31.11)
Medium	1,567	(58.87)	1,095	(41.13)	1,732	(65.06)	930	(34.94)
Low	380	(55.23)	308	(44.77)	399	(57.99)	289	(42.01)
Total (n = 4,476)								
Support from relatives (n = 4,476)								
Yes/no need	2,163	(66.45)	1,092	(33.55)	2,199	(67.56)	1,056	(32.44)
No, but need	565	(46.27)	656	(53.73)	704	(57.66)	517	(42.34)

TABLE 4: Odds ratio (OR) of inadequate information and adverse events according to HLQ scales 6 and 9 and support from relatives^{ab}.

	Inadequate information				Adverse events			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
HL scale 6								
High	1		1		1		1	
Medium	2.46	(2.13–2.84)	2.52	(2.17–2.92)	1.45	(1.26–1.66)	1.44	(1.24–1.66)
Low	4.89	(3.98–6.02)	5.55	(4.46–6.91)	2.24	(1.83–2.74)	2.26	(1.83–2.78)
HL scale 9								
High	1		1		1		1	
Medium	1.47	(1.26–1.71)	1.67	(1.42–1.96)	1.19	(1.02–1.39)	1.28	(1.09–1.50)
Low	1.71	(1.40–2.08)	2.40	(1.93–2.99)	1.60	(1.31–1.96)	1.93	(1.55–2.40)
Support from relatives								
Yes/no need	1		1		1		1	
No, but need	2.30	(2.01–2.63)	2.34	(2.03–2.69)	1.53	(1.34–1.75)	1.47	(1.28–1.69)

Note: ^aEach scale is analysed separately and adjusted for age, sex, cohabitation status, educational level, income level, cancer diagnosis, and the region of residence. ^bSignificant results are marked with bold.

between health professionals and patients [8, 12, 18]. Therefore, it may be argued that if health-related communication was addressing to the individual cancer patients' level of HL, this would increase the patients' understanding of own health care situation and thereby increase the experienced patient safety and patient satisfaction during cancer treatment.

Other studies have found that the absence of support from relatives increases the likelihood of inadequate information and adverse events, especially the perception of information being inadequate and the levels of adverse events regarding the treatment outcome, e.g., pain relief, mobilization, patient observations, and rehabilitation, were increased when relatives were not presented in a supporting role or if they were not included as a resource by health professionals during the cancer patients' pathway [4, 5]. Involving the patients' network in the cancer pathway represents a valid approach towards securing adequately informed patients and reduction of adverse events [5, 32].

4.2. Limitations and Strengths. We acknowledge that patient-reported outcome measures and questionnaires might imply bias. Self-reported answers entail the risk of recall difficulties as well as low or high self-estimated problems which may affect exposures and outcomes, and thus, they lead to an over- or underestimation of frequency or association [27, 28]. By applying a validated measurement regarding HL, we believe that the information bias in this study was limited. We find it reasonable to extract the two scales 6 and 9 from the HLQ into analysis, but we acknowledge that all nine scales [16] might be associated with adverse events and inadequate information. Our study sets the stage for further research regarding association with other scales from the HLQ within the domains of patient safety errors.

Statistically significant results from the 2017 survey indicate acceptable representativeness regarding sex and the region of residence. Nevertheless, both responders living alone and patients being young or elderly were under-represented. Responders diagnosed with breast or colon

cancer were over-represented compared to lung and urine cancer. Overall, nonresponders were mostly men and older people often diagnosed with poor prognosis [24], and the same trend was seen in this study's statistical analyses of the characteristics between responders and nonresponders. In the Survey 2017, the questionnaire was long with the total of 129 single- and multi-item scales and only sent out in Danish language [24, 25], which itself makes demands on the responders' level of HL. This could indicate that respondents are not fully comparable to nonresponders and could indicate selection bias [27, 28]. Despite this, our study includes a large population, which is considered a strength, and increases the representativeness of our results.

The category cohabitation status was created using data from registers about the responders being married, widowed, divorced, or alone. The variable does not tell if people live in a collective or two people in a relationship are not married but living together. Thus, the variable could contribute to a too narrow picture of cohabitation status. It was possible to adjust as most of the potential confounders, which was considered a strength, although ethnicity and health environment, remained unobserved.

It may be considered that our categorisation of response options regarding experienced patient safety errors, i.e., inadequate information and adverse events, could potentially alter the results. One could have chosen to focus only on the cancer patients who responded the option "lacked a lot of information" in the categorisation of inadequate information. This could have generated a smaller and more intense group. When examining patient safety, no validated coding rules exist to the best of our knowledge. The chosen cut-off points were made in compliance with the stated intentions of adequate information given to patients in contact with the Danish health care system and of avoiding any adverse events, as described by the Danish health law [13–15]. Therefore, any amount of experienced lack of information or any adverse events were interpreted as a negative treatment outcome and compromised patient safety.

