

ORIGINAL RESEARCH

Knowledge, attitudes and practices related to the COVID-19 outbreak among Romanian adults with cancer: a cross-sectional national survey

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Background: The coronavirus disease 2019 (COVID-19) pandemic outbreak forced cancer care providers to face different challenges in terms of prevention and treatment management due to specific precautions implemented for oncological patients. We aimed to describe the level of knowledge, attitude and practices (KAP) among cancer patients, with the purpose to provide an image of the impact of COVID-19 and evaluate the effectiveness of pandemic response measures.

Patients and methods: We developed a cross-sectional multicentric study that targeted adults with active cancer during the COVID-19 outbreak, aiming to describe KAP related to COVID-19 among Romanian oncological patients. A questionnaire investigating 64 items on KAP related to the novel coronavirus was designed and applied in seven Romanian hospitals. The group of participants consisted of 1585 oncological patients who completed the questionnaire during the outbreak (April-May 2020).

Results: Only 172 patients (10.8%) had very good knowledge about severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection symptoms, treatment options and incubation period. Only 44.3% of patients identified diarrhoea as a sign of COVID-19. About one-third of patients (32.6%) declared that they are 'very worried' about getting infected with the novel coronavirus. More than two-thirds of participants (68%) considered that having cancer represents an additional risk for infection with SARS-CoV-2, but 27.8% would rather not vaccinate against SARS-CoV-2 should a vaccine be available. A small percentage (8.8%) believed that the risk of infection justifies delaying/stopping oncological treatment until after the pandemic. Around half of the participants (55.5%) declared being compliant with all the protective measures against coronavirus infection listed in the questionnaire.

Conclusion: Romanian oncological patients have a less than expected knowledge about SARS-CoV-2, appropriate prevention behaviours, with limited trust in their efficacy, optimistic attitudes towards COVID-19 and low level of trust in information sources. Good COVID-19 knowledge was associated with appropriate practices towards COVID-19 and optimistic attitudes.

Key words: SARS-CoV-2, knowledge, attitudes and practices, COVID-19 outbreak, health survey, Romania

INTRODUCTION

The advent of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), together with the disease it

causes, coronavirus disease 2019 (COVID-19), marked the beginning of a new pandemic. Since the first report of COVID-19 in Wuhan in December 2019, the spread of SARS-CoV-2 has rapidly gone worldwide, thus mobilizing authorities and populations to take immediate measures to prevent the risk of further infection.^{1,2} By the end of October 2020, more than 42 million cases of SARS-CoV-2 infections were confirmed worldwide and nearly 1.15 million deaths have been declared.³

Special attention was dedicated to cancer patients, whose immunity is often compromised, either due to the

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treatment or the disease itself.^{4,5} When diagnosed with COVID-19, patients with an oncological history have a higher risk of requiring mechanical ventilation and admission to the intensive care unit, being also exposed to a higher fatality rate compared with individuals without cancer.⁵⁻⁸ In a recent nationwide, population-based analysis in Belgium, it has been shown that solid cancer is an independent adverse prognostic factor for in-hospital mortality among patients with COVID-19.⁹ Consequently, international and national guidelines from various oncological societies and hospitals have been developed to reduce the exposure of cancer patients to SARS-CoV-2 infection and diminish the impact of the pandemic upon health services for oncological diseases.¹⁰

Public confusion and lack of action emerged in the early stages of the outbreak, as a result of misinformation regarding COVID-19, increasing the possibility of a worse outcome for vulnerable populations such as cancer patients.¹¹ Not only was the world in the middle of a pandemic, but it also faced an ‘infodemic’, where accessibility to selective, quality information and its understanding were crucial when making decisions and taking action in times of crisis such as this.¹² This situation dramatically illustrated the need to enhance health literacy in populations to enable national health authorities to achieve effective emergency responses in pandemic situations.^{12,13}

Knowledge about the active role of citizens in times of epidemics or pandemics is essential for good planning and

response, as their level of awareness, perceptions or misperceptions, behaviours and trust can influence the effectiveness of the actions and policies implemented by health systems and authorities.

To add to the above body of knowledge, we developed a quantitative, cross-sectional multicentric study, targeting adults with cancer during the outbreak of COVID-19, aiming to describe the knowledge, attitude and practices (KAP) related to COVID-19 among Romanian oncological patients. Recognizing the value of KAP surveys for the management of COVID-19, other countries have started to collect similar data at a national level.¹⁴⁻¹⁶

Romania, the second-largest country in Eastern Europe, with a land area comparable with that of the United Kingdom, has a population of around 19 million. The International Agency for Research in Cancer (IARC) estimates that 83 461 new cases of cancer appear yearly and that there are around 202 000 prevalent cases in the country.¹⁷ A number of public and private health institutions provide specialized care for these patients (Figure 1).

