Citation: Ugas, M.A.; Avery, L.; Wang, Y.; Berlin, A.; Giuliani, M.E.; Krzyzanowska, M.; Papadakos, T.J.; Quartey, N.K.; Samoil, D.; Papadakos, J.K. COVID-19 and Cancer Patients in the Second Year of the Pandemic: Investigating Treatment Impact, Information Sources, and COVID-19-Related Knowledge, Attitudes and Practices. Curr. Oncol. 2022, 29, 8917–8936. https://doi.org/10.3390/curroncol29110701
Received: 8 October 2022
Accepted: 16 November 2022
Published: 18 November 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Abstract: Background: The novel coronavirus that has triggered the present COVID-19 pandemic continues to spread globally, resulting in widespread morbidity and mortality. Patients with cancer remain one of the most vulnerable subsets of the population to the disease. This study examined the effects of the pandemic on cancer patients’ treatment, psychology, knowledge, attitudes, and practices. Methods: A survey was emailed to 9861 patients at a cancer centre in Toronto, Canada. Descriptive results were summarized. Qualitative feedback was coded and summarized. Regression modelling was used to explore factors associated with patient psychological well-being, knowledge, attitudes, and practices. Results: A total of 1760 surveys were completed, with a response rate of 17.8%. Most participants did not experience any pandemic-related treatment delays, and vaccination rates were high. Participants who identified themselves as non-white (OR 3.30, CI: 1.30–5.30; p ≤ 0.001), and those who referred to journal articles for information (p = 0.002) reported higher psychological impact scores. There were no significant predictors of whether participants would use personal protective equipment when leaving their homes or whether they would go to crowded places. Discussion: This study provides another snapshot of cancer patients perceptions and needs during the COVID-19 pandemic.

Keywords: COVID-19; coronavirus; cancer; health literacy; vaccination; knowledge; attitudes; practices

1. Introduction

The novel coronavirus that has triggered the present COVID-19 pandemic continues to spread globally, resulting in widespread morbidity and mortality [1]. While the emergence of new methods of prevention and treatment, including several highly efficacious vaccines and antiviral therapies, have offered tools to combat the disease, the emergence of more virulent and transmissible variants, combined with the relaxation of non-pharmaceutical interventions, has resulted in SARS-CoV2 remaining a major cause of death internationally, with the World Health Organization estimating that nearly 6.5 million people have...
succumbed to the virus, a figure that likely undercounts the true toll when excess deaths are considered [1].

Patients with cancer remain one of the most vulnerable subsets of the population to COVID-19 infection. They are also overrepresented in two other at-risk groups: the elderly and the immunocompromised. As such, the impact of the pandemic on these sections of the population is an important area of study. Restrictions placed on the recipients of healthcare services in the interest of infection control may result in hindering access, while patients themselves may delay treatment to protect themselves, especially considering the complex nature of cancer treatment [2,3]. Early studies have found that cancer patients’ attitudes to lockdown measures were positive, and only those needing acute care continued to attend hospitals regularly [4]. Other studies, however, have found that patients with cancer have suffered from low quality of life because of lockdown measures and have found telehealth to be inadequate to meet their care needs [5,6].

As an at-risk population, the perceptions of patients with cancer are important as they may shape practices that contribute to their safety. They can also provide information on whether healthcare systems are meeting the needs of the most vulnerable sections of the population during a public health crisis. Understanding these attitudes and perceptions may prove useful in dealing with the mental health ramifications of the public health situation and prolonged isolation. Greater levels of risk perception among patients with cancer during the outbreak have been associated with more distress [7]. Patients have also cited social isolation as the most difficult aspect of dealing with cancer during the pandemic [3].

This study seeks to evaluate the impact of COVID-19 on the psychological well-being and access to cancer health care services of patients with cancer at the end of the fourth wave of the pandemic. It further seeks to investigate their knowledge, attitudes, and practices regarding COVID-19, as well as the sources of information they have consumed. This study seeks to identify predictors and to contrast the results with those found in the first iteration of this survey, administered in the summer 2020 (between the first and second waves [8]), particularly considering the availability of vaccines against the coronavirus.

2. Materials and Methods

The study replicated the methodology used by the authors in an earlier paper [8] by employing a cross-sectional design, with a survey administered to patient participants recruited from a large academic cancer centre in Toronto, Canada. The results of the survey were then used to model relationships between various patient characteristics and outcomes, including knowledge, psychological impact, use of preventative measures, and media sources consumed. Patients were eligible for the survey if they were at least 18 years old, were able to read and write in English, and were currently receiving cancer care. Ethics approval was obtained, and consent was implied by survey completion. A link was sent out with email addresses obtained from the hospital’s Virtual Care Management System, and patients were invited to complete the anonymous survey on the LimeSurvey online platform [9]. The survey was first sent out on 21 October 2021. A reminder invitation was sent out on 28 October 2021, and a final notice for participants to complete the survey was issued on 4 November 2021.

2.1. Survey Structure

The survey comprised ten sections (Supplementary File). Section S1 (demographics) asked participants about their age, gender, income, education, race, living arrangements, cancer type and other personal characteristics. Health literacy was assessed in this section as well, using a validated, single-item screening tool that asks the question, “Are you comfortable filling out medical forms on your own?”, adapted from Chew and colleagues [10]. To determine the extent of their exposure risk to the virus, participants were asked if they considered themselves essential workers, with grocery store workers, bus drivers, and healthcare workers given as examples. Section S2 (treatment impact and concerns) focused
on impacts on cancer treatments due to the pandemic. For example, participants were asked if their treatment was delayed, and if so, for how long. They were also asked to rate their concern over whether the pandemic might adversely affect their prognosis (referred to as cancer worry) and whether they feared infection at the hospital, both using five-point Likert scales. Section S3 (COVID-19 information sources and quality) asked participants to select from a list the sources they consult for information about COVID-19 and to rate the frequency with which they sought information from the source. They were also asked to evaluate the quality of the different information sources in the context of COVID-19. Section S4 (psychological impact) asked participants to indicate the psychological impact of COVID-19 by rating their agreement on statements concerning fears and anxieties with respect to the pandemic. Participants were asked if they felt isolated, had difficulty sleeping or focusing on tasks, had feelings of anxiety and irritability, and about fears that they themselves or their loved ones might contract the virus. Section S5 (knowledge) asked participants “True” or “False” questions to gauge their knowledge of the symptoms of COVID-19, risk factors, transmission, and prevention, based on what was known about the virus at the time of survey deployment. Section S6 (practices) asked participants to answer “Yes” or “No” to whether participants adhered to best practices aimed at preventing the spread of COVID-19 including hand washing, the wearing of masks, and social distancing measures. Section S7 (attitudes) included questions about participant’s attitudes to the pandemic, using a five-point scale to determine if they thought it could be controlled, whether the cancer centre was doing an adequate job in response, and whether they were confident they could avoid infection personally. Section S8 concerned vaccine uptake and attitudes. Participants were asked whether they received the vaccine, which version of the vaccine they received, what their motivations for doing or not doing so were, and what hurdles they may have faced. These questions were adapted from the CDC vaccine question bank [11]. Section S9 (discrimination) asked the participants 6 questions related to racism and the pandemic including whether one should avoid people from Brazil or India (countries that had, at the time of the survey, been recently hit by devastating waves of the virus), whether they had witnessed or were the target of a racist incident, and the nature of that incident. Section S10 (most needed information) comprised two open-ended questions asking participants to indicate their most pressing information needs and asking for any additional comments. Note that to promote flow in the survey, knowledge, attitudes, and practices appear in order of knowledge, practices, and attitudes (Supplementary File).

