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General

Health-related quality of life in hemato-oncology patients: role of informativeness and doctor-patient communication

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Background

The patient's information about the disease and doctor-patient communication are both constructs whose importance is emphasized in the theory, but much less frequently researched and used in the practice.

Objective

This study aimed to determine whether certain facets of health-related quality of life of hemato-oncology patients in Croatia could be predicted based on patients' sociodemographic data, the disease's determinants, the patients' information about their disease and the quality of doctor-patient communication.

Methods

60 women and 54 men with diagnoses of both leukemia and lymphoma have participated in filling out questionnaires. The survey consisted of a sociodemographic questionnaire, EORTC QLQ-C30~(version 3)~, EORTC QLQ-INFO25 and the Doctor-Patient Communication Questionnaire.

Results

Patients' sociodemographic data, the disease's determinants, the patients' information about their disease and the quality of doctor-patient communication predicted 26.8 % variance of global health status ($F = 2.756$, $p < .01$), 35.7% variance of physical functioning ($F = 4.196$, $p < .01$), 23.3% variance of role functioning ($F = 2.291$, $p < .05$), 29.9% variance of emotional functioning ($F = 3.215$, $p < .01$) and 27.9% of social functioning ($F = 2.881$, $p < .01$). Predictors that significantly contributed to the change in variance of health-related quality of life were age, duration of diagnosis, the existence of comorbidity, frequency of hospitalization, talking with the psychologist after getting the diagnosis and information.

Conclusion

The study offers valuable insights into an under-researched patient population and a better understanding of their health-related quality of life. The results indicate the importance of information that can be implemented in everyday clinical practice, and pave the way for further research on doctor-patient communication.

1. INTRODUCTION

Hemato-oncology patients are diagnosed with hematologic cancer, also known as blood or liquid cancer. Within that category, leukemia, lymphoma and myeloma are most common types.[1] Leukemia is a tumor change in hematopoietic stem cells that results in excessive accumulation of immature stem cells in the bone marrow and peripheral blood.[1, 2] According to the cells of origin, the four main types of leukemia are acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL) and chronic myeloid/granulocytic leukemia (CML).[2]

Lymphomas are a heterogeneous group of tumors that arise in lymphoid cells in lymph nodes or other lymphoid tissue.[1] The classification of lymphoma is very complex, but the main differentiation is between Hodgkin's lymphoma (HL) and non-Hodgkin's lymphoma (NHL).[2]

Diagnosis of any cancer may cause great psychological-emotional stress with fear being the first reaction.[3] Therefore, doctors should have virtues like empathy, understanding and good communication skills.[4,5] Doctor-patient communication can be defined as an interpersonal relationship developed on subtle intellectual, emotional and respectful components.[6] This socially constructed process is the main premise of human-centered medicine focused on the holistic approach and therefore a fundamental and indispensable skill.[6-10] There are numerous models of doctor-patient communication,[8,11] but the main goal of modern medicine is to shift from the paternalistic model in which the doctor has all the power and the patient is a passive observer in the treatment, towards the model of shared decision-making.[10-12] Currently, there is a significant trend of incorporating good communication skills into the curricula of medical schools and colleges.[1] Patients' most common criticism of healthcare workers is related to poor and insufficient communication,[13] that leads to lower patient satisfaction and affects health outcomes and treatment due to a poorer and limited understanding of interventions.[10]

Effective doctor-patient communication is a prerequisite for good informativeness that helps patients make informed treatment decisions.[14] Providing appropriate and adequate information results in patients' greater satisfaction with the service, reduced stress, better sense of control, higher quality of life, and better communication.[15] Patients are often unsatisfied with the information received from doctors.[14-17] Oncological patients get extremely little to no information about the impact of their disease on sexual well-being.[14,18] Also, they aren't informed about rehabilitation services and additional help outside the hospital.[18] More than 50% of hemato-oncological patients haven't received any type of information about psychological help, recovery process and implications for sexual activity.[19] Furthermore, many patients can't locate the disease-affected organ,[20] or understand the concept of their treatment.[21,22] That highlights the importance of adequately informing patients without assuming some information is well-known or self-explanatory. Sharing case records with patients or giving them audio recordings has been shown helpful,[16] especially since there is a discrepancy between what patients recall and what doctors claim to have mentioned in consultations.[23]

There are many definitions of health-related quality of life (HRQoL), but the emphasis on performing daily activities and subjective satisfaction unites them.[24,25] The European Organization for Research and Treatment of Cancer's (EORTC) definition highlights the ability to perform daily activities that reflect psychological, physical and social well-being and patient's satisfaction with disease control and levels of functioning.[26] Oncological patients have many symptoms that affect their everyday functioning and impair their HRQoL.[27,28] The most common symptoms that occur in hemato-oncological patients are fatigue, vomiting and nausea, pain, dyspnea, insomnia, loss of appetite, constipation and diarrhea,[29] with pain being often overlooked.[30] Psychological symptoms are also very prevalent within this population with higher levels of anxiety and depression.[28,31] Due to the nature of disease, they have significantly weakened immune systems, which was an additional difficulty in the recent period of the COVID-19 pandemic when many showed signs of generalized anxiety disorder.[32]

