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Author/s:

Chazan, G;Franchini, F;Alexander, M;Banerjee, S;Mileshkin, L;Blinman, P;Zielinski, R;Karikios, D;Pavlakakis, N;Peters, S;Lordick, F;Ball, D;Wright, G;Ijzerman, M;Solomon, B

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# Impact of COVID-19 on cancer service delivery: results from an international survey of oncology clinicians



Grace Chazan ,<sup>1</sup> Fanny Franchini,<sup>2,3</sup> Marliese Alexander,<sup>1,4</sup> Susana Banerjee,<sup>5,6</sup> Linda Mileshkin,<sup>1,7</sup> Prunella Blinman,<sup>8,9</sup> Rob Zielinski,<sup>10,11</sup> Deme Karikios,<sup>12,13</sup> Nick Pavlakis,<sup>14</sup> Solange Peters,<sup>15</sup> Florian Lordick ,<sup>16,17</sup> David Ball,<sup>1,18</sup> Gavin Wright,<sup>19,20</sup> Maarten IJzerman,<sup>2,3</sup> Benjamin Solomon<sup>1,7</sup>

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For numbered affiliations see end of article.

## Correspondence to

Dr Benjamin Solomon;  
[ben.solomon@petermac.org](mailto:ben.solomon@petermac.org)

## ABSTRACT

**Objectives** To report clinician-perceived changes to cancer service delivery in response to COVID-19.

**Design** Multidisciplinary Australasian cancer clinician survey in collaboration with the European Society of Medical Oncology.

**Setting** Between May and June 2020 clinicians from 70 countries were surveyed; majority from Europe (n=196; 39%) with 1846 COVID-19 cases per million people, Australia (AUS)/New Zealand (NZ) (n=188; 38%) with 267/236 per million and Asia (n=75; 15%) with 121 per million at time of survey distribution.

**Participants** Medical oncologists (n=372; 74%), radiation oncologists (n=91; 18%) and surgical oncologists (n=38; 8%).

**Results** Eighty-nine per cent of clinicians reported altering clinical practices; more commonly among those with versus without patients diagnosed with COVID-19 (n=142; 93% vs n=225; 86%, p=0.03) but regardless of community transmission levels (p=0.26). More European clinicians (n=111; 66.1%) had treated patients diagnosed with COVID-19 compared with Asia (n=20; 27.8%) and AUS/NZ (n=8; 4.8%), p<0.001. Many clinicians (n=307; 71.4%) reported concerns that reduced access to standard treatments during the pandemic would negatively impact patient survival. The reported proportion of consultations using telehealth increased by 7.7-fold, with 25.1% (n=108) of clinicians concerned that patient survival would be worse due to this increase. Clinicians reviewed a median of 10 fewer outpatients/week (including non-face to face) compared with prior to the pandemic, translating to 5010 fewer specialist oncology visits per week among the surveyed group. Mental health was negatively impacted for 52.6% (n=190) of clinicians.

**Conclusion** Clinicians reported widespread changes to oncology services, in regions of both high and low COVID-19 case numbers. Clinician concerns of potential negative impacts on patient outcomes warrant objective assessment, with system and policy implications for healthcare delivery at large.

## INTRODUCTION

Patients with cancer are at significantly increased risk of morbidity and death from COVID-19, with mortality estimates ranging from 11% to 40.5% across different

## Key questions

### What is already known about this subject?

- The COVID-19 pandemic is impacting cancer service delivery.

### What does this study add?

- Eighty-nine per cent of surveyed oncology clinicians report altering cancer management.
- The surveyed group report 5010 fewer patient visits/week during the pandemic.
- Clinicians report a 7.7-fold increase in the proportion of consultations using telehealth.
- Twenty-five per cent of clinicians report concerns that increased telehealth could lead to worsened patient survival.

### How might this impact on clinical practice?

- Reduced patient presentations and alterations to standard treatment pathways may result in increased cancer-related mortality.
- The public should be encouraged to present early with cancer-related signs or symptoms.
- Clinicians' concerns regarding telehealth require further exploration.

studies.<sup>1-6</sup> This large range likely reflects the heterogeneity of these studies, with some including patients with inactive cancer versus only active cancer and some including only hospitalised patients. Although it is clear that COVID-19-related outcomes are poor in patients with cancer, the impact of anti-cancer therapy on these outcomes remains contentious. Many studies have reported that recent use of anticancer therapy may worsen COVID-19-related outcomes.<sup>2,3,7,8</sup> One of the largest of these studies, from the COVID-19 and Cancer Consortium, reported that recent use of anticancer therapy, including chemotherapy-immunotherapy and targeted therapy (anti-CD20 in particular), was associated with increased mortality.<sup>8</sup> However, other studies have found that recent use of

anticancer therapy was *not* independently associated with mortality.<sup>9</sup> This ambiguity contributes to additional uncertainty in decision-making regarding cancer treatments for both patients and clinicians during the pandemic period.