PATIENTS AND METHODOLOGY

Study design

We designed a survey tool, based on a structured questionnaire, following the model of the one developed by the World Health Organization (WHO) Regional Office for Europe.¹⁸

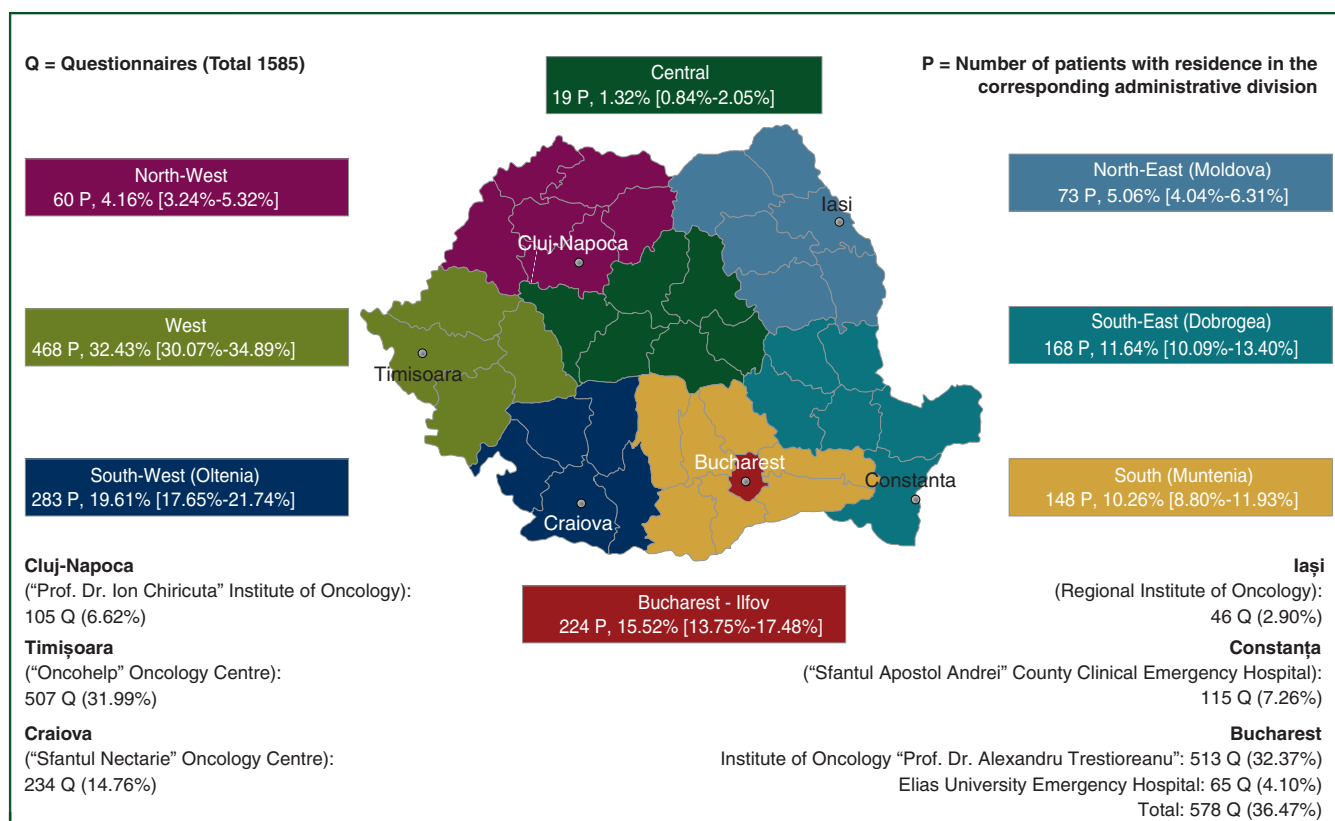


Figure 1. Distribution of patients according to the oncology centres across the country in which the questionnaire was applied (N = 1585) and their residence in the administrative divisions of Romania (N = 1443).

Q, questionnaires; P, patients.

Participants and sampling

The study included adult patients with active cancer under treatment at the time of survey, with or without any other chronic diseases. We applied a random sampling method on consecutive patients that fulfilled the inclusion criteria, from different areas of Romania.

Data collection instrument

The questionnaire contained an introductory section with sociodemographic information followed by 64 questions on KAP related to COVID-19. We evaluated the level of distress about contracting the infection, current knowledge about the disease, perception of the threat of coronavirus and the impact of the pandemic upon cancer outcome, methods of prevention used and their efficacy, level of trust in the capability of medical staff to manage COVID-19 and also the level of trust in different sources of information regarding coronavirus. The full questionnaire is available in the [Supplementary material](https://doi.org/10.1016/j.esmooop.2020.100027), available at <https://doi.org/10.1016/j.esmooop.2020.100027>.

The answers to 12 of the questions were used to calculate the accuracy score of participants' general knowledge of the topic: (i) correct knowledge of symptoms, (ii) correct knowledge of treatment and vaccine existence and (iii) correct knowledge of the incubation period.

Data collection process

Between 27 April and 15 May 2020, the questionnaire was applied in seven Romanian hospitals. Resident doctors or medical students, trained for the purpose, invited patients from the oncology and radiotherapy wards and clinics (both inpatients and outpatients) to answer a set of questions regarding COVID-19, after informing them about the aim of the study and asking them to read and sign the consent form. An important part of the process was the conveyance of accurate information on COVID-19 after the participant had finished answering the questionnaire. As an awareness campaign, we gave each participant a leaflet, containing useful information regarding COVID-19.