4.3. Generalisability. Responders were mostly <60 years, female, high educated, and with a high income. Hence, responders were not fully comparable to nonresponders who were mostly men, elderly, and often diagnosed with cancers of poor prognosis. Hence, results should be carefully generalized to an entire cancer population.

In conclusion, cancer patients having a low level of HL or cancer patients without support from relatives have higher odds of experiencing patient safety errors. By focusing on improvements related to cancer patients' HL and the support in their network, it could be suggested that the increased quality and safety in the health care system would prevent inequity and social inequalities in the health care system [17, 33].

Data Availability

According to Danish regulation of research, data are stored at the Statistic Denmark and must only be accessed remotely (VPN); therefore, the data are not available to the public.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All authors contributed to conception, design, acquisition of data or analysis, interpretation of data, involved in drafting or critically revising the manuscripts, and approved public responsibility.

Acknowledgments

We gratefully acknowledge the contribution from the Research Unit for General Practice (FEAP), Aarhus University, Denmark, regarding data availability for this study.

References

- [1] J. Grime, A. Blenkinsopp, D. K. Raynor, K. Pollock, and P. Knapp, "The role and value of written information for patients about individual medicines: a systematic review," *Health Expectations*, vol. 10, no. 3, pp. 286–298, 2007.
- [2] L. L. Rønfeldt, D. H. Jakobsen, H. Kehlet, H. Lipczak, and K. Wennervaldt, "A nationwide study of the quality of surgical guidelines and written patient information," *Danish Medical Journal*, vol. 65, no. 6, 2018.
- [3] R. L. Street Jr., K. M. Mazor, and N. K. Arora, "Assessing patient-centered communication in cancer care: measures for surveillance of communication outcomes," *Journal of Oncology Practice*, vol. 12, no. 12, pp. 1198–1202, 2016.
- [4] I. J. Bergerød, G. S. Braut, B. Fagerdal, B. Gilje, and S. Wiig, "Developing a next-of-kin involvement guide in cancer care—results from a consensus process," *Cancer Nursing*, vol. 44, no. 6, pp. E447–e457, 2021.
- [5] I. J. Bergerød, B. Gilje, G. S. Braut, and S. Wiig, "Next-of-kin involvement in improving hospital cancer care quality and safety—a qualitative cross-case study as basis for theory development," *BMC Health Services Research*, vol. 18, no. 1, p. 324, 2018.
- [6] M. Bertram, U. S. Brandt, R. K. Hansen, and G. T. Svendsen, "Does higher health literacy lead to higher trust in public hospitals," *International Journal for Equity in Health*, pp. 1–15, 2021.
- [7] K. Friis, M. Lasgaard, G. Rowlands, R. H. Osborne, and H. T. Maindal, "Health literacy mediates the relationship between educational attainment and health behavior: a Danish population-based study," *Journal of Health Communication*, vol. 21, no. sup2, pp. 54–60, 2016.
- [8] K. Friis, M. Lasgaard, R. H. Osborne, and H. T. Maindal, "Gaps in understanding health and engagement with healthcare providers across common long-term conditions: a population survey of health literacy in 29,473 Danish citizens," *BMJ Open*, vol. 6, no. 1, Article ID e009627, 2016.
- [9] M. A. Heberer, I. K. Komenaka, J. N. Nodora et al., "Factors associated with cervical cancer screening in a safety net population," *World Journal of Clinical Oncology*, vol. 7, no. 5, pp. 406–413, 2016.
- [10] G. S. Petersen, S. G. W. Laursen, H. Jensen et al., "Patients' health literacy is associated with timely diagnosis of cancer—A cross-sectional study in Denmark," *European Journal of Cancer Care*, vol. 31, no. 1, Article ID e13532, 2021.