Although understanding of COVID-19 is rapidly evolving, it was clear from early on that strains on health infrastructures and increased risk of mortality in patients with cancer during the pandemic had implications on the delivery of cancer health services. In accordance with this, multiple institutional, national and international guidelines were released to inform the practice of clinicians caring for people with cancer during the COVID-19 pandemic. Recommended measures included reducing hospital visits by delaying treatments, reducing the frequency of therapy and the preferential use of oral agents.<sup>10–12</sup>

As clinicians and policymakers grapple with the direct impact of COVID-19 on patients and healthcare systems, the indirect impact on patients with chronic illness and non-communicable disease, such as cancer, is of increasing concern.<sup>13</sup> In many countries, diagnostic pathways have been disrupted by a multitude of factors, including closure or downscaling of cancer screening programmes and changes to health-seeking behaviours.<sup>14,15</sup> The impact of delayed referrals and presentations is unknown, but mathematical modelling indicates significant impacts in terms of excess cancer-related deaths<sup>16</sup> and impacts to healthcare budgets.<sup>17</sup> Both the direct and indirect impacts of COVID-19 on patients with cancer and healthcare systems are alarming and further work is required to understand specific changes in cancer management and service delivery and the underlying factors contributing to these changes.

## METHODS

### Survey

The survey aimed to determine clinicians' perspectives on cancer service delivery during the COVID-19 pandemic. Target participants were medical oncologists, radiation oncologists and surgical oncologists or trainees in these fields. The survey was designed by the project team with refinement and piloting through consultation with an expert panel of clinicians. The survey was administered in English language only and consisted of 23 questions regarding clinician demographics, changes to cancer management and service delivery and factors influencing these changes (online supplemental file 1). The survey distributed by Australian and European societies was identical but for the terminology used in questions 17.2/18.2 relating to categories of surgical urgency. Responses were a mix of qualitative and quantitative data. Informed consent was implied from participants' decision to undertake the survey. Responses were anonymous and data were non-identifiable.

### Survey distribution

The online survey, open between 4 May and 19 June 2020, was distributed via email hyperlink from professional societies within Australia (AUS) and Europe (non-random sampling). These organisations were Clinical Oncology Society of Australia, European Society of Medical Oncology (ESMO), Medical Oncology Group of Australia, Royal Australian College of Surgeons and Royal Australian and New Zealand College of Radiologists (RANZCR). The hyperlink was also published in the online newsletter of ESMO and RANZCR. Selected participants with leadership positions in their societies were also invited to participate via snowball sampling.

### Data analysis

Descriptive statistics were used to analyse and report outcomes from survey response data. Quantitative data are reported using mean, standard deviation, median (and quartiles 1 and 3 where of particular importance). Qualitative data are reported using absolute number of participants in addition to the percentage of participants who selected a given response. The denominator used to calculate the percentage reflects the total number of clinicians answering that specific question. The number of participants who commenced the survey but did not complete a given question is reported as 'N-miss'. Participants who completed less than 3% of the survey were excluded from analysis (n=2). Changes in percentage telehealth use are reported as x-fold increase, calculated by dividing the mean percentage use during the pandemic by the mean percentage use prior to the pandemic. P values were calculated using the Kruskal-Wallis test for numerical data and the  $\chi^2$  test for categorical data. Geographical location of practice was collected as country but is reported by major area (Europe, AUS/New Zealand (NZ), Asia and 'Other' for countries outside of these regions, which collectively accounted for 8.4% of responses). 'Australia/New Zealand' was used instead of 'Oceania' as there were no other responding countries from this major region. Data were analysed using R V.4.0.2 (2020).

## RESULTS

### Demographics

Internationally, 501 clinicians took the survey. Most participants were medical oncologists (n=372; 74.3%), 18.2% (n=91) were radiation oncologists and 7.6% (n=38) were surgical oncologists. Clinician demographics are summarized in online supplemental table 1. The mean age was 44 years, 50.3% (n=252) were female and 48.5% (n=243) were male. Seventy countries were represented, with each individual country accounting for <5% of participants except for AUS (n=168; 33.5%), Italy (n=34; 6.8%), Spain (n=28; 5.6%) and India (n=25; 5.0%) (online supplemental table 2). Participants most commonly worked at metropolitan general hospitals (n=208; 41.6%) and metropolitan specialised cancer centres (n=165; 33.0%). Nearly a quarter (n=120;

24.0%) worked in regional settings. Level of clinician experience varied with 21.2% (n=106) participants being trainees and 42.5% (n=213) having worked as consultants for 10 years or more. The date of survey completion ranged from 4 May 2020 to 15 June 2020; cumulative COVID-19 cases per million people on the first and last days of the survey increased from 267 to 290 in AUS (relative change +9%), 236 to 240 in NZ (relative change +2%), 1846 to 2969 in Europe (relative change +59%) and 121 to 386 in Asia (relative change +218%).<sup>18</sup>

#### Clinicians with patients diagnosed with COVID-19

The percentage of clinicians who reported having had patients diagnosed with/die from COVID-19 was 66.1%/31.5% in Europe, 27.8%/8.3% in Asia and 4.8%/1.2% in AUS/NZ. Clinicians who had a patient diagnosed with COVID-19 were more likely to alter their practice during the pandemic compared with clinicians who had no patients diagnosed with COVID-19 (n=142; 93.4% vs n=225; 86.4%, p=0.03).