Data analysis

Data collected from the questionnaire was entered into Epi Info™ (version 7.2.2.6; trademark of the Centers for Disease Control and Prevention, Division of Health Informatics & Surveillance, Center for Surveillance, Epidemiology & Laboratory Services, Atlanta, GA), for analysis and processing. We defined descriptive measures, including percentages and corresponding 95% confidence intervals (CIs). Continuous numeric variables were summarized by calculating the measures of central location (mean, median) and dispersion [standard deviation (SD)]. Multivariate analysis (logistic and linear regression) has been used to study the correlation between sociodemographic characteristics and survey outcomes. A calculated *P* value less than 0.05 was considered statistically significant.

Ethical considerations

Our research received approval from the ethics committees and managerial levels involved at each hospital that participated in the study and fulfilled the requirements regarding data security and protection. Participation was entirely voluntary, and patients did not receive any remuneration. All those who agreed to answer the questionnaire provided written, informed consent after being informed about the topic and the purpose of the study.

RESULTS

In total, 2050 cancer patients were invited to take part in the study, out of which 237 declined participation and 228 accepted to participate, but did not return the completed questionnaire. With 1585 patients completing the study, the cooperation rate was 77.3%.

The distribution of the patients included in the study according to the oncology centres across the country was as follows: 578 (36.4%) patients from two hospitals in Bucharest, 507 (31.9%) from Timișoara, 234 (14.7%) from Craiova, 115 (7.2%) from Constanța, 105 (6.6%) from Cluj-Napoca and 46 (2.9%) from Iași ([Figure 1](#)).

The study included 1585 patients between 17 and 87, with a median age of 60 (SD = 11.4), and a sex ratio of 0.7 male to female. The background characteristics of the population included in the study are summarized in [Table 1](#). The medical characteristics of the patients are presented in [Table 2](#).

Level of distress about contracting coronavirus and influenza virus

The level of patients' distress was assessed, both regarding contracting SARS-CoV-2 and influenza virus, to compare risk perceptions for COVID-19 and influenza. About one-third of the patients (493; 32.6%) declared that they are 'very worried' about getting infected with the coronavirus or developing COVID-19, while 542 (35.9%) were 'somewhat worried', 360 (23.8%) 'a little worried' and 114 (7.5%) were 'not worried' at all. The distress regarding the risk of infection with influenza virus was lower, compared with that of coronavirus infection ([Supplementary Table S1](#) and [Supplementary Figure S1](#), available at <https://doi.org/10.1016/j.esmooop.2020.100027>). Participants with low income and those with higher education were more worried that they might become infected with SARS-CoV-2.

Attitudes of the participants regarding testing and vaccination

At the time of study, only 10 responders (0.6%) declared having tested positive for coronavirus, and 524 (33.9%) had a negative result. The other 1010 patients (65.4%) were not tested at all. Almost two-thirds (631; 64.9%) of the number of untested patients declared that they would take a test for coronavirus, while 35.0% would prefer not to undergo testing procedures.

Table 1. Background characteristics of the patients (sex, age, education, occupation, profession, monthly income)

Background characteristic	n	% (out of N) [95% CI]
Sex (N = 1585)		
Male	667	48.08% [39.67%-44.53%]
Female	918	57.92% [55.47%-60.33%]
Age (N = 1585)		
Under 40	108	6.81% [5.67%-8.16%]
40-54	438	27.63% [25.49%-29.89%]
55-64	518	32.68% [30.42%-35.03%]
Over 65	521	32.87% [30.60%-35.22%]
Education level (N = 1535)		
Low education	1022	66.58% [64.18%-68.90%]
Elementary/lower secondary education	236	15.37% [13.66%-17.27%]
Upper secondary education (high school)	786	51.21% [48.70%-53.70%]
High education	513	33.42% [31.10%-35.82%]
University	452	29.45% [27.22%-31.78%]
Post-university	61	3.97% [3.11%-5.07%]
Occupation (N = 1561)		
Unemployed	144	9.22% [7.89%-10.76%]
Employed	412	26.39% [24.27%-28.64%]
Retired	1005	64.38% [61.97%-66.72%]
Profession (N = 822)		
Mental labour	451	54.87% [51.45%-58.24%]
Engineers	99	12.04% [9.99%-14.45%]
Life sciences or medicine-related	90	10.95% [8.99%-13.27%]
Economists	61	7.42% [5.82%-9.42%]
Professors/teachers	56	6.81% [5.28%-8.74%]
Accountants	25	3.04% [2.07%-4.45%]
Lawyers	15	1.82% [1.11%-2.99%]
Physical labour	371	45.13% [41.76%-48.55%]
Unqualified workers	83	10.10% [8.22%-12.35%]
Mechanics	27	3.28% [2.27%-4.74%]
Drivers	18	2.19% [1.39%-3.43%]
Electricians	14	1.70% [1.02%-2.84%]
Farmers	12	1.46% [0.84%-2.53%]
Monthly income (N = 1521)		
Low income (less than the minimum gross Romanian wage)		
<2000 RON (<415 EUR)	935	61.47% [59.00%-63.89%]
High income		
2000-5000 RON (415-1035 EUR)	479	31.49% [29.21%-33.87%]
5000-10 000 RON (1035-2070 EUR)	83	5.46% [4.42%-6.71%]
>10 000 RON (>2070 EUR)	24	1.58% [1.06%-2.34%]
Area of residence (N = 1528)		
Rural area	547	35.80% [33.43%-38.24%]
Urban area	981	64.20% [61.76%-66.57%]
Marital status (N = 1528)		
Married	1225	80.17% [78.10%-82.09%]
Not married	303	19.83% [17.91%-21.90%]
Number of persons sharing the household (N = 1550)		
Living alone	219	14.13% [12.48%-15.95%]
Living with one or more persons	1331	85.87% [84.05%-87.52%]
Living with children (N = 1574)		
No	979	62.20% [59.78%-64.56%]
Yes, one child	341	21.66% [19.70%-23.77%]
Yes, two or more children	254	16.14% [14.40%-18.04%]
Having relatives/acquaintances with medical background (N = 1567)		
Yes	650	41.48% [39.06%-43.94%]
No	917	58.52% [56.06%-60.94%]