Compared to solid tumors, the research on HRQoL of hemato-oncological patients is lacking, even though studies demonstrate significantly higher levels of fatigue and later and less approaching to palliative care.[33,34] Although theory emphasizes the importance of doctor-patient communication and information for HRQoL, more research is needed on this matter. It was found that some facets of quality of life could be explained by the patients' information satisfaction.[17]

Our study aims to determine the prediction success of HRQoL of hemato-oncological patients based on sociodemographic data, determinants of the disease, patients' information about the disease and doctor-patient communication. It's assumed that hemato-oncological patients will have lower HRQoL with reduced functioning and more disease symptoms. Patients are expected to report low levels of informativeness and low quality of communication with their hematologist-oncologist. It is expected that better-informed patients and patients with better doctor-patient communication will also have a better HRQoL.

2. MATERIALS AND METHODS

ETHICAL CONSIDERATIONS

Prior to the data collection, the approval of the Ethics Committee of the Dubrava Clinical Hospital was obtained (approval number: 2023/1605-06). Everyone was informed that their participation was completely anonymous and voluntary and that it would not interfere with their medical treatment in any way.

PARTICIPANTS

The sample included 114 hemato-oncology patients. 60 (52.63%) of women and 54 (47.37%) of men between the ages of 20 and 80 ($M = 54.65$, $sd = 15.36$) were diagnosed with leukemia ($N = 56$; 49.1%), lymphoma ($N = 52$; 45.6%) or both (N = 2; 1.8%). Specific diagnoses were HL ($N = 16$), NHL ($N = 35$), ALL ($N = 5$), AML ($N = 16$), KLL ($N = 22$), KML ($N = 11$), both NHL and ALL ($N = 1$) and both HL and hairy cell leukemia ($N = 1$). Some data about diagnoses were missing ($N = 4$, 3.5%), while 3 participants (2.6%) were not sure of their specific diagnosis. 19 (16.7%) patients were hospitalized, 32 (28.1%) were being treated outside of the hospital and 62 (54.4%) were in remission. There were 20 (17.5%) participants who experienced a relapse of their hematological diagnosis in their life, whereas more than half said they hadn't ($N = 86$; 75.4%).

As the highest level of education participants reported the following: elementary school ($N = 2$; 1.8%), high school ($N = 59$; 51.8%), undergraduate study ($N = 9$; 7.9%), graduate study ($N = 35$; 30.7%) and postgraduate study ($N = 9$; 7.9%). The sample consisted mostly of married people ($N = 79$; 69.3%). Other participants were single ($N = 11$; 9.6%), divorced ($N = 9$; 7.9%), in a relationship ($N = 7$, 6.1%), widowed ($N = 7$; 6.1%) or both widowed and currently in a relationship (*N* = 1, .9%). Regarding the work status, 4 (3.5%) of participants were still students, 2 (1.8%) were unemployed, 44 (38.6%) were employed, 18 (15.8%) were employed, but on sick leave due to their primary disease, and 46 (40.4%) participants were retired. Estimated monthly income ranged from none to 2300 € (*C* = 700 €, *sd* = 548.07).

INSTRUMENTS

For this study, a 17-question sociodemographic questionnaire was formed. It included information on general sociodemographic data (e.g., gender, age) and determinants of the disease (e.g., specific diagnosis, current status of treatment).

HRQoL was measured with the Croatian version of the EORTC Quality of Life Questionnaire (EORTC QLQ-C30 ~(version 3)~). It consists of 30 items forming 3 main parts of the questionnaire: global health status, functional scales and symptom scales/items. For the global health status participants answer the questions on a Likert scale from 1 (very poor) to 7 (excellent) which after linear transformation gives results that can range from 0 to 100. Higher result means better global health status. Functional scales are being answered on a Likert scale from 1 (not at all) to 4 (very much). After linear transformation of results that can range from 0 to 100, the higher result represents a better, healthier level of functioning. The same Likert scale is used for the symptom scales/items, but after linear transformation of the results from 0 to 100, a higher result means a higher level of symptomatology or more health problems.[35,36] In this study indexes of Cronbach Alpha were satisfactory: for physical functioning $\alpha = 0.87$ (*N* = 113), role functioning $\alpha = 0.87$ (*N* = 112), emotional functioning $\alpha = 0.90$ (*N* = 111), cognitive functioning $\alpha = 0.80$ (*N* = 110) and social functioning $\alpha = 0.86$ (*N* = 109).

EORTC QLQ-INFO25 is the Information module that is presented together with the main EORTC questionnaire. Twenty-five items incorporate information scales/items and satisfaction scales/items; 4 scales for information about the disease, medical tests, treatments and other services and 8 items about other areas and satisfaction with provided information. Questions are answered on a Likert scale from 1 (not at all) to 4 (a lot) or with "yes" and "no". After linear transformation, results can range from 0 to 100 where a higher score means a higher level of information and greater satisfaction. This questionnaire also has a global score.[15]

Communication was assessed with the Doctor-Patient Communication questionnaire.[9] For this study, the questionnaire was translated into Croatian language. The result is calculated from 15 questions on a Likert scale from 1 to 4 (1= no, 2 = maybe no, 3 = maybe yes, 4 = yes) and it can range from 15 to 60 where a higher score means better communication between the doctor and the patient. The reliability in this study was high, $\alpha = 0.94$, *N* = 109.