2.2. Statistical Analysis

Descriptive statistics were used to summarize the results. To investigate factors associated with cancer worry, knowledge, attitudes and practices, multivariable models were fit with candidate predictor variables informed by both a priori hypotheses of which variables would be significant and univariate regression analyses. To reduce the likelihood of type I errors, Bonferroni-corrections were applied to univariate regressions for each outcome to identify significant predictors. For continuous outcomes (cancer worry, COVID-19 knowledge, COVID-19-related attitudes, engagement in preventive practices), linear regressions were modelled, and model assumptions were checked using plots of standardized residuals and normal Q-Q plots.

For the regression analyses, variables were coded as follows: Education: low (some high school and grade school), medium (some college and college), and high (postgraduate); Race: white versus non-white; Income: <$40 k, $40–60 k, $60–100 k, and greater than USD100 k; Cancer Type: blood cancers versus others. Continuous measures of cancer worry, preventative practices, psychological impact and knowledge were computed by summing the relevant survey questions and tested for internal consistency.

The most used information sources were identified by the percentage of participants who answered “Often” or “Always” in reporting their usage. To determine factors associated with use of information sources, multivariable ordinal regression models were fit. The assumption of proportional odds was assessed visually by comparing logit spacing...
across categories in the manner described by Harrell [12]. The Holm-adjusted \( p \)-value was calculated to control for multiple testing and holds the type-I error rate for each analysis at 5%. The R statistical programming language was used for all quantitative analysis.

2.3. Open-Ended Responses

Data derived from the two open-ended questions at the end of the survey were organized and analyzed using the qualitative data software program NVivo [13]. The responses were categorized thematically, using inductive coding, and summarized with representative quotations.

3. Results

Surveys were emailed to patients in the fall of 2021 with responses completed between 21 October and 12 December. Of the 9861 that were sent out, 1760 were completed for a response rate of 17.8%.

3.1. Descriptive Statistics

The median age of participants was 64 years (range: 19–100 years of age). A total of 51% identified themselves as female and 49% as male. No participants identified as non-binary genders. Nearly two-thirds (62%) were born in Canada, and more than three quarters (76%) spoke English as their first language. Most participants (94%) answered in the affirmative to the health literacy metric regarding whether they were able to fill out forms in English, and 62% reported a medium level (some college and college) of educational attainment. Overall, 40% reported working full or part-time, and of those, 74% identified themselves as essential workers. The majority (81%) were suffering from solid-tumor cancers, with most (60%) in follow-up after the conclusion of their treatment. At the time of the survey, 60% were in follow-up post-treatment, and 17% were in active treatment. Nearly two-thirds of participants (63%) reported not experiencing any treatment delays (Table 1). Of those that did experience treatment delays, 27 (2%) experienced delays less than 2 weeks long, and 86 (5%) were delayed for between 2 weeks and 3 months. With respect to modality, 59% of participants had their appointments made virtual (Table 2).

| Variables                  | N (%) |
|----------------------------|-------|
| Gender                     |       |
| Male                       | 839 (49) |
| Female                     | 861 (51) |
| Other                      | 4 (0) |
| Missing                    | 56 |
| Age                        | 61.8 (13.9) |
| Mean (SD)                  | 64 (19,100) |
| Median (Min, Max)          | 83 |
| Sexuality                  | 1534 (91) |
| Heterosexual               | 160 (9) |
| Other                      | 66 |
| Country of Birth           |       |
| Canada                     | 1046 (62) |
| Other                      | 654 (38) |
| Missing                    | 60 |
| First Language             | 1298 (76) |
| English                    | 401 (24) |
| Other                      | 61 |
Table 1. Cont.

| Variables                                           | N (%) |
|-----------------------------------------------------|-------|
| **Language Spoken at Home**                         |       |
| English                                             | 1452 (86) |
| Other                                               | 242 (14)  |
| Missing                                             | 66    |
| **Understand Health Information in English**         |       |
| Yes                                                 | 1655 (97) |
| No                                                  | 49 (3)   |
| Missing                                             | 56    |
| **Comfort Filling Out Medical Forms**                |       |
| Yes                                                 | 1587 (94) |
| No                                                  | 105 (6)   |
| Missing                                             | 68    |
| **Race**                                            |       |
| White/Caucasian/European                             | 1296 (76) |
| Other                                               | 415 (24)  |
| Missing                                             | 49    |
| **Highest Level of Education Completed**             |       |
| Low                                                 | 263 (16)  |
| Medium                                              | 1051 (62) |
| High                                                | 382 (23)  |
| Missing                                             | 64    |
| **Annual Household Income**                         |       |
| Less than USD 40,000                                 | 223 (17)  |
| USD 40,000–59,999                                   | 173 (13)  |
| USD 60,000–99,999                                   | 329 (25)  |
| More than USD 100,000                                | 589 (45)  |
| Missing                                             | 46    |
| **Main Work-Related Activity**                      |       |
| Working (part time or full-time)                    | 684 (40)  |
| Retired                                             | 20 (1)    |
| Other                                               | 1005 (59) |
| Missing                                             | 51    |
| **Marital Status**                                  |       |
| Married/common law                                  | 223 (13)  |
| Other                                               | 1484 (87) |
| Missing                                             | 53    |
| **Living Arrangements**                             |       |
| Alone                                               | 336 (20)  |
| Not alone                                           | 1366 (80) |
| Missing                                             | 58    |
| **Do you live with someone whose job puts them in contact with others?** |       |
| Yes                                                 | 531 (39)  |
| No                                                  | 780 (58)  |
| Not sure                                            | 37 (3)    |
| Missing                                             | 412   |
| **Are you an essential worker?**                    |       |
| Yes                                                 | 487 (74)  |
| No                                                  | 175 (26)  |
| Missing                                             | 1098  |
Table 1. Cont.