CI, confidence interval; EUR, euro; ROM, Romanian leu.

Table 2. Medical characteristics of the patients (oncological diagnosis, treatment received at time of completing the survey, form of hospital admission, smoking status and other chronic conditions)

Medical characteristic	n	% (out of N) [95% CI]
Oncological diagnosis—cancer type (N = 1361)		
Breast and gynaecologic cancers	514	37.77% [35.23%-40.37%]
Breast cancer	358	26.30% [24.03%-28.71%]
Ovarian cancer	81	5.95% [4.81%-7.34%]
Cervical cancer	43	3.16% [2.35%-4.23%]
Uterine cancer	31	2.28% [1.61%-3.21%]
Digestive tract cancers	314	23.07% [20.91%-25.38%]
Colorectal cancer	215	15.80% [13.96%-17.83%]
Pancreas cancer	39	2.87% [2.10%-3.89%]
Gastric cancer	35	2.57% [1.85%-3.56%]
Respiratory system and thoracic cancers	243	17.85% [15.91%-19.98%]
Lung cancer	235	17.27% [15.35%-19.37%]
Urogenital cancers	61	4.48% [3.50%-5.72%]
Prostate cancer	51	3.75% [2.86%-4.89%]
Bladder cancer	24	1.76% [1.19%-2.61%]
Kidney cancer	23	1.69% [1.13%-2.52%]
Testicular cancer	10	0.73% [0.40%-1.35%]
Skin cancers	53	3.89% [2.99%-5.06%]
Melanoma	47	3.45% [2.61%-4.56%]
Head and neck cancers	41	3.01% [2.23%-4.06%]
Other cancers	39	2.87% [2.10%-3.89%]
Lymphoid, haematopoietic tissue cancers	31	2.28% [1.61%-3.21%]
Central nervous system cancers	18	1.32% [0.84%-2.08%]
Treatment (N = 1212)		
Chemotherapy	799	65.92% [63.21%-68.54%]
Targeted therapy	152	12.54% [10.79%-14.52%]
Immunotherapy	131	10.81% [9.18%-12.68%]
Radiotherapy	95	7.84% [6.45%-9.49%]
Hormonotherapy	35	2.89% [2.08%-3.99%]
Admission to hospital (N = 1414)		
Outpatient	1173	82.96% [80.91%-84.83%]
Inpatient	241	17.04% [15.17%-19.09%]
Cigarette smoking (N = 1558)		
Yes	198	12.71% [11.15%-14.45%]
No	888	57.00% [54.52%-59.43%]
Former smoker	472	30.30% [28.06%-32.62%]
Mean number of years of smoking cessation = 10.84 (SD = 10.62)		
Other chronic conditions, except for cancer (N = 1585)		
No	716	45.17% [42.74%-47.63%]
Yes	869	54.83% [52.37%-57.26%]
Arterial hypertension	432	27.26% [25.12%-29.50%]
Cardiac diseases	284	17.92% [16.11%-19.88%]
Diabetes mellitus	207	13.06% [11.49%-14.81%]
Pulmonary diseases	133	8.39% [7.12%-9.86%]
Other diseases	82	5.17% [4.19%-6.38%]
Hepatic diseases	74	4.67% [3.74%-5.82%]
Renal diseases	66	4.16% [3.29%-5.26%]
Autoimmune diseases	46	2.90% [2.18%-3.85%]

CI, confidence interval; SD, standard deviation.

percentage of the patients (485; 37.1%) believed that getting the seasonal influenza vaccine was an effective measure to prevent the spread of and infection with SARS-CoV-2. However, 422 participants (27.8%) declared that they would not get vaccinated against coronavirus if a vaccine would become available in Romania (Supplementary Table S2, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

Preparedness and perceived knowledge

As the level of preparedness is one of the factors that influence the application of protective behaviours, we asked

In order to assess participants' attitudes towards vaccination, we first determined that their vaccination rate for influenza was 15.9% within the past year. A notable

the patients how many times per week were they actively searching for coronavirus information. Most of the patients responded they were informing themselves 'several times daily' (561; 36.6%) or 'once a day' (513; 33.5%). Lower percentages of the study population declared searching for information once a week (177; 11.5%), or only two to three times per week (171; 11.1%). There were also participants in the study who declared not actively searching for any information at all (109; 7.1%).