DATA COLLECTION

Data was collected in-person from the 4th of April until the 7th of July 2023. Each potential participant was given a consent form that explained the purpose of the study, the anonymity of participant's responses and identities, and the volunteer nature of the entire research.

DATA ANALYSIS

For data analysis, *IBM SPSS Statistics 26.0* program was used. Studied constructs were described by calculating descriptive statistics. The prediction of HRQoL was measured with hierarchical regression with four blocks of predictors: sociodemographic data, determinants of the disease, patient's information about the disease and doctor-patient communication.

3. RESULTS

Approximately equal number of people diagnosed with leukemia and lymphoma participated. Duration of their specific diagnoses ranged from three days to 27 years and 9 months (*C* = 41.5 months, *sd* = 79.72). 60 (52.6%) patients reported comorbidity with disorders of the musculoskeletal system (*f* = 26), heart conditions (*f* = 17), thyroid disease (*f* = 14), hypertension (*f* = 13) and diabetes (*f* = 12) being mentioned the most. 30 (26.3%) patients said they were never hospitalized because of their hematological diagnosis, whereas more than half have been hospitalized once (*N* = 19, 16.7%) or more times (*N* = 64, 56.1%). Only 39 (34.2%) of patients talked to the psychologist sometime after getting their diagnosis. In the evaluation of satisfaction with their family support on a scale from 1 ("completely no") to 5 ("completely yes"), most patients reported complete satisfaction (*N* = 77, 67.5%).

Even though a total of 114 participants enrolled in the study, as seen in Table 1. some data was missing which was expected considering the pen-paper questionnaires. According to thresholds for clinical importance for the functioning and symptom scales of the EORTC QLQ-C30,[37] patients in this study have significant difficulties with physical, emotional, cognitive and social functioning, fatigue, pain, nausea and vomiting, dyspnea, diarrhea and financial problems.

As presented in Table 1., patients reported being informed the best about the medical tests and far poorer about other services and different places of care. More than half of them said they haven't received any information at all regarding rehabilitation services (*N* = 66, 60.6%), professional psychology support (*N* = 57, 51.8%) or additional help outside of the hospital (*N* = 57, 51.8%). Also, they lacked information about the effects of treatment on their sexual functioning (*N* = 40, 36%). Most of the patients haven't gotten any type of materials with information about their disease that they could take along. Only 12 patients (10.5%) have gotten a CD or videotape and only 40 of them got written information (35.1%). Only 5 (4.4%) patients said they would prefer it if they had gotten less information, whereas 69 (60.5%) would like to get more information. Answers about the specific topics were coded into the following categories: more general information about their specific diagnosis (*f* = 17), psychological help and support (*f* = 12),

Table 1. Descriptive data of results on the EORTC QLQ-C30 questionnaire,[1] EORTC QLQ-INFO25 questionnaire[2] and Doctor-Patient Communication questionnaire[3]

		N	*M*	*sd*	*min*	*max*	*K-S*	Skewness	Kurtosis
1	Global health status	112	60.04	25.34	.00	100	.13**	-.21	-.70
	Physical functioning	113	70.15	24.04	.00	100	.16**	-.84	-.06
	Role functioning	112	61.61	32.64	.00	100	.18**	-.28	-1.07
	Emotional functioning	111	62.69	26.20	.00	100	.13**	-.46	-.42
	Cognitive functioning	110	69.85	27.88	.00	100	.21**	-.96	.28
	Social functioning	109	56.88	32.33	.00	100	.16**	-.24	-1.09
	Fatigue	111	49.35	29.35	.00	100	.14**	.24	-.81
	Nausea and vomiting	110	15.61	23.92	.00	100	.33**	1.74	2.67
	Pain	110	34.55	31.34	.00	100	.19**	.59	-.72
	Dyspnea	111	36.64	33.32	.00	100	.22**	.52	-.79
	Insomnia	112	42.86	35.63	.00	100	.23**	.35	-1.10
	Appetite loss	111	26.43	32.76	.00	100	.31**	.96	-.28
	Constipation	110	23.64	32.98	.00	100	.35**	1.14	.01
	Diarrhea	109	20.49	26.02	.00	100	.33**	1.16	.79
	Financial problems	112	38.10	34.62	.00	100	.21**	.45	-.99
2	Information about the disease	111	60.68	24.89	8.33	100	.10*	-.10	-.99
	Information about medical tests	110	71.72	25.88	.00	100	.18**	-.59	-.34
	Information about treatments	111	60.26	26.29	.00	100	.07	-.28	-1.07
	Information about other services	109	28.82	27.84	.00	100	.16**	.98	.20
	Information about different places of care	110	37.58	35.01	.00	100	.22**	.52	-.94
	Information about things you can do to help yourself	110	48.48	34.87	.00	100	.19**	.03	-1.17
	Satisfaction with the information received	111	55.56	33.13	.00	100	.24**	-.30	-.92
	Overall the information has been helpful	111	65.17	27.48	.00	100	.25**	-.41	-.39
	Global score	108	50.17	19.73	13.66	100	.07	.22	-.62
3	Global score	109	57.00	8.18	25.00	60.00	.10*	-.10	-.99

Note: **<.01, *<.05, K-S= Kolmogorov-Smirnov test with the Lilliefors Significance Correction

methods and course of treatment ($f = 12$), remission and life after battling the disease ($f = 10$), patient rights ($f = 6$), consequences of disease and treatments ($f = 5$), prognosis ($f = 5$), relapse ($f = 5$), support associations and experiences of other patients ($f = 4$), diet ($f = 3$) and new findings in disease research ($f = 3$).