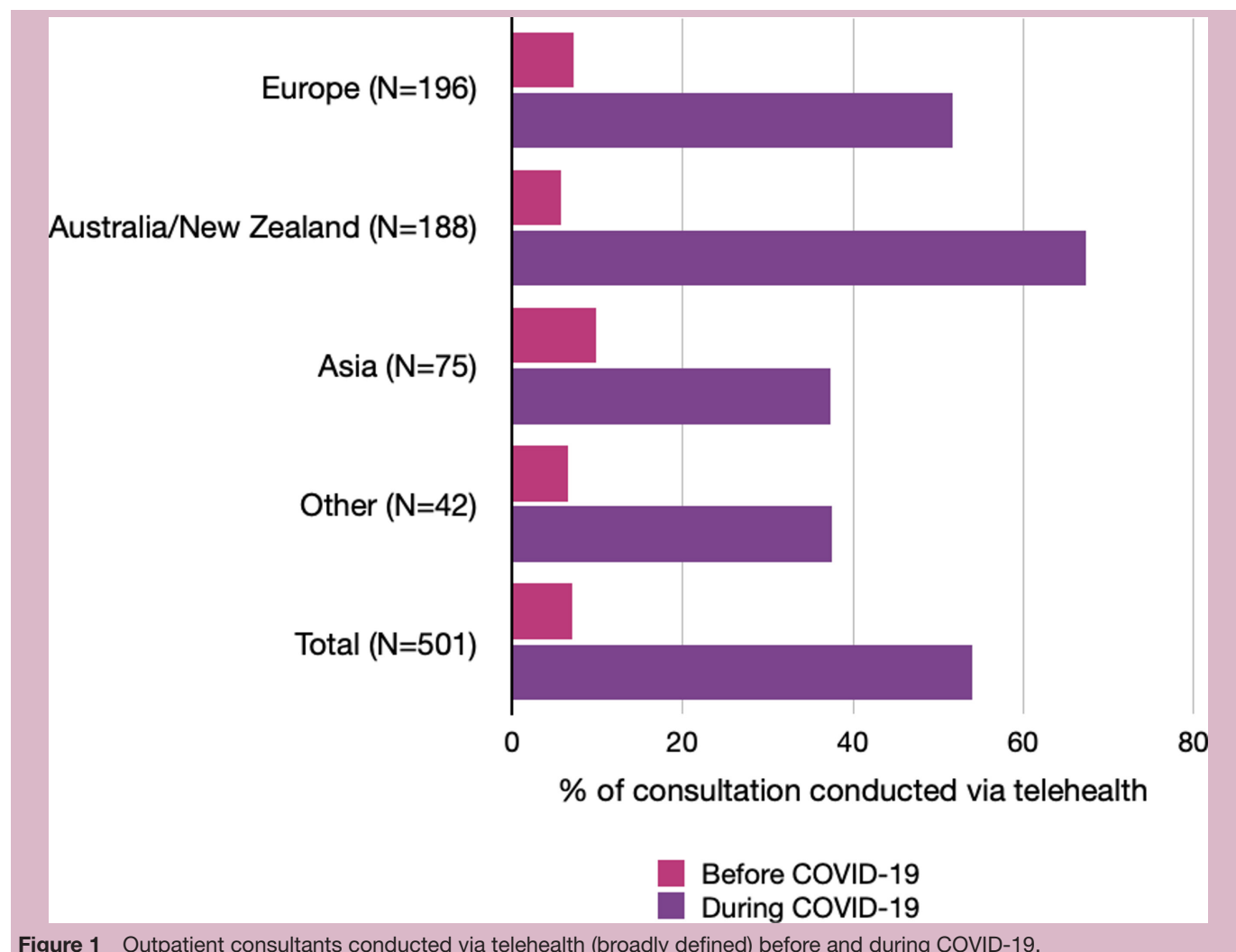
#### Changes to outpatient consultations

During the pandemic, clinicians reported seeing a median of 10 (Q1=-20, Q3=0) fewer outpatients/week (including

non-face-to-face modalities). This correlates to 5010 fewer patients being reviewed by the surveyed oncology clinicians each week. This change was smaller in AUS (median 4 fewer/week) compared with Asia (median 20 fewer/week) and Europe (median 10 fewer/week) (p<0.001). The percentage of outpatient consultations conducted by telehealth increased by 11.8-fold in AUS/NZ, 7.2-fold in Europe and 3.8-fold in Asia (figure 1).