The perceived level of knowledge was determined according to a scale from 1 to 10 (1 = 'very poor knowledge' and 10 = 'very good knowledge'), on which we asked the patients to score their understanding of preventing the spread of the new coronavirus. The mean value of the self-evaluated knowledge was 7.5 (SD = 2.0), with a median of 8.

Being asked how well they knew how to protect themselves from coronavirus, only 475 patients (32.3%) from the total number of participants rated themselves at 10 on a scale on which 1 meant 'not at all' and 10 'very much so'. The mean value of the replies to this question was 8.2 (SD = 1.9), with a median of 9.

Related to the level of self-efficacy, we asked the patients to also rate on a scale from 1 to 10 how difficult (1 = 'extremely difficult') or easy (10 = 'extremely easy') it has been for them to avoid infection with SARS-CoV-2. We obtained a mean value of 6.0 (SD = 2.8), with a median of 6 (Supplementary Table S3, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

Oncological patients' knowledge of COVID-19 symptoms, treatment, vaccine existence and incubation period of the novel coronavirus

Only 172 patients (10.8%) replied correctly to all 12 questions used to calculate a score, between 1 and 12, of participants' accurate general knowledge on coronavirus, while 283 (17.8%) gave the right answer to 11 out of 12 questions. We obtained a mean knowledge score of 7.8 (SD = 3.5), with a median of 9.

The most recognized symptoms of infection with SARS-CoV-2 were fever (1359 participants; 86.7%), cough (1306; 84.3%) and dyspnoea or shortness of breath (1237; 80.3%). Two of the less known symptoms were diarrhoea and nasal congestion, as only 668 patients (44.3%) affirmed that diarrhoea can be related to coronavirus, and 808 (53.7%) knew that the disease can manifest by rhinorrhoea (Supplementary Table S4 and Supplementary Figure S2, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

Approximately two-thirds of the patients (1103; 71.2%) knew that the incubation period of SARS-CoV-2 is up to 14 days and around half of them (839; 53.8%) provided the right answer regarding the existence of treatment and vaccine (Supplementary Table S5, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

We compared the true knowledge (as measured with our score mentioned above) with the self-assessed knowledge, and we observed that the percentage of participants who graded their knowledge about coronavirus as being very

good (12 out of 12) was almost twice as high as the percentage of subjects with true very good knowledge (18.8% versus 10.8%). However, the most significant difference between the perceived and true levels of knowledge was noted in the group of patients (42.7%) who thought their knowledge was good (graded as 8-9 out of 10), while only 17.8% scored accordingly by answering the questionnaire (knowledge score of 11 out of 12). A similar discrepancy was also notable in the group with very poor knowledge, as only 45 patients (2.9%) evaluated themselves as having very poor knowledge (graded as 1-2 on the scale from 1 to 10), while the real knowledge was very poor (score of 0-4 out of 12) among 290 respondents (18.3%) (Supplementary Table S6 and Supplementary Figure S3, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

Moreover, less than one-quarter of the total participants in the study (345; 21.7%) registered the same ratings for their self-evaluated and objectively measured knowledge. In the rest of the group, the discrepancy between the two parameters might constitute a psychological barrier to behavioural change.

According to the linear regression model analysis by Pearson's correlation (r), better knowledge was positively statistically associated with patients aged between 40 and 54 years [$r(1582) = 0.08, P < 0.001$], finishing a higher education program [$r(1532) = 0.11, P < 0.001$], belonging to urban areas [$r(1525) = 0.08, P < 0.001$], having a profession that required mental labour [$r(819) = 0.14, P < 0.001$] and higher income compared with the minimum gross wage [$r(1518) = 0.09, P < 0.001$]. Moreover, participants who declared any level of distress regarding possible infection with coronavirus registered a higher knowledge score [$r(1506) = 0.08, P < 0.001$] than the ones who did not worry at all (Table 3).

In the attempt to stratify responders' knowledge based on their demographic characteristics, we observed that women had better knowledge about coronavirus and COVID-19 compared with men (Table 4).

Perceived risks, fears and opinion about the influence of COVID-19 on cancer evolution

More than two-thirds of patients (1041; 68.0%) considered that having an oncological disease represents an additional risk for infection with the novel coronavirus, while only 134 (8.8%) of them believed that the risk of infection is a reason for delaying/stopping oncological treatment until after the pandemic.

Regarding patients' fears, a small percentage (175; 11.6%) stated fearing infection with coronavirus more than oncological progression, while 26.5% of participants (401) were more preoccupied about cancer evolution. However, the majority of the responders (933; 61.8%) were fearful of both events in equal measure.