The evaluation of doctor-patient communication shown in Table 1 was quite high considering the theoretical range of the scale. The best-evaluated item was "Do you have confidence in this doctor" ($M = 3.88$, $sd = .331$) where none of the patients answered *no* or *possibly no*. On the other hand, involving patients in decision-making ($M = 3.24$, $sd = 1.133$; *no/possibly no* $N = 25$) and explaining the advantages and disadvantages of the treatment or care strategy ($M = 3.27$, $sd = 1.087$; *no/possibly no* $N = 26$) were rated the lowest.

Eleven predictors arranged in four blocks were used for the prediction of five facets of HRQoL. Sociodemographic data implied gender, age, level of education, estimated monthly income and perceived family support. Determinants of the disease included duration of diagnosis, frequency of hospitalization, the existence of comorbidities and the opportunity to talk to the psychologist after getting the diagnosis. The last two blocks, information and doctor-patient communication consisted of one variable each and they implied the global scores on the EORTC QLQ-INFO25 and Doctor-patient communication questionnaire.

The correlation matrix revealed significant correlations between global health status and comorbidity ($r = .31$, $p \leqslant .01$), education ($r = .26$, $p \leqslant .01$), information ($r = .25$, $p \leqslant .01$), hospitalization ($r = -.22$, $p \leqslant .05$), age ($r = -.20$, $p \leqslant .05$) and monthly income ($r = .19$, $p \leqslant .05$). Physical functioning was correlated with age ($r = -.36$, $p \leqslant .01$), comorbidity ($r = .29$, $p \leqslant .01$), hospitalization ($r = -.26$, $p \leqslant .01$), monthly income ($r = .25$, $p \leqslant .01$), perceived family support ($r = .22$, $p \leqslant .05$), information ($r = .20$, $p \leqslant .05$) and education ($r = .17$, $p \leqslant .05$). Role functioning was correlated with hospitalization ($r = -.30$, $p \leqslant .01$), education ($r = .26$, $p \leqslant .01$), monthly income ($r = .23$, $p \leqslant .05$) and comorbidity ($r = .18$, $p \leqslant .05$). Emotional functioning was correlated with talking with psychologiest ($r = .30$, $p \leqslant .01$), age ($r = .25$, $p \leqslant 0.1$), gender ($r = -.25$, $p \leqslant .01$), perceived family support ($r = .23$, $p \leqslant .05$) and information ($r = .22$, $p \leqslant .05$). Social functioning was correlated with hospitalization ($r = -.27$, $p \leqslant .01$), talking with psychologist ($r = .23$, $p \leqslant .05$), education ($r = .20$, $p \leqslant .05$) and monthly income.

ANOVA results indicated that the described four-block regression model significantly predicts the global health status of hemato-oncological patients ($F = 2.756$, $p < .01$) and explains 26.8% of its variance. As seen in Table 2, in the first step of the regression, a higher level of patients' education indicated a higher level of global health status ($\beta = .237$, $t = 2.11$, $p < .05$), but it lost significance adding the three remaining blocks. In the second step only comorbidity was a significant predictor ($\beta = .283$, $t = 2.66$, $p < .01$), which changed by adding the block information. Along with information ($\beta = .230$, $t = 2.28$, $p < .05$) and comorbidity ($\beta = .291$, $t = 2.79$, $p < .01$), hospitalization also emerged as a significant predictor ($\beta = -.233$, $t = -2.30$, $p < .01$). The final model showed that patients who hadn't any comorbidities ($\beta = .290$, $t = 2.78$, $p < .01$), reported higher informativeness ($\beta = .258$, $t = 2.10$, $p < .05$) and were hospitalized less frequently ($\beta = -.228$, $t = -2.22$, $p < .01$), also had better global health status.

Our regression model significantly ($F = 4.196$, $p < .01$) predicted 35.7% of the variance of the patients' physical functioning. Age remained significant in every step, as seen in Table 3. Perceived family support was only significant in the second step ($\beta = .194$, $t = 2.11$, $p < .05$). Information and doctor-patient communication weren't significant predictors, but these blocks contributed to the overall model by decreasing or increasing the significance of other predictors. Therefore, perceived family support wasn't significant anymore, impact of hospitalization ($\beta = -.244$, $t = -2.54$, $p < .05$) and comorbidity ($\beta = .272$, $t = 2.78$, $p < .01$) slightly increased and the impact of age ($\beta = -.272$, $t = -2.76$, $p < .01$) and the duration of diagnosis ($\beta = .232$, $t = 2.36$, $p < .05$) slightly decreased. Younger patients, patients who hadn't any comorbidities, were hospitalized less frequently and had been diagnosed longer with the disease, also had better physical functioning.