| Variables                                                                 | N (%) |
|---------------------------------------------------------------------------|-------|
| If you live with someone whose job puts them in contact with others, are they vaccinated? |       |
| Yes—fully vaccinated                                                      | 484 (91) |
| Yes—partially vaccinated                                                  | 15 (3)  |
| No                                                                        | 16 (3)  |
| Not sure                                                                 | 15 (3)  |
| Missing                                                                  | 1230    |
| Cancer Type                                                               |       |
| Blood cancer                                                             | 308 (19) |
| Other                                                                    | 1288 (81) |
| Missing                                                                  | 164     |
| Treatment Stage                                                           |       |
| In treatment                                                             | 281 (17) |
| Not in treatment                                                          | 377 (23) |
| Follow-up                                                                | 1003 (60) |
| Missing                                                                  | 99      |
| How has COVID-19 changed your appointments?                              |       |
| Made virtual                                                             | 948 (59) |
| No change                                                                | 667 (41) |
| Missing                                                                  | 145     |

Table 2. Treatment Impact of COVID-19.

| Variables                                                                 | N “Yes” |
|---------------------------------------------------------------------------|---------|
| Delayed by less than 2 weeks                                              |         |
| No                                                                        | 1634 (98) |
| Yes                                                                       | 27 (2)   |
| Missing                                                                   | 99      |
| Delayed by more than two weeks but less than 3 months                     |         |
| No                                                                        | 1575 (95) |
| Yes                                                                       | 86 (5)   |
| Missing                                                                   | 99      |
| Delayed by more than 3 months                                             |         |
| No                                                                        | 1641 (99) |
| Yes                                                                       | 20 (1)   |
| Missing                                                                   | 99      |
| Delayed by more than 3 months but less than 6 months                      |         |
| No                                                                        | 1642 (99) |
| Yes                                                                       | 19 (1)   |
| Missing                                                                   | 99      |
| Delayed by more than 6 months                                             |         |
| No                                                                        | 1641 (99) |
| Yes                                                                       | 20(1)    |
| Missing                                                                   | 99      |
| Delayed and I do not know when it will be rescheduled                     |         |
| No                                                                        | 1656 (100) |
| Yes                                                                       | 5 (0)    |
| Missing                                                                   | 99      |
| No change; my treatments were carried out as planned                      |         |
| No                                                                        | 622 (37) |
| Yes                                                                       | 1039 (63) |
| Missing                                                                   | 99      |
A plurality of participants (29%) were neutral on whether the pandemic would make it difficult to get cancer care in the future and whether they would experience complications due to the pandemic (33%). Thirty percent disagreed that their cancer would return and not be detected or managed properly due to the pandemic. Sixty-nine percent disagreed or strongly disagreed that they would contract the coronavirus by coming to the cancer centre (Table 3).

**Table 3.** Cancer worry.

| I Am Worried/Afraid That... | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Missing |
|-----------------------------|-------------------|---------|---------|-------|---------------|---------|
| The COVID-19 pandemic and the response to it will make it hard for me to get cancer care in the future. | 267 (16) | 401 (25) | 472 (29) | 367 (23) | 120 (7) | 133     |
| I will experience complications with my current cancer treatment because of the COVID-19 pandemic. | 66 (21) | 95 (30) | 106 (33) | 35 (11) | 16 (5) | 1442    |
| My cancer will return and not be detected or managed properly because of the COVID-19 pandemic. | 232 (18) | 386 (30) | 339 (27) | 221 (17) | 89 (7) | 493     |
| I will get COVID-19 by coming to the cancer centre. | 358 (31) | 440 (38) | 240 (21) | 101 (9) | 31 (3) | 590     |

Information sources varied among participants with most more commonly relying on television (24% = always) and the public health press releases (36% = always) for information about COVID-19, compared to social media (2% = always). Perceptions of the quality of each source were mixed, with public health department and press releases (36%) along with cancer centre resources (32%) being rated as “excellent” most often (Table 4). The median psychological impact score was 65 out of 100 (with a range of 20–100), indicating moderate impact of the pandemic on mental health (Table 5). Knowledge scores were high, with between 88–98% answering correctly for each question except for a single item regarding how common it is for cold-like symptoms to manifest with COVID-19 and half answered incorrectly (Table 6).

**Table 4.** Source of information.

| Source of information | Never/Very Poor | Rarely/Poor | Sometimes/Neutral | Often/Good/ | Always/Excellent | Missing |
|-----------------------|-----------------|-------------|-------------------|------------|-----------------|---------|
| Television stations   |                 |             |                   |            |                 |         |
| Usage                 | 156 (10)        | 197 (12)    | 347 (22)          | 508 (32)   | 380 (24)        | 172     |
| Quality/trustworthiness | 52 (3)      | 130 (9)     | 385 (26)          | 730 (49)   | 192 (13)        | 271     |
| Daily or weekly print newspapers |             |             |                   |            |                 |         |
| Usage                 | 547 (37)        | 258 (17)    | 279 (19)          | 235 (16)   | 166 (11)        | 275     |
| Quality/trustworthiness | 41 (4)   | 73 (6)      | 363 (32)          | 533 (47)   | 129 (11)        | 621     |
| Websites or online news pages |             |             |                   |            |                 |         |
| Usage                 | 130 (8)         | 157 (10)    | 459 (29)          | 489 (31)   | 326 (21)        | 199     |
| Quality/trustworthiness | 50 (3)    | 133 (9)     | 569 (40)          | 585 (41)   | 100 (7)         | 323     |
| Public health department and press releases |             |             |                   |            |                 |         |
| Usage                 | 86 (5)          | 143 (9)     | 460 (29)          | 519 (33)   | 370 (23)        | 182     |
| Quality/trustworthiness | 26 (2)   | 33 (2)      | 202 (14)          | 694 (47)   | 534 (36)        | 271     |
### Table 4. Cont.