Being asked to qualify how they perceive the impact of the COVID-19 outbreak response measures on the evolution of their oncological disease, 427 patients (28.3%) reported that pandemic measures had a bad influence and fewer

Table 3. Results of linear regression on factors associated with COVID-19 knowledge

	Coefficient	Standard error	F test	P value
Sex (female versus male)	0.370	0.180	4.232	0.039
Age group (years)				
55-64 versus 40-54	-0.748	0.228	10.724	0.001
Over 65 versus 40-54	-0.475	0.228	4.333	0.037
Under 40 versus 40-54	-1.634	0.378	18.705	<0.001
Academic level				
Post-university versus elementary education	1.961	0.499	15.427	<0.001
University versus elementary education	1.431	1.978	26.279	<0.001
High school versus elementary education	0.839	1.345	10.580	0.001
Work (mental versus physical labour)	1.268	0.208	37.225	<0.001
Monthly income				
>2070 EUR versus <415 EUR	1.547	0.724	4.568	0.032
415-1035 EUR versus <415 EUR	0.619	0.197	9.888	0.001
1035-2070 EUR versus <415 EUR	0.863	0.401	4.626	0.031
Area of residence (urban versus rural)	0.637	0.187	11.614	<0.001
Marital status (not married versus married)	-0.110	0.225	0.239	0.624
Sharing the household (yes versus no)	0.480	0.257	3.492	0.061
Living with children (yes versus no)	-0.267	0.184	2.117	0.145
Having relatives or acquaintances with medical background (yes versus no)	0.803	0.180	19.884	<0.001
Worried about coronavirus infection (yes versus no)	1.125	0.340	10.975	<0.001

EUR, euro.

people (318; 21.1%) voted for the opposite ('good influence'). None the less, half of the participants (762; 50.5%) did not perceive any influence at all (Supplementary Table S7, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

Coronavirus infection risk perception: probability and severity

We asked the patients to define the level of probability of themselves or their family and close friends getting infected with SARS-CoV-2. The replies were similar, with a slightly bigger percentage of pessimism regarding their own risk: 4.2% certainly believed they would get infected, while 3.0% had the same perception for their family and close friends. Additionally, 8.8% of the patients rated the infection as being 'extremely likely' for themselves in comparison with 6.8% who thought the same for their family and friends. Most of the participants were optimistic about the probability of getting infected, as 436 (28.2%) stated they would certainly not get coronavirus, and 904 (58.6%) perceived the event as 'possible'.

The perceived susceptibility of infection was assessed on a scale from 1 (not at all susceptible) to 10 (very susceptible), where the mean grade found was 5.8 (SD = 2.9), with a median of 6. The mean grade of perceived severity of infection (1 = not severe, 10 = very severe) was 8.1 (SD = 2.4),

with a median of 9. Almost half of the participants in the study (731; 48.2%) considered that contracting SARS-CoV-2 would translate into a very severe form of COVID-19 for them, but only 243 (16.4%) categorized themselves as 'very susceptible' to infection (Supplementary Table S8, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

Own behaviours applied for preventing coronavirus infection

For the analysis of the patients' behaviours regarding prevention methods, we asked them to indicate which ones they had applied since the beginning of the COVID-19 pandemic to prevent infection with SARS-CoV-2. Around half of the participants (880; 55.5%) declared having applied all 10 correct measures listed in the questionnaire (see Supplementary material, available at <https://doi.org/10.1016/j.esmooop.2020.100027>). Each of the appropriate behaviours for prevention was applied by over 80% of the population included in the study, with a mean percentage of 90.9%. The most used measure to prevent infection with SARS-CoV-2 was hand washing for at least 20 seconds, as 1485 participants (97.2%) have declared practising it.

The questionnaire included six additional prevention myths that circulated among the public, such as using herbal supplements (32.8%), antibiotics (12.7%) or homeopathic remedies (16.4%), practising saltwater nasal irrigation or using nasal sprays (30.8%), taking hot baths or showers (43.0%) and eating garlic, ginger or lemon (45.8%). Their use was limited but still prevalent in the population included in the study, with a mean percentage of application of 30.2% (Supplementary Table S9, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

Knowledge on the effectiveness of these prevention methods was evaluated by asking the patients to indicate which ones were efficient at preventing the spread and infection with SARS-CoV-2, regardless if they applied them or not. The most effective measure seemed to be avoiding touching the eyes, nose and mouth with the hands, indicated by 79.4% of the patients. The rates of perceived effectiveness were lower than the rates of usage of protective behaviour, the latter being between 1.04 and 1.27 times higher for the listed measures (ratio of applied measures to perceived effectiveness) (Supplementary Table S10 and Supplementary Figure S4, available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

We also asked the participants to rate on a scale from 1 (not at all) to 10 (very much) their perceived adherence to authorities' recommendations regarding the prevention of coronavirus spread. Most of them (891; 59.9%) declared to have followed the recommendation at the maximum level of 10; the mean value of the answers to this question is 9.0 (SD = 1.6).