23.3% of role functioning variance can be explained by the four-block model ($F = 2.291$, $p > .05$). Education was significant in the first step ($\beta = .288$, $t = 2.00$, $p < .05$), but it lost its significance with adding other three blocks of predictors, as seen in Table 4. By adding determinants of the disease, hospitalization ($\beta = -.269$, $t = -2.63$, $p < .01$) and duration of diagnosis ($\beta = .247$, $t = .237$, $p < .05$) showed as significant predictors and remained significant for the final model. Their quantities didn't change with the addition of the third block, information, which wasn't significant in predicting role functioning. Finally, doctor-patient communication hasn't shown as the significant predictor, but adding it to the regression model slightly increased the impact of hospitalization ($\beta = -.276$, $t = -2.63$, $p < .01$) and duration of the diagnosis ($\beta = .244$, $t = 2.27$, $p < .05$). Patients who were hospitalized less frequently and those who had their diagnosis longer showed higher levels of role functioning.

Furthermore, the four-block model was shown significant ($F = 3.215$, $p > .01$) in predicting 29.9% of the variance of emotional functioning. As shown in Table 5, the first model indicated that older patients ($\beta = .250$, $t = 2.60$, $p < .01$), patients who perceived they had better family support ($\beta = .223$, $t = 2.28$, $p < .05$) and male patients ($\beta = -.221$, $t = -2.22$, $p < .05$), also had higher levels of emotional functioning. This continued in the second step with adding determinants of the disease where no new significant predictors emerged, but the mentioned block decreased the impact of perceived family support ($\beta = .216$, $t = 2.21$, $p < .05$) and gender ($\beta = -.210$, $t = -2.04$, $p < .05$) and slightly increased the impact of age ($\beta = .252$, $t = 2.42$, $p < .05$). Adding the information showed that the block itself is a significant predictor ($\beta = .222$, $t = 2.25$, $p < .05$). It also further increased the impact of age ($\beta = .269$, $t = 2.63$, $p < .01$), decreased the impact of gender ($\beta = -.178$, $t = -1.75$, $p < .05$), while perceived family support became insignificant. Adding doctor-patient communication affected the final model even though it wasn't a significant predictor. It increased the impact of information ($\beta = .247$, $t = 2.05$, $p < .05$), and age ($\beta = .270$, $t = 2.63$, $p < .01$), whereas gender became an insignificant predictor. Patients who were older and who reported higher informativeness also showed higher levels of emotional functioning.

Lastly, ANOVA results indicated that social functioning can be predicted by the four-block model ($F = 2.881$, $p >.01$), which explained 27.9% of its variance. None of the sociodemographic variables were significant predictors at any step of the regression, as seen in Table 6. By adding the determinants of the disease, hospitalization ($\beta = -.244$, $t = -2.38$, $p < .05$) and duration of diagnosis ($\beta = .236$, $t = 2.23$, $p < .05$) emerged as significant predictors, but the latter became insignificant by adding the information. At that point, information wasn't a significant predictor, but it increased the impact of hospitalization ($\beta = -.268$, $t = -2.63$, $p < .01$). Lastly, doctor-patient communication wasn't a significant predictor, but it made an impact on the final regression model. Information became significant and the best predictor of social functioning ($\beta = .288$, $t = 2.34$, $p < .05$), the impact of hospitalization decreased ($\beta = -.250$, $t = -2.45$, $p < .05$), duration of diagnosis became significant again ($\beta = .212$, $t = 2.02$, $p < .05$) and talking with psychologist became significant predictor ($\beta = .208$, $t = 2.03$, $p < .05$). Patients who reported higher informativeness, who were less frequently hospitalized, who had their diagnosis longer and patients who never had a chance of talking to the psychologist after get their diagnosis, showed higher levels of social functioning.

Table 2. Hierarchical regression with global health status as dependent variable (N = 95)

	Model 1			Model 2			Model 3			Model 4		
Variable	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Gender	-3.833	5.260	-.075	-3.714	5.375	-.073	-2.037	5.298	-.040	-2.178	5.336	-.043
Age	-.330	.167	-.197	-.149	0.179	-.089	-.119	.175	-.071	-.118	.176	-.070
Education	5.526	2.616	**.237***	3.695	2.615	.159	3.586	2.553	.154	3.406	2.605	.146
Monthly income	.002	.005	.044	.001	0.005	.024	-.001	.005	-.014	-.001	.005	-.013
Perceived family support	3.049	2.925	.105	3.693	2.891	.128	2.212	2.896	.076	2.567	3.041	.089
Duration of diagnosis				.020	0.033	.066	.008	.033	.025	.009	.033	.028
Hospitalization				-6.061	3.084	-.202	-6.977	3.037	**-.233***	-6.826	3.076	**-.228***
Comorbidity				14.530	5.463	**.283****	14.907	5.335	**.291****	14.888	5.362	**.290****
Talking with psychologist				-5.198	5.704	-.094	-3.847	5.599	-.070	-3.696	5.640	-.067
Information							.307	.135	**.230***	.345	.165	**.258***
Doctor-patient communication										-.155	.385	-.051