|                               | Never/Very Poor | Rarely/Poor | Sometimes/Neutral | Often/Good/ | Always/Excellent | Missing |
|-------------------------------|-----------------|-------------|-------------------|-------------|------------------|---------|
| Conversations with friends    |                 |             |                   |             |                  |         |
| and family Usage              | 85 (5)          | 302 (19)    | 651 (41)          | 414 (26)    | 145 (9)          | 163     |
| Quality/trustworthiness       | 56 (4)          | 172 (12)    | 761 (52)          | 429 (29)    | 53 (4)           | 289     |
| Conversations with work       |                 |             |                   |             |                  |         |
| colleagues Usage              | 394 (32)        | 297 (24)    | 344 (28)          | 162 (13)    | 52 (4)           | 511     |
| Quality/trustworthiness       | 85 (9)          | 139 (14)    | 520 (54)          | 189 (20)    | 28 (3)           | 799     |
| Journal articles              |                 |             |                   |             |                  |         |
| Usage                         | 432 (30)        | 367 (25)    | 446 (31)          | 166 (11)    | 43 (3)           | 306     |
| Quality/trustworthiness       | 31 (3)          | 46 (4)      | 393 (35)          | 452 (40)    | 196 (18)         | 642     |
| Social media                  |                 |             |                   |             |                  |         |
| Usage                         | 665 (44)        | 305 (20)    | 320 (21)          | 150 (10)    | 86 (6)           | 234     |
| Quality/trustworthiness       | 353 (30)        | 319 (27)    | 323 (28)          | 150 (13)    | 24 (2)           | 591     |
| Search engines                |                 |             |                   |             |                  |         |
| Usage                         | 273 (18)        | 300 (19)    | 578 (37)          | 306 (20)    | 100 (6)          | 203     |
| Quality/trustworthiness       | 86 (6)          | 167 (12)    | 605 (45)          | 443 (33)    | 58 (4)           | 401     |
| Radio stations                |                 |             |                   |             |                  |         |
| Usage                         | 380 (25)        | 321 (21)    | 468 (31)          | 260 (17)    | 103 (7)          | 228     |
| Quality/trustworthiness       | 63 (5)          | 99 (8)      | 482 (39)          | 501 (40)    | 95 (8)           | 520     |
| Cancer centre resources       |                 |             |                   |             |                  |         |
| Usage                         | 432 (28)        | 448 (29)    | 437 (28)          | 148 (10)    | 78 (5)           | 217     |
| Quality/trustworthiness       | 20 (2)          | 34 (3)      | 261 (22)          | 476 (41)    | 373 (32)         | 596     |

### Table 5. Psychological impact of COVID-19.

| Question                                                                 | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Does Not Apply | Missing |
|--------------------------------------------------------------------------|-------------------|----------|---------|-------|----------------|----------------|---------|
| It has been difficult to focus on tasks because of concerns about COVID-19 | 214 (14)          | 487 (31) | 312 (20)| 436 (28)| 104 (7)        | 21 (1)         | 186     |
| It has been difficult for me to sleep because of concerns about COVID-19  | 382 (24)          | 570 (36) | 331 (21)| 220 (14)| 49 (3)         | 25 (2)         | 183     |
| I have had fears about getting COVID-19                                  | 128 (8)           | 256 (16) | 308 (20)| 641 (41)| 223 (14)       | 18 (1)         | 186     |
| I have had fears of family/loved ones getting COVID-19                   | 62 (4)            | 149 (9)  | 183 (12)| 778 (49)| 384 (24)       | 18 (1)         | 186     |
| I have felt socially isolated from friends getting COVID-19              | 78 (5)            | 176 (11) | 306 (19)| 785 (50)| 206 (13)       | 19 (1)         | 190     |
| I have felt anxiously about financial concerns because of COVID-19       | 202 (13)          | 388 (25) | 369 (23)| 431 (27)| 162 (10)       | 21 (1)         | 187     |
| I have felt anxious about financial concerns because of COVID-19        | 263 (17)          | 462 (29) | 311 (20)| 281 (18)| 192 (12)       | 64 (4)         | 187     |
Table 6. Knowledge about COVID-19.

| Question                                                                 | N (%)          | True   | False | I Do Not Know | Missing |
|-------------------------------------------------------------------------|----------------|--------|-------|---------------|---------|
| Symptoms of COVID-19 include fever, fatigue, dry cough, and muscle pain | 1430 (93)      | 36 (2) | 71 (5) | 223           |         |
| Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in people who have COVID-19. | 573 (37)       | 600 (39) | 364 (24) | 223           |         |
| Right now, there is no cure for COVID-19, but catching symptoms early and getting treatment can help patients recover from the virus. | 1250 (81)      | 166 (11) | 123 (8) | 221           |         |
| Not all people with COVID-19 will develop to severe cases. Seniors and people with chronic illnesses are more likely to be severe cases. | 1451 (94)      | 51 (3)  | 40 (3) | 218           |         |
| Eating or touching wild animals can cause you to become sick with the COVID-19 virus. | 87 (6)         | 1132 (73) | 322 (21) | 219           |         |
| People with COVID-19 cannot give the virus to others when they do not have a fever. | 52 (3)         | 1389 (90) | 95 (6) | 224           |         |
| The COVID-19 virus spreads via respiratory droplets through coughing, sneezing or intimate contact. | 1493 (97)      | 19 (1)  | 22 (1) | 226           |         |
| Wearing a medical mask can help prevent the COVID-19 virus from spreading. | 1494 (97)      | 22 (1)  | 25 (2) | 219           |         |
| Children and young adults do not have to take measures to prevent the spread of the COVID-19 virus. | 28 (2)         | 1480 (96) | 32 (2) | 220           |         |
| To prevent the spread of COVID-19, people should limit (stop) going to crowded places and limit taking public transportation. | 1319 (86)      | 148 (10) | 73 (5) | 220           |         |
| Isolation and treatment of people with COVID-19 are ways to slow down the spread of the virus. | 1474 (96)      | 26 (2)  | 40 (3) | 220           |         |
| People who have contact with someone who has the COVID-19 virus should be isolated in a safe place for at least 14 days. | 1443 (94)      | 55 (4)  | 44 (3) | 218           |         |
| The incubation period of COVID-19 can be up to 14 days. People with cancer have to be more careful than people to protect themselves against COVID-19. | 1399 (91)      | 36 (2)  | 106 (7) | 219           |         |
| 1394 (90)         | 51 (3)  | 97 (6) | 218           |         |

Psychology Score

- Mean (SD): 63.7 (16.2)
- Median (Min, Max): 65.0 (20.0–100.0)

Preventative practices for infection control were similarly very high among participants, ranging from 89–99% for each except for quarantining, only 69% of which reported doing (Table 7). Attitudes regarding the pandemic were optimistic, with 59% agreeing that the pandemic could be controlled successfully, and 43% strongly agreeing that they could protect themselves from COVID-19 (Table 8). Two-hundred and fifty participants did not answer whether they were vaccinated. Of those that did, 97% received at least one dose, and of those that did not (N = 46), 53 were not planning on doing so. The biggest motivating factor for getting vaccinated was to protect one’s health (88%) and the least commonly cited factor was the encouragement of others (7%; see Table 9). Most participants (48%) agreed that one should avoid people where COVID-19 case numbers are high (Table 10).
Table 7. COVID-19 preventative behaviours.