Application of the right preventive methods proved to be positively statistically associated with having good knowledge about coronavirus [$r(1582) = 0.21, P < 0.001$]. However, out of the participants (172) who obtained the maximum knowledge score, only 118 (68.6%, 95% CI: 61.1%

Table 4. Demographic characteristics of participants and knowledge score of COVID-19 by demographic variables					
	Knowledge				
	Very poor	Poor	Medium	Good	Very good
Sex					
Male	122 (18.29%)	157 (23.54%)	223 (33.43%)	102 (15.29%)	63 (9.45%)
Female	168 (18.30%)	156 (16.99%)	304 (33.12%)	181 (19.72%)	109 (11.87%)
Age group (years)					
Under 40	25 (23.15%)	34 (31.48%)	29 (26.85%)	14 (12.96%)	6 (5.56%)
40-54	58 (13.24%)	77 (17.58%)	164 (37.44%)	79 (18.04%)	60 (13.70%)
55-64	107 (20.66%)	105 (20.27%)	174 (33.59%)	86 (16.60%)	46 (8.88%)
Over 65	100 (19.19%)	97 (18.62%)	160 (30.71%)	104 (19.96%)	60 (11.52%)
Education level					
Low	219 (21.43%)	195 (19.08%)	317 (31.02%)	191 (18.69%)	100 (9.78%)
High	53 (10.33%)	110 (21.44%)	197 (38.40%)	81 (15.79%)	72 (14.04%)
Occupation					
Unemployed	33 (22.92%)	34 (23.61%)	43 (29.86%)	23 (15.97%)	11 (7.64%)
Employed	52 (12.62%)	89 (21.60%)	153 (37.14%)	71 (17.23%)	47 (11.41%)
Retired	203 (20.20%)	188 (18.71%)	317 (31.54%)	185 (18.41%)	112 (11.14%)
Work					
Mental labour	37 (8.20%)	98 (21.73%)	172 (38.14%)	79 (17.52%)	65 (14.41%)
Physical labour	71 (19.14%)	72 (19.41%)	122 (32.88%)	73 (19.68%)	33 (8.89%)
Monthly income					
Low	196 (20.96%)	180 (19.25%)	290 (31.02%)	179 (19.14%)	90 (9.63%)
High	73 (12.46%)	116 (19.80%)	222 (37.88%)	94 (16.04%)	81 (13.82%)
Area of residence					
Rural	130 (23.77%)	102 (18.65%)	156 (28.52%)	105 (19.20%)	54 (9.87%)
Urban	144 (14.68%)	200 (20.39%)	355 (36.19%)	168 (17.13%)	114 (11.62%)

to 75.4%) followed all the recommendations for protective behaviour. The percentage is similar regarding the group of patients (288) who self-evaluated their knowledge as very good (grade 10/10), as 187 (64.9%, 95% CI: 59.1% to 70.4%) of them applied all the measures listed above.

Regression analysis indicated that having a chronic pulmonary disease besides cancer (odds ratio: 0.699, 95% CI: 0.49-0.99, $P = 0.049$) was correlated with low prevention practices.

Level of trust in medical staff to handle the pandemic and in different information sources regarding their reporting about the novel coronavirus

We assessed the patients' level of trust in the healthcare professionals' capacity to handle the novel coronavirus pandemic. On a 1-10 scale of ascending levels of confidence, the mean value recorded was 8.7 (SD = 1.7), with a median of 10. Most of the patients (767; 51.3%) rated their trust in physicians to manage the COVID-19 outbreak as very high (grade 10/10), but some participants offered a grade equal to or less than 5 (7.0%).

Finally, we assessed the patients' level of trust on an ascending scale from 1 to 10 in various sources of information about COVID-19: consultations with health workers [mean trust level (MTL) of 8.0, SD = 2.5], medical institution press releases (MTL of 7.8, SD = 2.7) and official, government press releases (MTL of 7.3, SD = 2.8) enjoyed the highest trust. Conversations with family and friends (MTL of 6.7, SD = 2.9) were trusted more than television stations (MTL of 6.3, SD = 2.8), radio stations (MTL of 5.5, SD = 3.1), daily or weekly newspapers (MTL of 4.8, SD = 3.0), opinion polls (MTL of 4.6, SD = 2.8), websites or online news pages (MTL of 4.5, SD = 3.0), social media (MTL of

4.2, SD = 2.9) or celebrities and social media influencers (MTL of 3.8, SD = 2.8) ([Supplementary Table S11](https://doi.org/10.1016/j.esmooop.2020.100027), available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

DISCUSSION

To our knowledge, this is the first study in Romania that aimed to examine KAP towards COVID-19 among cancer patients. To optimally assess the situation in the country, the questionnaire has been adapted to the cultural context of Romania and the local epidemiological situation related to COVID-19.

A state of emergency due to the COVID-19 pandemic was first declared by Romanian authorities on 16 March 2020 (after 113 confirmed COVID-19 cases¹⁹ in the country by 15 March) and it lasted until 14 May 2020. During this period, the nationwide lockdown restricted individuals from leaving their homes for nonessential reasons. Afterwards, a national state of alert was implemented, which maintained only part of the restrictions that were previously in place.

Despite the drastic measures taken by the authorities, by the time we started our study (27 April), there were 16 247 confirmed cases of COVID-19 in Romania (83.69 cases per 100 000 population) and 1046 deaths (5.39 per 100 000 population), according to the data provided by the European Centre for Disease Prevention and Control (ECDC).¹⁹ The access of patients to cancer care facilities was not restricted during the state of emergency. According to the international guidelines, an epidemiological triage department was installed at the entrance of each hospital, where every patient had their body temperature measured by medical staff using an infrared thermometer. Healthcare

professionals had to wear personal protective equipment to minimize the risk of SARS-CoV-2 transmission.