#### Factors influencing clinicians to alter/not to alter practice

Most clinicians (n=397; 88.8%) reported altering cancer management or the delivery of cancer services due to the COVID-19 pandemic, with similar rates across Europe (n=152; 90.5%), AUS/NZ (n=142; 85.0%) and Asia (n=66; 91.7%) despite disparities in COVID-19 case numbers (p=0.26). Patient and system factors influencing clinicians to alter practice are shown in table 1. The patient and system factors influencing the largest percentage of clinicians across all regions were (1) presence of respiratory comorbidities (n=293; 74.7%, p=0.20) and (2) institutional guidelines (n=275; 70.2%, p=0.06). There were regional differences in proportion influenced by certain factors, for example, (1) concern about overwhelming the healthcare system by



**Figure 1** Outpatient consultants conducted via telehealth (broadly defined) before and during COVID-19.

**Table 1** Patient and system factors influencing clinicians to alter management (% of clinicians influenced by this factor)

Factor influencing change	Europe (n=196)	Australia/New Zealand (n=188)	Asia (n=75)	Other (n=42)	Total (n=501)	P value
N-miss	46	48	10	5	109	
Age	71.3%	72.9%	83.1%	73.0%	74%	0.327
Performance status	73.3	60.0%	83.1%	75.7%	70.4%	0.004
Presence of respiratory comorbidities	70.7%	74.3%	84.6%	75.7%	74.7%	0.194
Presence of non-respiratory comorbidities	30.0%	44.3%	49.2%	35.1%	38.8%	0.020
Patient's preference	55.3%	72.9%	70.8%	54.1%	64.0%	0.006
Patient's social situations put them at higher risk of COVID-19	48.0%	44.3%	75.4%	56.8%	52.0%	<0.001
Active COVID-19 infection	72.7%	46.4%	63.1%	62.2%	60.7%	<0.001
Other patient factor	1.3%	17.1%	7.7%	5.4%	8.4%	<0.001
Institutional guidelines	64.7%	78.6%	67.7%	64.9%	70.2%	0.056
National/international guidelines	71.3%	66.4%	73.8%	54.1%	68.4%	0.154
Government directives	55.3%	47.9%	69.2%	48.6%	54.3%	0.033
Inadequate resources	19.3%	22.9%	49.2%	37.8%	27.3%	<0.001
Inadequate staff	15.3%	32.1%	44.6%	37.8%	28.3%	<0.001
Concerns about overwhelming healthcare system	26.0%	40.7%	41.5%	37.8%	34.9%	0.033
Inadequate PPE	15.3%	22.1%	35.4%	24.3%	21.9%	0.013
Other systems factor	2.0%	5.0%	0.0%	0.0%	2.6%	0.101

PPE, personal protective equipment.

41.5% (n=27) in Asia, 40.7% (n=57) in AUS/NZ and 26.0% (n=39) in Europe (p=0.03) and (2) inadequate staff by 44.6% (n=29) in Asia, 32.1% (n=45) in AUS/NZ and 15.3% (n=23) in Europe (p<0.001).

Fifty participants (11.2%) reported not altering cancer management or the delivery of cancer services due to COVID-19 (n=34; 10.3% of medical oncologists, n=9; 10.7% of radiation oncologists and n=7; 21.9% of surgical oncologists). These clinicians were from AUS (n=25; 50.0%), Europe (n=16; 32.0%) and Asia (n=6; 12.0%) and most (n=40; 80.0%) had *not* had a patient diagnosed with COVID-19. For the 50 participants not altering practice, factors influencing this decision included (1) belief that patients should have access to standard of care treatment despite the risk of COVID-19 (n=33; 66.0%), (2) belief that no change to cancer management was required (n=16; 32.0%), and (3) feeling they did not have enough evidence or guidelines to change cancer management because of COVID-19 (n=9; 18.0%).

#### Changes to patient management due to COVID-19: medical oncologists

In the curative setting, some medical oncologists reported being less likely to prescribe adjuvant systemic therapy (n=53; 18.2%) or neoadjuvant systemic therapy (n=39; 13.4%) (figure 2A). In the palliative setting, the majority of medical oncologists reported altering management, with 60.1% (n=175) being more likely to alter their choice of systemic therapy, 44.0% (n=128) being more likely to prescribe a reduced dose, 45.0% (n=131) being more likely to delay starting treatment and 44.3% (n=129) being more likely to stop systemic treatment (figure 2B). A greater proportion of

medical oncologists in AUS/NZ reported being more likely to stop treatment (n=49; 63.6%), compared with those in Europe (n=52; 38.8%) and Asia (n=18; 37.5%) (p<0.001). Clinicians also reported being more likely to add granulocyte colony-stimulating factor in both curative settings (n=167; 57.4%) and palliative settings (n=116; 39.9%).