| Actions                                                   | N (%)     |
|-----------------------------------------------------------|-----------|
|                                                            | Yes  | No  | Does Not Apply | Missing |
| Hand washing for 20 s                                      | 1493 (98) | 32 (2) | 5 (0) | 230     |
| Did not touch your eyes, nose, and mouth with unwashed hands | 1362 (89) | 159 (10) | 10 (1) | 229     |
| Used disinfectants to clean your hands                     | 1496 (98) | 33 (2) | 4 (0) | 227     |
| Stayed home when you were sick or had a cold              | 1153 (75) | 8 (1) | 370 (24) | 229     |
| Did not go near someone who was sick or had a cold        | 1342 (88) | 82 (5) | 106 (7) | 230     |
| Wore personal protective equipment when leaving home      | 1501 (98) | 29 (2) | 2 (0) | 228     |
| Only made essential trips outside of the home             | 1357 (89) | 160 (10) | 16 (1) | 227     |
| Did not go to crowded places                              | 1398 (91) | 118 (8) | 15 (1) | 229     |
| Practiced social distancing as much as possible          | 1505 (98) | 22 (1) | 5 (0) | 228     |
| Self-quarantined                                          | 699 (46) | 312 (20) | 520 (34) | 229     |

Table 8. Attitudes about COVID-19.

| Question                                                                 | N (%)     |
|-------------------------------------------------------------------------|-----------|
| Do you think the COVID-19 pandemic can be successfully controlled?      | 316 (21) | 889 (59) | 231 (15) | 72 (5) | 0 (0) | 252     |
| Do you think that Princess Margaret Cancer Centre has done a good job of responding to the COVID-19 pandemic? | 672 (45) | 697 (46) | 127 (8) | 11 (1) | 0 (0) | 253     |
| As a person affected by cancer, do you feel confident that you know what to do to protect yourself from COVID-19? | 648 (43) | 781 (52) | 70 (5) | 13 (1) | 0 (0) | 248     |

Table 9. Vaccinations.

| Question                                                                 | N (%)     |
|-------------------------------------------------------------------------|-----------|
| Do you believe that the COVID-19 vaccines will help control the spread of COVID-19? | 40 (3) | 1407 | 59 (4) | 254     |
| Have you had at least one dose of the vaccine?                          | 46 (3) | 1464 (97) | 250 |
| If you have not had the vaccine, do you plan on doing so?               | 23 (51) | 4 (9) | 18 (40) | 1715     |
Table 9. Cont.

| Question                                                                 | N (%)          |
|--------------------------------------------------------------------------|----------------|
| What is your motivation for getting the vaccine or wanting to get the vaccine? (Select all that apply) |
| Protect my health                                                        |                |
| No                                                                       | 185 (12)       |
| Yes                                                                      | 1365 (88)      |
| Missing                                                                  | 210            |
| Protect health of family/friends                                         |                |
| No                                                                       | 305 (20)       |
| Yes                                                                      | 1245 (80)      |
| Missing                                                                  | 210            |
| Protect health of co-workers                                            |                |
| No                                                                       | 1012 (65)      |
| Yes                                                                      | 538 (35)       |
| Missing                                                                  | 210            |
| Protect health of community                                              |                |
| No                                                                       | 460 (30)       |
| Yes                                                                      | 1090 (70)      |
| Missing                                                                  | 210            |
| To get back to work/school                                               |                |
| No                                                                       | 1188 (77)      |
| Yes                                                                      | 362 (23)       |
| Missing                                                                  | 210            |
| To resume social activities                                              |                |
| No                                                                       | 636 (41)       |
| Yes                                                                      | 914 (59)       |
| Missing                                                                  | 210            |
| To resume travel                                                         |                |
| No                                                                       | 780 (50)       |
| Yes                                                                      | 770 (50)       |
| Missing                                                                  | 210            |
| Because others encouraged me to get the vaccine                          |                |
| No                                                                       | 1443 (93)      |
| Yes                                                                      | 107 (7)        |
| Missing                                                                  | 210            |
| Not sure                                                                 |                |
| No                                                                       | 1532 (99)      |
| Yes                                                                      | 18 (1)         |
| Missing                                                                  | 210            |

3.2. Multi-Variable Regression

The preventative practice, cancer worry, and knowledge metrics all scored poorly on internal consistency and were excluded from the multivariable analysis.

Participants who identified themselves as non-white (OR 3.30; \( p \leq 0.001 \)), and those who referred to journal articles for information, reported higher psychological impact scores (Table 11). A larger proportion of non-white participants did not answer the questions regarding psychological impact. Participants who used public health department and press releases or television as their sources for COVID-19 information, were more likely to be vaccinated, as were those with household incomes of greater than USD 40,000 and older patients, although this effect was marginal (OR 1.03; \( p = 0.035 \)). Older participants and non-white participants were less likely to answer the vaccination question (Table 12).
Table 10. COVID-19 and discrimination.

| Question | N (%) |
|----------|-------|
| Do you think that you should avoid people from countries where COVID-19 case numbers are/deaths are high (for example Brazil or India)? | |
| Yes | 727 (48) |
| No | 465 (31) |
| I do not know | 249 (17) |
| I prefer not to say | 68 (5) |
| Missing | 251 |

Have you seen, heard, or experienced any incidents of discrimination related to COVID-19?
| Yes | 338 (22) |
| No | 1170 (78) |
| Missing | 252 |

What was your role?
| You were the target | 30 (9) |
| You witnessed it | 137 (41) |
| You supported someone who experienced it | 64 (19) |
| Other | 105 (31) |

Table 11. Multivariate analysis.

| Model 1. Psychological Impact | N | Adjusted Estimate (95% CI) | p-Value | Holm Adj p |
|------------------------------|---|---------------------------|---------|------------|
| Ethnicity                    |   |                           |         |            |
| White                        | 1208 | Reference                | <0.001 | 0.001 |
| Other                        | 362 | 3.30 (1.30, 5.30)         |         |            |

Use of Journal Articles
| N | Adjusted Estimate (95% CI) | p-Value | Holm Adj p |
|---|---------------------------|---------|------------|
| Never | 416 | Reference | 0.001 | 0.002 |
| Rarely | 353 | 2.26 (−6 × 10⁻³, 4.53) | 0.032 | 0.051 |
| Sometimes | 436 | 3.65 (1.50, 5.80) | <0.001 | <0.001 |
| Often | 165 | 4.58 (1.68, 7.47) | 0.001 | 0.002 |
| Always | 42 | 5.46 (0.39, 10.52) | 0.035 | 0.035 |