Note: **$p < .01$, *$p < .05$
Model 1: F~(5, 89)~ = 2.701, $p < .05$, $R^2 = .132$
Model 2: ΔF~(4, 85)~ = 2.425, $p > .05$, $R^2 = .221$, $\Delta R^2 = .089$
Model 3: ΔF~(1, 84)~ = 5.198, $p < .05$, $R^2 = .266$, $\Delta R^2 = .045$
Model 4: ΔF~(1, 83)~ = .163, $p > .05$, $R^2 = .268$, $\Delta R^2 = .001$

Table 3. Hierarchical regression with physical functioning as dependent variable (N = 95)

	Model 1			Model 2			Model 3			Model 4		
Variable	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Gender	-3.193	4.641	-.067	-5.794	4.587	-.122	-4.997	4.617	-.105	-4.930	4.654	-.104
Age	-.547	.148	**-.351****	-.437	.153	**-.280****	-.423	.153	**-.271****	-.424	.154	**-.272****
Education	1.922	2.308	.089	.414	2.232	.019	.363	2.225	.017	.449	2.271	.021
Monthly income	.007	.005	.160	.006	.005	.133	.005	.005	.114	.005	.005	.114
Perceived family support	3.959	2.581	.147	5.213	2.467	**.194***	4.509	2.524	.167	4.338	2.652	.161
Duration of diagnosis				.074	.028	**.254****	.068	.028	**.233***	.067	.029	**.232***
Hospitalization				-6.310	2.632	**-.226***	-6.745	2.647	**-.242***	-6.818	2.682	**-.244***
Comorbidity				12.783	4.662	**.268****	12.962	4.649	**.271****	12.971	4.676	**.272****
Talking with psychologist				-1.218	4.868	-.024	-.577	4.880	-.011	-.650	4.918	-.013
Information							.146	.117	.117	.128	.143	.103
Doctor-patient communication										.075	.335	.027

Note: $^{**}p < .01$, $^{*}p < .05$

Model 1: *F*~(5, 89)~ = 5.025, *p* < .01, R^2 = .220

Model 2: Δ*F*~(4, 85)~ = 4.056, *p* < .01, R^2 = .345, ΔR^2 = .125

Model 3: Δ*F*~(1, 84)~ = 1.546, *p* > .05, R^2 = .357, ΔR^2 = .012

Model 4: Δ*F*~(1, 83)~ = .049, *p* > .05, R^2 = .357, ΔR^2 = .000

Table 4. Hierarchical regression with role functioning as dependent variable (N = 95)

	Model 1			Model 2			Model 3			Model 4		
Variable	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Gender	-8.009	6.800	-.123	-12.038	-12.038	-.185	-12.047	6.918	-.185	-11.812	6.963	-.182
Age	-.234	.216	-.109	-.167	-.167	-.078	-.167	.229	-.078	-.170	.230	-.080
Education	6.756	3.382	**.228***	5.050	5.050	.170	5.050	3.334	.170	5.350	3.399	.180
Monthly income	.006	.007	.097	.003	.003	.048	.003	.007	.048	.003	.007	.047
Perceived family support	.321	3.781	.009	1.926	1.926	.052	1.934	3.781	.052	1.342	3.968	.036
Duration of diagnosis				.098	.098	**.247***	.098	.042	**.247***	.097	.043	**.244***
Hospitalization				-10.292	-10.292	**-.269****	-10.287	3.966	**-.269***	-10.539	4.013	**-.276****
Comorbidity				11.714	11.714	.179	11.712	6.966	.179	11.744	6.997	.180
Talking with psychologist				3.538	3.538	.050	3.531	7.310	.050	3.278	7.359	.046
Information							-.002	.176	-.001	-.064	.215	-.038
Doctor-patient communication										.258	.502	.067

Note: **p < .01, *p < .05

Model 1: F~(5, 89)~ = 2.142, $p > .05$, $R^2 = .107$

Model 2: ΔF~(4, 85)~ = 3.399, $p < .05$, $R^2 = .230$, $\Delta R^2 = .123$

Model 3: ΔF~(1, 84)~ = .000, $p > .05$, $R^2 = .230$, $\Delta R^2 = .000$

Model 4: ΔF~(1, 83)~ = .002, $p > .05$, $R^2 = .233$, $\Delta R^2 = .002$

Table 5. Hierarchical regression with emotional functioning as dependent variable (N = 95)