#### Changes to patient management due to COVID-19: radiation oncologists

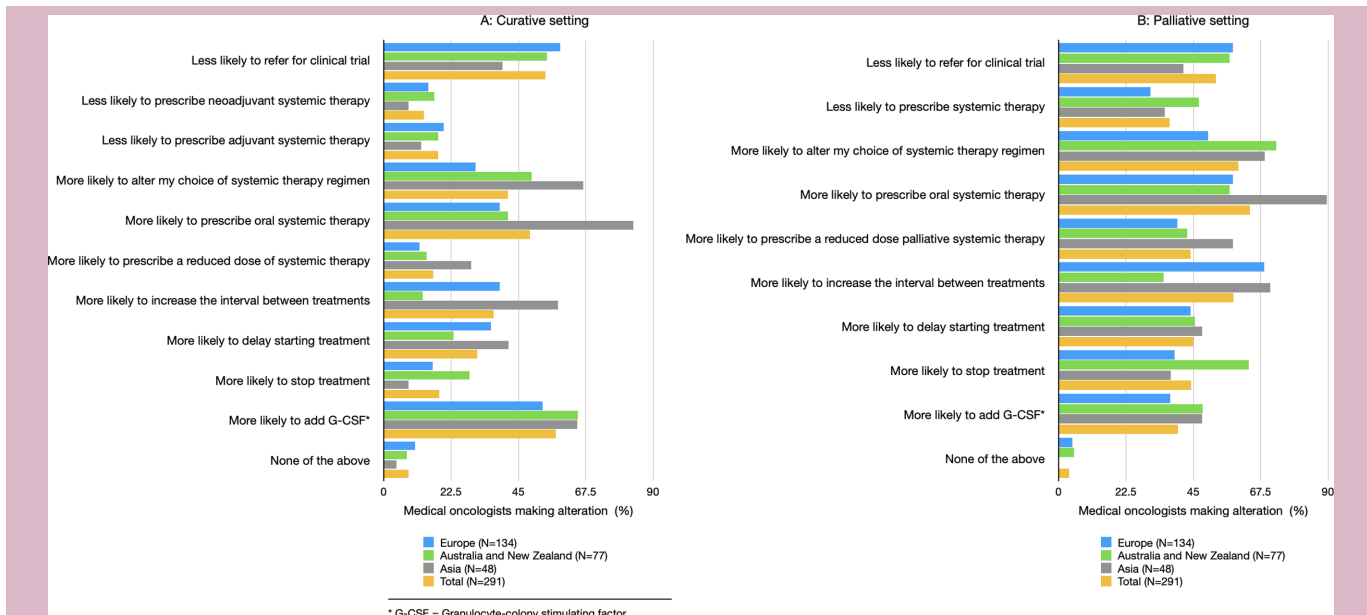
Most radiation oncologists reported being more likely to alter the fractionation of radiotherapy in both the curative setting (n=61; 82.4%) and the palliative setting (n=58; 78.4%). Some radiation oncologists (n=16; 21.6%) reported being less likely to prescribe adjuvant radiotherapy and 54.1% (n=40) were more likely to delay starting adjuvant radiotherapy (figure 3A). Few (n=2; 2.7%) were less likely to prescribe definitive radiotherapy. Almost one-third (n=23; 31.1%) reported being less likely to prescribe palliative radiotherapy (figure 3B).

#### Changes to patient management due to COVID-19: surgical oncologists

Twenty-five surgeons (65.8%) responded to questions about changes in cancer management during the pandemic. Of these, 40% (n=10) reported delaying surgery and 12% (n=3) reported deciding not to operate in the urgent elective setting. In the non-urgent elective setting, 80% (n=20) reported delaying surgery and 32% (n=8) reported deciding not to operate.

#### Predicted impact of changes to patient management and oncology service delivery

Most participants (n=313; 72.8%) reported increasing non-face-to-face consultation modalities would not impact



**Figure 2** Changes to patient management by medical oncologists due to COVID-19. Panel A demonstrates the ways in which medical oncologists report altering management in the curative setting and Panel B in the palliative setting.

patient survival and 25.1% (n=108) reported concern this would lead to worse patient survival (figure 4). Most participants reported patient survival would be worse due to reduced access to standard treatment pathways (n=307; 71.4%) and delayed referrals and/or presentations (n=378; 87.3%).