- [11] S. Thapa and J. B. Nielsen, "Association between health literacy, general psychological factors, and adherence to medical treatment among Danes aged 50-80 years," *BMC Geriatrics*, vol. 21, no. 1, p. 386, 2021.
- [12] D. Weller, "Health literacy and its impact on cancer outcomes," *European Journal of Cancer Care*, vol. 28, no. 1, Article ID e12998, 2019.
- [13] Indenrigs- og Sundhedsministeriet, "Bekendtgørelse af sundhedsloven," *Patients Medinddragelse i Beslutninger-Informeret Samtykke, Indenrigs- og Sundhedsministeriet*, Copenhagen, Denmark, vol. 5, 2023, <https://www.retsinformation.dk/eli/lta/2023/1011>.
- [14] Styrelsen for Patientsikkerhed, "Utlisgtede hændelser," 2021, <https://stps.dk/da/laering/utlisgtede-haendelser/>.
- [15] Indenrigs- og Sundhedsministeriet, "Bekendtgørelse af sundhedsloven," *Patientsikkerhed og Læring, Indenrigs- og Sundhedsministeriet*, Copenhagen, Denmark, vol. 61, 2023, <https://www.retsinformation.dk/eli/lta/2023/1011>.
- [16] R. H. Osborne, R. W. Batterham, G. R. Elsworth, M. Hawkins, and R. Buchbinder, "The grounded psychometric development and initial validation of the Health Literacy Questionnaire (HLQ)," *BMC Public Health*, vol. 13, p. 658, 2013.
- [17] Kræftens Bekæmpelse, "Kræft i Danmark," Kræftens Bekæmpelse, Copenhagen, Denmark, edn. 1, 2022, <https://www.cancer.dk/dyn/resources/File/file/9/9699/1665127828/kræft-i-danmark-2022-bog-singlepages-3udg.pdf>.
- [18] H. T. Maindal and K. Vinther-Jensen, "Sundhedskompetence (health literacy)-teori, forskning og praksis-health literacy-theory, research and Practice," *Klinisk Sygepleje*, vol. 30, no. 1, pp. 1-24, 2016.
- [19] M. H. Madsen, B. Højgaard, and J. Albæk, *Health Literacy-Begrebet, Konsekvenser Og Mulige Interventioner*, Sundhedsstyrelsen, København, Denmark, 2009.
- [20] S. G. Kjeld, L. A. S. Brautsch, D. L. Svartá, A. F. Hansen, S. Andersen, and D. Danielsen, *Social ulighed i mødet med sundhedsvæsenet-en systematisk litteraturgennemgang*, Sundhedsstyrelsen, København, Denmark, 2022.
- [21] C. Burrows Walters and E. A. Duthie, "Patients engagement as a patient safety strategy: patients' perspectives," *Oncology Nursing Forum*, vol. 44, no. 6, pp. 712-718, 2017.
- [22] S. Cuschieri, "The STROBE guidelines," *Saudi Journal of Anesthesia*, vol. 13, pp. S31-s34, 2019.
- [23] J. P. Vandembroucke, E. von Elm, D. G. Altman et al., "Strengthening the reporting of observational studies in epidemiology (STROBE): explanation and elaboration," *International Journal of Surgery*, vol. 12, no. 12, pp. 1500-1524, 2014.
- [24] Kræftens Bekæmpelse, *Kræftpatienters Behov Og Oplevelser Med Sundhedsvæsenet under Udredning Og Behandling*, Kræftens Bekæmpelses Barometerundersøgelse, 2017, https://www.cancer.dk/dyn/resources/File/file/1/6911/1515741637/2017_kraeftpatienters-behov-og-oplevelser-med-sundhedsvaesenet-under-udredning-og-behandling.pdf.
- [25] Kræftens Bekæmpelse, "Spørgeskema - En undersøgelse af dine behov og oplevelser under udredning og behandling," 2017, https://www.cancer.dk/dyn/resources/File/file/2/6912/1513860458/final_barometerskema_nyeste.pdf.
- [26] H. T. Maindal, L. Kayser, O. Norgaard, A. Bo, G. R. Elsworth, and R. H. Osborne, "Cultural adaptation and validation of the Health Literacy Questionnaire (HLQ): robust nine-dimension Danish language confirmatory factor model," *SpringerPlus*, vol. 5, no. 1, pp. 1-16, 2016.
- [27] L. Gordis, *Epidemiology*, Saunders Elsevier, Philadelphia, 2009.
- [28] S. Juul, *Epidemiologi Og Evidens*, Munksgaard, Copenhagen, Denmark, 2013.
- [29] Indenrigs- og Sundhedsministeriet, "Bekendtgørelse af lov om videnskabetisk behandling af sundhedsvidenskabelige for skningsprojekter og sundhedsdatavidenskabelige for skningsprojekter," Anmeldelse af Sundhedsvidenskabelige Forskningsprojekter, Indenrigs- og Sundhedsministeriet, Copenhagen, Denmark, 2020, <https://www.retsinformation.dk/eli/lta/2020/1338>.
- [30] A. Bo, K. Friis, R. H. Osborne, and H. T. Maindal, "National indicators of health literacy: ability to understand health information and to engage actively with healthcare providers-a population-based survey among Danish adults," *BMC Public Health*, vol. 14, pp. 1-12, 2014.
- [31] M. Browall, I. Koinberg, H. Falk, and H. Wijk, "Patients' experience of important factors in the healthcare environment in oncology care," *International Journal of Qualitative Studies on Health and Well-Being*, vol. 8, Article ID 20870, 2013.
- [32] A. Aaby, A. Beauchamp, J. O'Hara, and H. T. Maindal, "Large diversity in Danish health literacy profiles: perspectives for care of long-term illness and multimorbidity," *The European Journal of Public Health*, vol. 30, no. 1, pp. 75-80, 2020.
- [33] C. H. Udesen, C. Skaarup, M. N. S. Petersen, and A. K. Ersbøll, "Social ulighed i sundhed og sygdom: Udviklingen i Danmark i perioden 2010-2017," 2020, <https://www.sst.dk/-/media/Udgivelser/2020/Ulighed-i-sundhed/Social-ulighed-i-sundhed-og-sygdom-tilgaengelig.ashx?la=da&hash=CB63CAD067D942FE54B99034085E78BE9F486A92>.