	Model 1			Model 2			Model 3			Model 4		
Variable	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Gender	-11.496	5.171	**-.221***	-10.897	5.350	**-.210***	-9.251	5.278	**-.178***	-9.380	5.317	-.181
Age	.426	.165	**.250***	.430	.178	**.252***	.459	.174	**.269****	.461	.175	**.270****
Education	2.567	2.572	.108	1.287	2.603	.054	1.181	2.544	.050	1.015	2.595	.043
Monthly income	.002	.005	.036	.001	.005	.028	.000	.005	-.008	.000	.005	-.007
Perceived family support	6.566	2.876	**.223***	6.356	2.878	**.216***	4.903	2.885	.166	5.231	3.030	.178
Duration of diagnosis				.018	.033	.057	.006	.032	.018	.006	.033	.020
Hospitalization				-2.714	3.070	-.089	-3.613	3.026	-.118	-3.474	3.064	-.114
Comorbidity				8.922	5.437	.171	9.292	5.315	.178	9.274	5.343	.178
Talking with psychologist				9.337	5.677	.166	10.662	5.578	.189	10.802	5.620	.192
Information							.302	.134	**.222***	.336	.164	**.247***
Doctor-patient communication										-.143	.383	-.046

Note: **$p < .01$, *$p < .05$

Model 1: F~(5, 89)~ = 4.195, $p < .01$, $R^2 = .191$

Model 2: ΔF~(4, 85)~ = 1.848, $p > .05$, $R^2 = .255$, $\Delta R^2 = .065$

Model 3: ΔF~(1, 84)~ = 5.043, $p < .05$, $R^2 = .298$, $\Delta R^2 = .042$

Model 4: ΔF~(1, 83)~ = .139, $p > .05$, $R^2 = .299$, $\Delta R^2 = .001$

Table 6. Hierarchical regression with social functioning as dependent variable (N = 94)

	Model 1			Model 2			Model 3			Model 4		
Variable	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Gender	-6.055	6.876	-.094	-9.574	4.587	-.148	-7.809	6.837	-.121	-8.558	6.809	-.132
Age	.211	.218	.100	.196	.153	.093	.228	.226	.108	.233	.224	.110
Education	4.967	3.415	.168	3.304	2.232	.112	3.170	3.281	.107	2.384	3.302	.081
Monthly income	.008	.007	.131	.005	.005	.087	.003	.007	.057	.003	.007	.059
Perceived family support	-3.718	3.815	-.102	-2.830	2.467	-.077	-4.320	3.699	-.118	-2.714	3.834	-.074
Duration of diagnosis				.093	.028	**.236***	.080	.042	.202	.084	.042	**.212***
Hospitalization				-9.247	2.632	**-.244***	-10.175	3.871	**-.268****	-9.488	3.873	**-.250***
Comorbidity				11.396	4.662	.175	11.846	6.904	.182	11.642	6.858	.179
Talking with psychologist				12.577	4.868	.178	13.865	7.288	.196	14.703	7.260	**.208***
Information							.313	.172	.185	.485	.207	**.288***
Doctor-patient communication										-.711	.485	-.186

Note: $^{**}p < .01$, $^{*}p < .05$

Model 1: F~(5, 88)~ = 1.704, $p > .05$, $R^2 = .088$

Model 2: ΔF~(4, 84)~ = 3.876, $p < .01$, $R^2 = .230$, $\Delta R^2 = .142$

Model 3: ΔF~(1, 83)~ = 3.307, $p > .05$, $R^2 = .260$, $\Delta R^2 = .029$

Model 4: ΔF~(1, 82)~ = 2.148, $p > .05$, $R^2 = .279$, $\Delta R^2 = .019$

4. DISCUSSION

Contrary to the expectations, considering the theoretical scale range, the patients showed an average level of global health status. Other research found lower levels of patients' global health status, which is not surprising given that they were all undergoing chemotherapy.[38] The present study showed that hemato-oncological patients, according to the thresholds for clinical importance, are showing functional limitations and symptoms that disrupt their daily routine, create problems and concerns and require additional help or care.[37] They have impaired physical, cognitive, emotional and social functioning with severe symptoms of fatigue, pain, nausea and vomiting, dyspnea, diarrhea and financial problems. Fatigue received the most severe ratings, which confirms previous research, and it is frequently underestimated by doctors.[34,39,40]

Regarding patient information, three patients stated that they were *not sure* of their more specific diagnosis, even though potential answers were provided. The latter is not so surprising given that a significant number of patients who can't locate their disease-affected organ[20] or don't understand foundational principles of therapy.[21,22] Hence, doctors shouldn't assume that patients have adequate knowledge their condition. Patients' comprehension of received medical information should be regularly assessed. Informativeness was rated average, according to the theoretical range of the scale, with patients receiving the most information about medical treatment and considerably less information about other services which is also supported by the literature.[18,19,41] Patients didn't get any, or very little information about rehabilitation services, additional help outside of the hospital, professional psychological help and the effects of the illness on sexual functioning, which is consistent with literature.[14,18,19] In our sample, 65 % of patients haven't spoken to the psychologist after getting the diagnosis, despite expressing a significant need for psychological help. Research suggests that hemato-oncological patients would be open to implementing interventions such as psychotherapy, relaxation techniques and group therapy into their daily routine.[42] Research shows that battling a hemato-oncological disease can cause a significant psychological burden that is often not recognized.[43] These topics should be studied more, and doctors should integrate information about psychological support into their practice.