Table 12. Multivariate analysis.

| Model 1. Vaccine Uptake | N | Adjusted Odds Ratio (95% CI) | p-Value | Holm Adj p |
|-------------------------|---|-----------------------------|---------|------------|
| Age                     | 1475 | 1.03 (1.00, 1.06) | <0.001 | 0.035 |
| Income                  | 1155 | <0.001 | 0.001 |
| Less than USD 400,000   | 184 | Reference |         |            |
| USD 40,000–59,999       | 148 | 6.00 (1.26, 28.54) | 0.019 | 0.024 |
| USD 60,000–99,999       | 296 | 4.48 (1.48, 13.58) | 0.005 | 0.008 |
| More than USD 100,000   | 527 | 6.52 (2.41, 17.66) | <0.001 | <0.001 |
| Television stations usage | 1478 | <0.001 | 0.07 |
| Never                   | 143 | Reference |         |            |
| Rarely                  | 182 | 2.07 (0.51, 8.36) | 0.08 | 0.3 |
| Sometimes               | 323 | 1.04 (0.34, 3.20) | 0.38 | 0.95 |
| Often                   | 475 | 3.49 (0.90, 13.62) | 0.004 | 0.072 |
| Always                  | 355 | 5.35 (0.96, 29.64) | 0.001 | 0.055 |
| Public health department and press releases usage | N   | Adjusted Odds Ratio (95% CI) | p-Value       | Holm Adj p |
|-------------------------------------------------|-----|-----------------------------|---------------|------------|
|public health department and press releases usage| 1467| 0.01                        | <0.001        | 0.038      |
|Never                                           | 76  | Reference                   |               |            |
|Rarely                                          | 134 | 0.79 (0.19, 3.18)           | 0.45          | 0.74       |
|Sometimes                                       | 420 | 3.29 (0.84, 12.94)          | 0.005         | 0.088      |
|Often                                           | 488 | 3.30 (0.83, 13.13)          | <0.001        | 0.09       |
|Always                                          | 349 | 5.17 (0.84, 31.69)          | <0.001        | 0.076      |

Model 2. I am worried that the COVID-19 pandemic and the response to it will make it hard for me to get cancer care in the future

| Public health department and press releases usage | N   | Adjusted Odds Ratio (95% CI) | p-Value       | Holm Adj p |
|-------------------------------------------------|-----|-----------------------------|---------------|------------|
|Age                                              | 1590| 0.99 (0.98, 1.00)           | <0.001        | 0.004      |
|public health department and press releases usage| 1466| 0.01                        |               | 0.002      |
|Never                                           | 25  | Reference                   |               |            |
|Rarely                                          | 32  | 1.06 (0.23, 4.79)           | 0.82          | 0.94       |
|Sometimes                                       | 199 | 0.44 (0.14, 1.42)           | 0.52          | 0.17       |
|Often                                           | 683 | 0.33 (0.11, 1.04)           | 0.16          | 0.06       |
|Always                                          | 527 | 0.27 (0.09, 0.85)           | 0.11          | 0.03       |

Model 3. I fear that my cancer will return and not be detected or managed properly because of the COVID-19 pandemic

| Public health department and press releases usage | N   | Adjusted Odds Ratio (95% CI) | p-Value       | Holm Adj p |
|-------------------------------------------------|-----|-----------------------------|---------------|------------|
|Age                                              | 1239| 0.98 (0.98, 0.99)           | <0.001        | <0.001     |
|public health department and press releases usage| 1151| 0.002                       |               | 0.04       |
|Never                                           | 19  | Reference                   |               |            |
|Rarely                                          | 22  | 0.74 (0.21, 2.59)           | 0.43          | 0.64       |
|Sometimes                                       | 159 | 0.54 (0.21, 1.37)           | 0.28          | 0.19       |
|Often                                           | 529 | 0.45 (0.18, 1.09)           | 0.09          | 0.08       |
|Always                                          | 422 | 0.34 (0.14, 0.85)           | 0.03          | 0.02       |

Model 4. I am afraid of getting COVID-19 by coming to the cancer centre

| Ethnicity                                      | N   | Adjusted Odds Ratio (95% CI) | p-Value       | Holm Adj p |
|------------------------------------------------|-----|-----------------------------|---------------|------------|
|White                                           | 895 | Reference                   | <0.001        | 0.03       |
|Other                                           | 272 | 1.53 (1.05, 2.21)           |               |            |
|Television stations usage                       | 1124| 0.002                       |               | 0.04       |
|Never                                           | 102 | Reference                   |               |            |
|Rarely                                          | 132 | 0.63 (0.35, 1.13)           | 0.16          | 0.12       |
|Sometimes                                       | 252 | 0.81 (0.48, 1.37)           | 0.91          | 0.44       |
|Often                                           | 355 | 0.78 (0.47, 1.30)           | 1.00          | 0.35       |
|Always                                          | 283 | 1.24 (0.73, 2.09)           | 0.07          | 0.43       |

| Public health department and press releases usage| N   | Adjusted Odds Ratio (95% CI) | p-Value       | Holm Adj p |
|-------------------------------------------------|-----|-----------------------------|---------------|------------|
|Never                                           | 16  | Reference                   |               |            |
|Rarely                                          | 20  | 3.29 (0.45, 24.26)          | 0.003         | 0.24       |
|Sometimes                                       | 130 | 6.10 (1.07, 34.87)          | 0.004         | 0.04       |
|Often                                           | 493 | 5.26 (0.95, 28.99)          | 0.01          | 0.06       |
|Always                                          | 398 | 3.73 (0.68, 20.57)          | 0.03          | 0.13       |

Model 5. Daily or weekly print newspapers usage

| Age                                             | N   | Adjusted Odds Ratio (95% CI) | p-Value       | Holm Adj p |
|-------------------------------------------------|-----|-----------------------------|---------------|------------|
|Education                                       | 1572| 1.02 (1.01, 1.03)           | <0.001        | <0.001     |
|Low                                             | 1553| 0.001                       |               |            |
|Medium                                          | 754 | 0.75 (0.56, 0.99)           | <0.001        | 0.043      |
|High                                            | 778 | 0.54 (0.38, 0.74)           | <0.001        | <0.001     |
|Television stations usage                       | 1468| 0.001                       |               | <0.001     |
|Never                                           | 50  | Reference                   |               |            |
|Rarely                                          | 125 | 2.61 (1.28, 5.33)           | 0.002         | 0.008      |
Table 12. Cont.