The President of the National Society of Medical Oncology from Romania (SNOMR), together with the board of directors addressed an official letter to the Romanian Ministry of Health on 3 April with several suggestions regarding measures that needed to be taken in the oncological practice during the COVID-19 pandemic.²⁰ The main points were testing for COVID-19 in patients with cancer (according to WHO recommendations), postponing oncological treatment in the case of positive COVID-19 patients and maintaining adequate cancer care for oncological patients who tested negative for COVID-19.²⁰ However, testing for COVID-19 in cancer patients did not become mandatory by the time our study was conducted, as reflected in the participants' answers: 1010 (65.4%) were not tested before admission for oncological treatment. The finding that 35% of this group of patients, although aware of their high risk of contracting a potentially lethal infectious disease, prefer not to undergo viral testing deserves further investigation to identify the reasons for their reluctance.

We expected that patients with other diseases besides cancer would better apply the right prevention methods for coronavirus. Surprisingly, our results did not sustain this hypothesis, but on the contrary, cancer patients with a chronic pulmonary disease were found to have less than adequate prevention behaviour.

The poor knowledge about diarrhoea as a manifestation of COVID-19 is potentially dangerous, as it was shown that these people shed the virus for about 6 weeks, i.e. longer than those with airway symptoms. They should observe additional prophylactic measures, such as closing the lid before flushing the toilet, disinfecting the toilet bowl frequently and ventilating the bathroom thoroughly after use. Such insufficient knowledge was signalled in a survey of doctors too.²¹

Data are limited to only one assessment in our study. A longitudinal KAP study could have captured the evolution of risk perceptions, knowledge and practices over time, as the pandemic unfolds. However, we tried to evaluate whether the knowledge of the consecutive participants had improved over the 3 weeks of study. We did not observe a linear improvement, as we would have expected. Most 'good' and 'very good' knowledge scores were achieved during the second week of data collection ([Supplementary Figure S5](https://doi.org/10.1016/j.esmooop.2020.100027), available at <https://doi.org/10.1016/j.esmooop.2020.100027>).

How a community reacts to a threat such as the coronavirus pandemic is highly dependent on the level of trust people have in different institutions. In the group of patients with the maximum level of trust in medical staff ($n = 767$), the rate of application of all adequate prevention behaviours against coronavirus was still moderate, with only 451 (58.8%, 95% CI: 55.2% to 62.2%) of them complying with all 10 good methods mentioned previously.

In a similar study conducted during the same period in Nepal, more than 98% of cancer patients were found to be compliant with the recommended preventive behaviours,

and 94.6% were familiar with the common symptoms of COVID-19 (fever, cough, sore throat and shortness of breath), despite low levels of formal education and literacy.²² Better knowledge and practice regarding COVID-19 were observed in cancer patients from Nepal compared with Romania, but the sample of participants included was smaller (224 participants from only one cancer hospital).²²

Because of the 'social desirability bias' effect, self-reported behaviours are known to differ from actual behaviour, so the findings of the study related to behaviour should be interpreted with this limitation in mind.

The strength of our study lies in the large group of participants recruited from different parts of the country, with a wide range of demographic variables. The study protocol was not designed to ensure that our group is closely representative of the entire population of active cancer patients in Romania, because, in the absence of a national cancer registry, the characteristics of that population are not known. Notwithstanding that, the information obtained could serve to design more effective patient education, by adapting the content and channels of communication for this category of patients.

Choosing a face-to-face interview when applying the survey would have probably led to better cooperation of the participants, but this approach was limited due to COVID-19 restrictions inside hospitals. Moreover, a face-to-face interview would have ensured fully completed questionnaires, as some patients returned them partially filled. Thus, when analysing data collected, percentages were calculated from the total number of answers at each specific question.

Conclusion

In summary, our findings were that the Romanian oncological patients studied had a less than expected knowledge about coronavirus, while a large segment of the study group overestimated their level of knowledge. They had appropriate prevention behaviours, optimistic attitudes towards COVID-19 but limited trust in the efficacy of prevention behaviours and low level of trust in other information sources besides doctors, medical authorities and government. A few patients would rather stop their treatment for the duration of the pandemic. Such cases should be identified and counselled accordingly. Ignoring diarrhoea as a potential manifestation of COVID-19 may contribute to spreading the virus. Many patients at present distrust the efficacy of anti-SARS-CoV-2 vaccines, without any evidence.

Specifically, those who had low socioeconomic status were more worried that they might become infected with SARS-CoV-2. Participants who had high health literacy (higher education) were also more worried about the pandemic, the elevated level of distress being associated with better prevention practices.

The results of this study suggest the need for implementation of better health education programs aimed at improving COVID-19 knowledge among Romanian

oncological patients in order to encourage optimistic attitudes and maintain good prevention behaviours. Moreover, as the risk perception is an essential feature of health-related behaviour theories, such results might contribute to a post-outbreak evaluation of the risk perception, knowledge, trusted sources of information and attitudes toward pandemic response initiatives, to better understand the mechanisms of crisis reaction in the population and develop better targeted approaches in future similar situations.

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DISCLOSURE

The authors have declared no conflicts of interest.

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