**Impact of COVID-19 on clinician mental health**

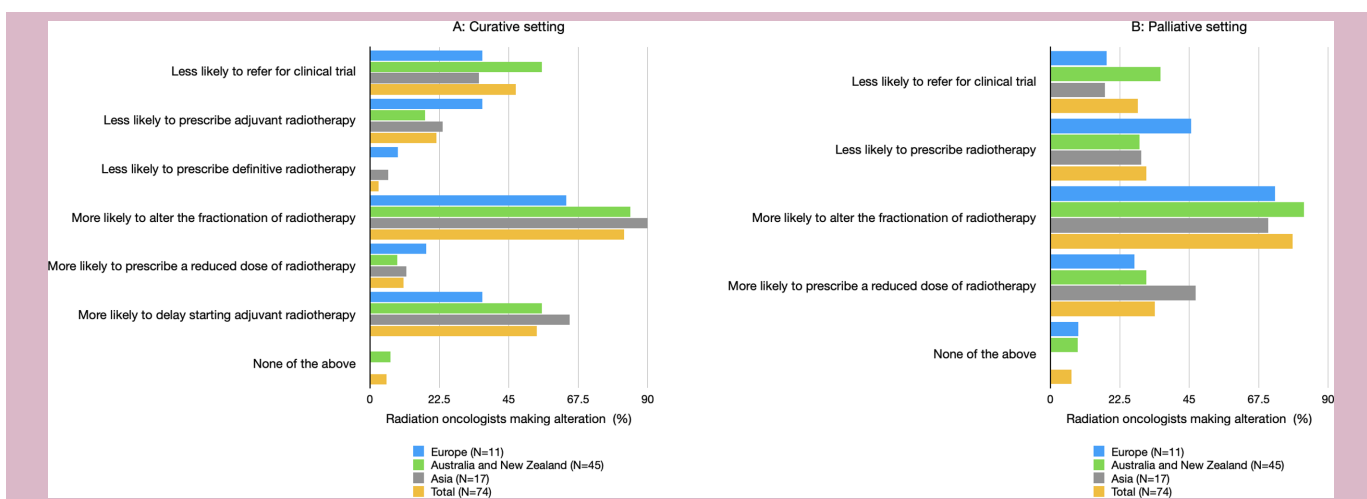
Mental health was negatively impacted for 52.6% of clinicians (43.5% (n=157) reported somewhat worse and 9.1% (n=33) reported significantly worse). The percentage of clinicians who reported negative health impacts due to working as a clinician during the COVID-19 pandemic was 61.3% (n=81) in Europe, 54.0% (n=27) in Asia and 41.7% (n=61) in AUS/NZ.

**Likelihood of service delivery changes persisting after COVID-19 pandemic**

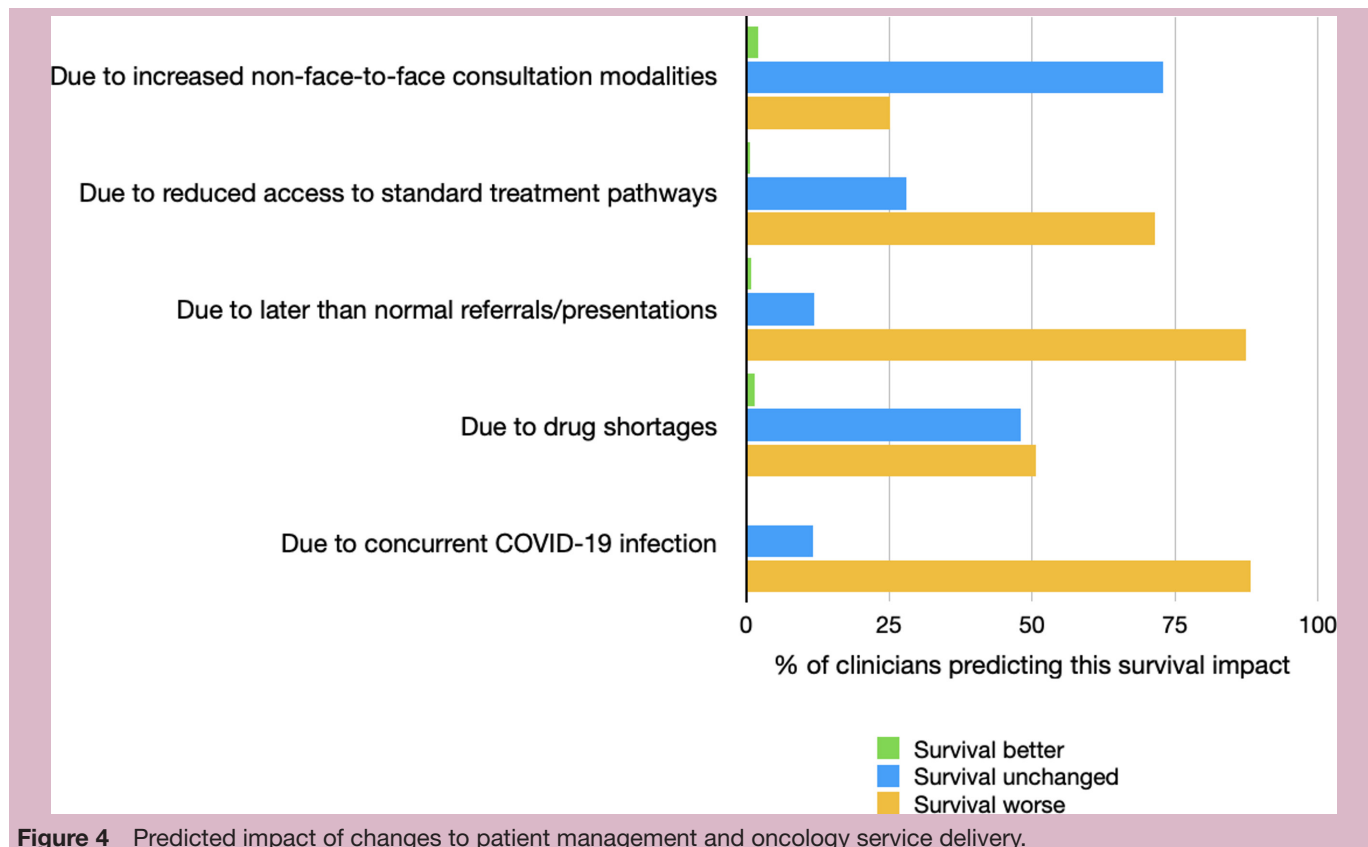
With regard to the likelihood that some of the changes to cancer service delivery would continue after the COVID-19 pandemic, clinicians overall thought this was more likely than not (median 7.0 on 10-point scale when 10 is extremely likely and 0 not at all likely).