|                           | N     | Adjusted Odds Ratio (95% CI) | p-Value    | Holm Adj p |
|---------------------------|-------|------------------------------|------------|------------|
| Sometimes                 | 379   | 4.56 (2.33, 8.90)            | <0.001     | <0.001     |
| Often                     | 724   | 14.49 (7.45, 28.20)          | <0.001     | <0.001     |
| Always                    | 190   | 47.75 (23.11, 98.68)         | <0.001     | <0.001     |
| Age                       | 1455  | 1.05 (1.04, 1.07)            | <0.001     | <0.001     |
| Education                 | 1470  |                             | <0.001     | 0.028      |
| Low                       | 218   | Reference                    |            |            |
| Medium                    | 907   | 1.38 (0.87, 2.18)            | 0.065      | 0.17       |
| High                      | 345   | 1.98 (1.17, 3.35)            | <0.001     | 0.011      |
| Daily or weekly print newspapers | 1085 |                       | <0.001     | <0.001     |
| Perceived Quality         |       |                             |            |            |
| Very poor                 | 37    | Reference                    |            |            |
| Poor                      | 70    | 11.54 (2.28, 58.51)          | <0.001     | 0.003      |
| Neutral                   | 345   | 20.46 (4.50, 93.01)          | <0.001     | <0.001     |
| Good                      | 510   | 63.11 (13.88, 286.92)        | <0.001     | <0.001     |
| Excellent                 | 123   | 228.97 (47.41, 1.1 × 10³)    | <0.001     | <0.001     |
| Age                       | 1529  | 0.98 (0.97, 0.99)            | <0.001     | <0.001     |
| Education                 | 1546  |                              | <0.001     | <0.001     |
| Low                       | 232   | Reference                    |            |            |
| Medium                    | 960   | 1.61 (1.12, 2.31)            | <0.001     | 0.01       |
| High                      | 354   | 2.28 (1.50, 3.47)            | <0.001     | <0.001     |
| Websites or online news pages usage | 1406 |                       | <0.001     | <0.001     |
| Never                     | 47    | Reference                    |            |            |
| Rarely                    | 129   | 3.40 (1.50, 7.67)            | <0.001     | 0.003      |
| Sometimes                 | 555   | 4.52 (2.14, 9.54)            | <0.001     | <0.001     |
| Often                     | 575   | 14.34 (6.74, 30.54)          | <0.001     | <0.001     |
| Always                    | 100   | 34.96 (14.76, 82.77)         | <0.001     | <0.001     |

Model 6. Public Health Department and Press Releases

| Public health department and press releases perceived quality | 1462 | <0.001 | <0.001 |
| Very poor | 25 | Reference |            |            |
| Poor | 32 | 9.20 (3.13, 27.09) | <0.001 | <0.001 |
| Neutral | 194 | 11.16 (4.52, 27.55) | <0.001 | <0.001 |
| Good | 681 | 26.07 (10.66, 63.73) | <0.001 | <0.001 |
| Excellent | 530 | 68.64 (27.71, 170.06) | <0.001 | <0.001 |

Model 7. Conversations with friends and family

| Language Spoken | 1575 | <0.001 | <0.001 |
| English | 1362 | Reference |            |            |
| Other | 213 | 1.82 (1.28, 2.60) |            |            |

| Conversations with friends and family perceived quality | 1575 | <0.001 | <0.001 |
| Very poor | 55 | Reference |            |            |
| Poor | 168 | 5.42 (2.81, 10.44) | <0.001 | <0.001 |
| Neutral | 758 | 24.89 (13.29, 46.61) | <0.001 | <0.001 |
| Good | 423 | 95.60 (49.84, 183.38) | <0.001 | <0.001 |
| Excellent | 53 | 309.87 (135.65, 707.84) | <0.001 | <0.001 |

Model 8. Conversations with work colleagues

| Employment | 1244 | <0.001 | <0.001 |
| Working (part-time or full-time) | 618 | Reference |            |            |
| Retired | 16 | 5.80 (1.73, 19.40) | 0.025 | 0.004 |
| Other | 610 | 0.33 (0.24, 0.46) | <0.001 | <0.001 |
| Q16 Contact Others | 994 | <0.001 | 0.029 |
Older participants were more likely to use television as a source of information (OR 1.02; \( p \leq 0.001 \)) than younger participants. Participants with high education were less likely to use television (OR 0.54; \( p \leq 0.001 \)), while participants who rated the quality of television information highly were more likely. Older age, high education and perceived quality were associated with use of print media. The use of friends and family was associated with not speaking English at home (OR 1.51; \( p \leq 0.001 \)) while working full or...
part-time was associated with the use of work colleagues as a source of information. Older participants reported being less likely to use social media (OR 0.96 \( p \leq 0.001 \)) or search engines (OR 0.98 \( p \leq 0.001 \)). Non-English speakers were less likely to answer questions on information sources (Table 12).

Age, although statistically significant \(( p \leq 0.001 \)) has a small effect on the concern that a recurrence of cancer will not be detected or managed properly due to COVID-19, with the odds of increased worry decreasing minimally with increased age (OR 0.98). Female participants tend to worry more than males (OR 1.37; \( p = 0.004 \)), and non-white participants worry more than white participants (OR 1.43; \( p = 0.01 \)). Participants who refer to public health literature for their information tend to worry less than those who never or rarely refer to public health resources. Non-white participants worry more about contracting COVID-19 at the hospital compared to white participants (OR 1.53; \( p = 0.03 \)), as were participants who never use television as a source for COVID-19 information, compared to those that always do (\( p = 0.04 \)). Patients who refer to public health literature as a source for COVID-19 information tend to worry more than those who never or rarely refer to these resources about contracting COVID-19 at the hospital (\( p = 0.02 \)). There were no significant predictors of whether participants would use personal protective equipment when leaving their homes or whether they would go to crowded places (Table 12).

3.3. Open-Ended Comments

In written feedback, participants primarily inquired about how they could obtain actionable information (primarily about vaccine boosters), how to maintain their safety, offered further context on the impact of the pandemic on their treatment/care, and expressed gratitude to the hospital and their healthcare providers. Participants also offered criticisms of the hospital (mostly concerning restrictions on visitors/caregivers), voiced support or opposition to vaccinations/vaccine mandates, and commented on the public health situation and the government’s handling of it.

4. Discussion

Our findings indicate that more than 20 months since the emergence of COVID-19, patients with cancer remain concerned about the pandemic, and are continuing to exhibit accurate knowledge about the disease, and undertake preventative measures, now including vaccine uptake. Rates of vaccination were high, while treatment continued with limited disruption for most patients despite the high disease burden in the population due to the spread of easily transmissible variants of concern.