Doctor-patient communication was rated higher than expected since the global score was very close to the scale maximum.[9] Although quantitative research on doctor-patient communication is currently lacking, available literature emphasizes patient's dissatisfaction with the doctor's approach.[6,10,12,13] Besides highlighting the importance of doctors' competence, honesty, respect and patience, oncological patients expressed a desire for increased time and a better relationship with their doctors.[5] More than half of patients' complaints in one study were related to doctors' lack of empathy and nonchalant treatment and not being involved in care.[13] This is a characteristic of the paternalistic model whose influence is sought to be reduced in human-centered medicine.[8,11] Paternalistic tendencies can be seen in the current study where, although the patients showed a tendency for socially desirable answers, the items that were rated lower still related to shared decision-making and explanation of advantages and disadvantages of different treatments. This is consistent with expectations since 69% of patients reported not being informed of the health consequences of refusing the treatment and 64% didn't have any information about alternative treatments.[12] Besides the tendency to evaluate doctor-patient communication with maximum scores, patients were found to leave written comments and messages for their doctors on the questionnaire. This gives the impression they believed doctors would read their answers, which questions their understanding of the anonymity and sincerity of their responses.

The hypothesis about predicting facets of HRQoL of hemato-oncological patients was only partially confirmed since doctor-patient communication wasn't a significant predictor for any facet. Even though there are no studies that explore communication as a predictor in this context, literature emphasize how good doctor-patient communication is crucial for any patient.[5-8,13] It was found that patients who insisted on good communication were more likely to feel unwell.[7] In the present study, doctor-patient communication wasn't even significantly correlated with any of the HRQoL facets. That could be a consequence of the non-variability of the construct itself as measured by the used questionnaire. However, even though communication hasn't been proven a predictor, it made an impact on the other predictors.

On the other hand, patients who reported higher informativeness also had better global health status and higher levels of emotional and social functioning. Those results are consistent with previous study in which 21% of the variance of the general quality of life, 12% of physical, 13% of social, 8% of emotional and 10% of functional well-being could be explained by the information satisfaction of oncological patients.[17] Despite initial expectations, information wasn't a significant predictor of physical and role functioning, but it made an impact on the other predictors.

Only age was a predictor of HRQoL in a way that younger patients showed higher levels of physical functioning and lower levels of emotional functioning. The latter was expected due to the nature of the construct and given the negative correlation between the physical functioning of hemato-oncological patients and age.[28] On the other hand, age wasn't presumed to predict emotional functioning due to conflicting findings. One study[44] shows that older hemato-oncological patients are at greater risk of experiencing symptoms of depression and having a lower quality of life, whereas other study[31] indicates that life age under 40 years could be associated with depression and anxiety. Furthermore, it was expected that perceived family support would be a predictor of at least one of HRQoL facets since social support is very significant for hemato-oncological patients.[45]

Lastly, some of the determinants of the disease were predictors of global health status, physical, role and social functioning. Patients who were less frequently hospitalized, had no comorbidities and had the diagnosis longer, also had better HRQoL. Surprisingly, results showed that patients who had the opportunity to talk to the psychologist since being diagnosed had lower levels of social functioning. It was expected that talking to the psychologist would relate to the higher HRQoL. Anyhow, the frequency of talking to the psychologist wasn't examined in this study. Patients may seek psychological help only when their social functioning is significantly impaired, given the need for support and the lack of information found in this study.

Our finding showed that facets of HRQoL of hemato-oncological patients can be predicted with the four-block model. Although doctor-patient communication wasn't a significant predictor, it's recommended to further investigate its connection to the HRQoL. The implication significance of this study lies in doctors' ability to improve their communication and give patients more information about their disease. Since better informativeness predicts better HRQoL, healthcare personnel should pay more attention to it, which should also be supported by the healthcare system and working conditions.[4] The first steps could include creating and distributing informative brochures containing important information about additional help and support patients could get. The measurement of patients' HRQoL should be introduced into daily clinical practice.[40]

LIMITATIONS

There are several limitations in this study which should be addressed. Firstly, since participants were filling in paper questionnaires, there were some missing values. Therefore, the sample size should be bigger. More different hospitals should be included in the study for better representativeness. Secondly, for assessing doctor-patient communication, alternative questionnaires should be considered. Results in this study showed that patients tended to give socially desired answers when it came to their doctors' communication. It would be better to use some reverse items.

5. CONCLUSION

Our research showed that different facets of HRQoL of Croatian hemato-oncological patients can be predicted based on patients' sociodemographic data, the disease's determinants, the patients' information about their disease and the quality of doctor-patient communication. Although the doctor-patient communication wasn't shown as a significant predictor, the information was a significant predictor of the global health status and emotional and social functioning. The importance of these data lies in their concrete applicability since information and communication, unlike sociodemographic variables and determinants of the disease, are constructs that healthcare staff can directly improve in clinical practice and thus effectively improve the patients' quality of life. In addition, given the general lack of research in adult hemato-oncological patients, this study provides useful insights that may pave the way for further research and discoveries within this population.

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AUTHORS' CONTRIBUTIONS

Conceptualization, SS and LB; methodology, SS ; resources: SS ; data curation: SS ; writing—original draft preparation, SS and LB ; writing—review and editing SS, LB and VK, ; supervision, LB and VK ; All authors have read and agreed to the published version of the manuscript.

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