**DISCUSSION**

This multidisciplinary global survey has identified that most oncology clinicians (88.8%) are altering their practice as a result of COVID-19. Key findings include reduced numbers of patients being reviewed by oncology clinicians, increase in telehealth use and concerns this



**Figure 3** Changes to patient management by radiation oncologists due to COVID-19. Panel A demonstrates the ways in which radiation oncologists report altering management in the curative setting and Panel B in the palliative setting.



**Figure 4** Predicted impact of changes to patient management and oncology service delivery.

may negatively impact patient outcomes, as well as many clinicians being less likely to prescribe cancer-directed therapies, including in both palliative and (neo)adjuvant settings. Despite the fact that AUS/NZ had relatively low COVID-19 case numbers at the time of the survey, when compared with Europe, a greater percentage of clinicians from this region reported certain healthcare resource concerns as factors influencing cancer management.

Our survey results suggest that, for the surveyed group alone, 5010 fewer patients/week are being reviewed compared with prior to the pandemic. This likely reflects a significant reduction in new patients being seen by cancer specialists and is congruent with global reports of reduced patient referrals and presentations. Data from the Netherlands Cancer Registry found new cancer diagnoses were down to 73% from prior to the COVID-19 pandemic.<sup>19</sup> Modelling studies predict significant cancer-related deaths resulting from such diagnostic delays.<sup>16 17</sup> More recent guidelines from ESMO suggest mitigation strategies to try to minimise the impact of changes to cancer service delivery on indirect COVID-19-related mortality.<sup>20</sup>

While it is not surprising to find telehealth use has increased globally, clinicians reported a larger relative increase in AUS/NZ compared with Europe, despite much lower COVID-19 case numbers. One possible contributor to this is the introduction of COVID-19-specific telehealth billing codes by the Medical Benefits Schedule in AUS on 13 March, supporting clinicians to use this where appropriate.<sup>21</sup> It is postulated that increased telehealth use is

likely to persist after the pandemic, further necessitating ongoing research into concerns held by the quarter of clinicians reporting fears that telehealth will lead to worse patient survival.

In our study, the reported changes to cancer management and service delivery in response to COVID-19 and the proportion of clinicians reporting concerns about healthcare resources did not always reflect the geographic burden of COVID-19. For example, compared with Europe, a greater proportion of clinicians in AUS/NZ reported concerns about overwhelming the healthcare system as a factor in their decision-making. Possible explanations for this incongruence may be that clinicians in AUS/NZ answered the survey hypothesising on what they 'would do' if COVID-19 cases were to increase or perhaps differences in cultures and attitudes between regions.

There are limitations to our study. First, these results rely on clinician recall of service changes; actual changes may be very different. Second, with the exception of AUS, the number of respondents per country is small and so findings are not necessarily representative of all clinicians. Due to the relatively small number of respondents from individual countries, results are grouped by major geographical region. Experiences between countries within each region may be vastly different and thus group comparisons must be interpreted with caution. Third, results are from clinicians' perspectives and do not provide an understanding of the lived experience of the oncology patient. A recent survey of 5302 oncology patients in the Netherlands during the pandemic found 30% of patients

reported consequences to their oncology treatment or follow-up.<sup>22</sup> Fourth, surgeons and radiation oncologists are under-represented in our survey responses, likely in part due to distribution through predominantly medical oncology societies. A certain percentage of responses were obtained via snowball sampling, possibly resulting in selection bias. Additionally, while results clearly suggest increase telehealth use, findings did not delineate between phone consultations and video consultations. Finally, the nature of the COVID-19 pandemic means epidemiological curves look different from one country to the next. This means apparent associations drawn from the survey results are likely to be time dependent and comparisons between geographical regions must be interpreted with care.