At the time of the survey, Canada was at the tail-end of the Delta variant driven fourth wave of the virus. While the variant had devastated other parts of the world and other regions of Canada, Ontario was not as severely affected [14]. Vaccination rates in the country were relatively high, and mandates had been introduced to compel healthcare workers to get vaccinated [15]. Breakthrough cases were not as common, and while news of the Omicron variant would have reached participants completing the survey in late November and early December, early reports stressed that the variant was “mild” relative to its predecessors. These factors may have combined to produce optimism among participants that the outbreak was beginning to taper off. Certain restrictions had been eased by this point, such as those on caregivers accompanying patients to the hospital, which had been identified as a particular source of displeasure among patients who relied on them for support [3]. The wide use of virtual care, however, has been welcomed by some patients with cancer, who point to reduced cost and the diminished reliance on caregivers to assist with an in-person visit [16], with both caregivers and patients reporting satisfaction with quality of care [17].

As a group, the participants displayed continued adherence to preventative measures despite the increasing risk of pandemic fatigue [18] as well as the increasing laxity associated with higher vaccine uptake [19]. Consistent with other findings, female participants reported greater perceived risk to themselves [20]; however, unlike the previous survey
and other studies, they did not report greater levels of preventative practices [8,21]. This may be due to the high levels of precautions among patients with cancer in recognition of the higher risk they face. Similarly, non-white participants also expressed greater fears of contracting the virus and its impact on their treatments. This may reflect the greater rates of COVID-19 infection witnessed among racialized groups in Toronto relative to their white counterparts [22]. This has been attributed to higher rates of comorbidities, as well as types of housing and areas of employment that undermine efforts at social distancing [23]. While this version of the survey collected data on sexual orientation, the numbers were not substantial enough to carry out analysis comparing different groups, although research indicates that belonging to non-heterosexual orientations may be related to greater adherence to precautionary measures [20].

Compared to the previous iteration of this survey, there were slight reductions in the psychological impact of COVID-19 on patients. This may be further evidence of the adjustment of perceptions to COVID-19 as well as a degree of survival bias in our sample. This may also be reflected in the responses to participants’ perceptions of personal risk and the threat posed to their treatment by COVID-19 with, for instance, the proportion of those strongly disagreeing that they would contract the virus at the hospital more than doubling. A shifting of expectations may also be the cause of these changing perceptions, such as the increasingly held view that the virus will become endemic in the population. For instance, while more participants in this survey believe the pandemic can be successfully controlled, fewer believe they themselves can avoid infection, compared to the survey administered in 2020 [8]. This likely stems from the increased protection offered by vaccines and the availability of treatments that reduce the risk for severe outcomes among those who contract the virus.

Our findings are complicated by non-response to some survey items. For example, 14% of participants declined to report their vaccination status. At the time of the survey, as mentioned, governments began instituting mandates to encourage vaccination, resulting in a polarized social debate on these measures [24]. This may explain the reluctance to share that information among participants, perhaps even among those who did obtain and support vaccination [25]. Early rates of hesitancy in the population had subsided at that point, as more than three quarters of the population had begun the initial vaccine series; however, misinformation about COVID-19 vaccines remained ubiquitous [26]. A large majority of participants also declined to identify whether they were essential workers or not. This may be due to the question prompt which offered examples in place of an actual definition. Consequently, we could not ascertain the extent of exposure among participants who indicated that they were employed, as it has been demonstrated that infection rates and death rates were disproportionately high among essential workers in Toronto during the pandemic [27].

Throughout the survey, participants with lower incomes, lower education backgrounds, poorer health literacy, as well as those who were non-white, and those that did not speak English as a first language, were less likely to answer questions. This may reflect an increase in non-response bias, as low-income households have witnessed a sharp drop in survey participation during the pandemic [28]. The direction in which this could bias our results is unclear, as racial minorities with cancer may be more willing to receive the vaccine, but existing hesitancy among other groups may dissipate over time as the safety of vaccines is clearly demonstrated [29]. The exclusion of patients with cancer from vaccine clinical trials could also have had the effect of encouraging hesitancy [2].

The lack of responses among those participants may point to confusion on their part. Scholars have pointed to the existence of a “misinfodemic” following the emergence of COVID-19, which has been compounded by the fact that factual information is inaccessible for much of the public [30]. The information that is available may be oversimplified and severely lacking in nuance [31]. This underscores the need to engage those sections of the population that are at risk for low health literacy to determine how they are coping with cancer amid the pandemic. Those with low socio-economic status would have already been
underserved by the cancer system, a process further exacerbated by the pandemic [32]. This should also be targeted to patients that had difficulty coping, including younger patients and women [33].

Limitations

Our findings are limited by our well-educated and wealthy population. Pandemic fatigue may also have contributed to a lower response rate compared to the prior version of this study. It is possible that as the pandemic has worn on, patients have adapted to its restrictions or have adjusted their expectations to the reality of the disease. Patients with cancer have reported increased resilience during the pandemic [16]. Participants who were no longer in active treatment were better represented among our participants, and recruitment at an earlier stage in the cancer journey may have produced different results.

5. Conclusions

This paper provides another snapshot of the state of patients with cancer during the second year of the COVID-19 pandemic. It demonstrates increased optimism among participants in 2021, relative to 2020, that the virus can be controlled and would not disrupt their cancer treatment. These patients continue to demonstrate strong adherence to infection control measures and are knowledgeable about the disease. While vaccine uptake was high, there appear to be significant gaps in information associated with racial minorities, low-income patients, and likely those with low health literacy. Future studies must address the needs of the most disadvantaged patients, who are part of a larger segment of society that has been disproportionately affected by the pandemic.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/curroncol29110701/s1. The following supplementary material is attached as part of this submission: “Supplementary File (survey)”.

Author Contributions: M.A.U.: data curation, formal analysis, investigation, validation, methodology, writing—original draft, writing—review and editing; L.A.: data curation, formal analysis, investigation, validation, writing—review and editing; Y.W.: data curation, formal analysis, investigation, validation, writing—review and editing; A.B.: conceptualization, data curation, formal analysis, investigation, writing—review and editing; M.E.G.: conceptualization, formal analysis, investigation, writing—review and editing; M.K.: conceptualization, formal analysis, investigation, writing—review and editing; T.J.P.: conceptualization, formal analysis, investigation, supervision, writing—review and editing; N.K.Q.: conceptualization, formal analysis, investigation, validation, writing—original draft, writing—review and editing. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Internal approval was obtained from the University Health Network ethics review board (REB#20–5589).

Informed Consent Statement: Consent was implied by survey completion. Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available in this article (and supplementary material).

Conflicts of Interest: The authors declare no conflict of interest.
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