Our study has identified some key issues that should be considered by policymakers and clinicians caring for people with cancer during the COVID-19 pandemic era and beyond. The reduced number of patients being reviewed by oncology clinicians will inevitably result in a ‘back-log’ of patients requiring specialist review. In addition, delays in referrals, presentation and management may result in additional cancer-related mortality. Wherever possible, countries should be educating the community on cancer-related signs and symptoms and encouraging primary care practitioners to continue to refer people with suspected cancer to relevant specialists. An increase in cancer-related morbidity and mortality can be expected to result in increasing demand for palliative care. Planning now for innovative ways to expand palliative care services in a manner compatible with social distancing requirements is critical. In order to mitigate the impact of COVID-19 on cancer management, novel modes of delivering systemic therapy must also be investigated and expanded where appropriate. These include nurse-led home infusions and injection practices, lengthening treatment schedules and delivering oral therapy to patients’ home addresses. Telehealth has enabled millions of patients worldwide to continue to receive care during the COVID-19 pandemic. However, if this initiative is to be continued into the future, patient perspectives on telehealth, including video versus phone consultations, need to be further studied. It is also critical that we fully appraise the potential clinician-perceived risks associated with telehealth; to this point a follow-up survey is planned. Results from our study are being used to form an enquiry into actual service delivery changes in AUS, as captured by cancer databases over the period of the pandemic, with linkage to death registries in order to study the impact of these changes. Finally, the finding that the majority of oncology clinicians report negative mental health impacts from COVID-19 is consistent with findings from the ‘ESMO Resilience Taskforce’ surveys, which identified that oncology clinicians reported increased rates of distress and burn-out throughout the pandemic period.<sup>23</sup> The ESMO Resilience Taskforce continues to work towards strategies to address these issues.

This multidisciplinary survey of oncology clinicians from around the world highlights that people with cancer are likely facing many additional challenges as a result of the COVID-19 pandemic. Results indicate that fewer patients are being seen by specialists, treatment pathways are being delayed and altered, a greater proportion of consultations are being conducted via non-face-to-face modalities and surveyed clinicians report concerns that these changes are likely to result in worsened patient outcomes. The oncology community must continue to work together to anticipate how changes to cancer service delivery may affect people with cancer and to mitigate the potential negative impact on cancer-related morbidity and mortality.

#### Author affiliations

- <sup>1</sup>Sir Peter MacCallum Department of Oncology, University of Melbourne Victorian Comprehensive Cancer Centre, Parkville, Victoria, Australia
- <sup>2</sup>Centre for Cancer Research, University of Melbourne, Melbourne, Victoria, Australia
- <sup>3</sup>Centre for Health Policy, University of Melbourne, Melbourne, Victoria, Australia
- <sup>4</sup>Pharmacy Department, Peter MacCallum Cancer Centre, Melbourne, Victoria, Australia
- <sup>5</sup>Gynaecology Unit, The Royal Marsden NHS Foundation Trust, London, UK
- <sup>6</sup>Division of Clinical Studies, The Institute of Cancer Research, London, UK
- <sup>7</sup>Department of Medical Oncology, Peter MacCallum Cancer Centre, Melbourne, Victoria, Australia
- <sup>8</sup>Faculty of Medicine, The University of Sydney, Sydney, New South Wales, Australia
- <sup>9</sup>Department of Medical Oncology, Concord Repatriation General Hospital, Concord, New South Wales, Australia
- <sup>10</sup>School of Medicine, Western Sydney University, Penrith South, New South Wales, Australia
- <sup>11</sup>Department of Medical Oncology, Orange Base Hospital, Orange, New South Wales, Australia
- <sup>12</sup>Department of Medical Oncology, Nepean Hospital, Penrith, New South Wales, Australia
- <sup>13</sup>Nepean Clinical School, The University of Sydney, Sydney, New South Wales, Australia
- <sup>14</sup>Department of Medical Oncology, Royal North Shore Hospital, St Leonards, New South Wales, Australia
- <sup>15</sup>Department of Oncology, Lausanne University Hospital CHUV, Lausanne, Switzerland
- <sup>16</sup>Department of Institut Roi Albert II, University Cancer Centre Leipzig, Leipzig, Germany
- <sup>17</sup>Department of Oncology, Leipzig University Medical Center, Leipzig, Germany
- <sup>18</sup>Department of Radiation Oncology, Peter MacCallum Cancer Centre, Melbourne, Victoria, Australia
- <sup>19</sup>Department of Surgery, Peter MacCallum Cancer Centre, Melbourne, Victoria, Australia
- <sup>20</sup>Department of Surgery, University of Melbourne, Melbourne, Victoria, Australia

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**Provenance and peer review** Commissioned; externally peer reviewed.

**Data availability statement** Data are available upon reasonable request. Please contact cancer-hsr@unimelb.edu.au for enquiries.

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#### ORCID iDs

Grace Chazan <http://orcid.org/0000-0001-7411-7680>

Florian Lordick <http://orcid.org/0000-0001-8591-9339>

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