


ORIGINAL ARTICLE

Business as unusual: medical oncology services adapt and deliver during COVID-19

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Key words

COVID-19, pandemics, medical oncology, health services, telehealth.

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Abstract

Background: The COVID-19 pandemic has challenged cancer care globally, introducing resource limitations and competing risks into clinical practice.

Aims: To describe the COVID-19 impact on medical oncology care provision in an Australian setting.

Methods: Calvary Mater Newcastle and Newcastle Private Hospital medical oncology data from 1 February to 31 April 2019 versus 2020 were retrospectively analysed.

Results: Three hundred and sixty-four inpatient admissions occurred in 2020, 21% less than in 2019. Total inpatient days decreased by 22% (2842 vs 2203). April was most impacted (36% and 44% fewer admissions and inpatient days respectively). Mean length of stay remained unchanged (6.4 vs 6.2 days, $P = 0.7$). In all, 5072 outpatient consultations were conducted, including 417 new-patient consultations (4% and 6% increase on 2019 respectively). Telephone consultations (0 vs 1380) replaced one-quarter of face-to-face consultations (4859 vs 3623, -25%), with minimal telehealth use (6 vs 69). Day Treatment Centre encounters remained stable (3751 vs 3444, -8%). The proportion of new patients planned for palliative treatment decreased (35% vs 28%, $P = 0.04$), observation increased (16% vs 23%, $P = 0.04$) and curative intent treatment was unchanged (both 41%). Recruiting clinical trials decreased by one-third (45 vs 30), two trials were activated (vs 5 in 2019) and 45% fewer patients consented to trial participation (62 vs 34).

Conclusion: Our medical oncology teams adapted rapidly to COVID-19 with significant changes to care provision, including fewer hospital admissions, a notable transition to telephone-based outpatient clinics and reduced clinical trial activity. The continuum of care was largely defended despite pandemic considerations and growing service volumes.

Introduction

The SARS-CoV-2 coronavirus (COVID-19) pandemic has had a global health impact. The burden of acute hospitalisations and amplified infection control measures has stressed health systems, overwhelming capacity in some instances.¹ Many countries were largely unprepared and responded by redistributing staff and

resources,² cancelling non-urgent procedures^{3,4} and increasing critical care capacity.⁵ Fears that attending hospitals may increase risk of contracting COVID-19 has driven a shift towards providing care via alternative means.⁶

Emerging data suggest that people with cancer are at increased risk of morbidity and mortality from COVID-19.^{7,8} Furthermore, delayed surgery, suspension of screening programmes, fears that treatment associated immunosuppression may increase risk of COVID-19

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severity and fewer service contacts (e.g. investigations) might all lead to poorer outcomes for cancer patients. Cancer clinicians have been supported by various guidelines to assist therapeutic decision-making,^{9,10} and the early introduction of telephone and telehealth Medicare items in Australia have permitted modified service provision.

Australians have largely heeded public health advice, constraining COVID-19 infection rates and mortality and sparing an influx of COVID-19-related hospitalisation. Nonetheless, tertiary services have modified provision and engagement to allow for capacity redistribution. Understanding these impacts will guide policy and planning for future disruptions to the healthcare system. Calvary Mater Newcastle (CMN) is the major cancer centre in the New South Wales (NSW) Hunter New England local health district, which provides care for approximately 840 000 people.¹¹ Newcastle Private Hospital (NPH) is the largest private hospital in Newcastle and provides comprehensive cancer care. Utilising data from these services, we sought to understand quantitatively the impact of COVID-19 on medical oncology service provision and engagement.

Methods

We undertook a retrospective analysis of inpatient, ambulatory, treatment and clinical trial data from both CMN and NPH for matching 3-month periods; 1 February 2019 – 30 April 2019 and 1 February 2020 – 30 April 2020. Data were extracted from our electronic systems and subsequently cleaned for accuracy and consistency. Treatment decision data were manually extracted from the electronic medical record by the treating clinicians. Data for each institution were analysed, separately and combined.

Length of stay (LOS) was defined as days from admission until discharge inclusive. Inpatient-days were calculated using the sum of hospitalised patients on each day within the specified time period. Day Treatment Centre and infusion-lounge treatments were not included as inpatient admissions.

New-patient consultations were defined as the first ambulatory encounter with a medical oncologist in the respective centre. New-patient treatment decisions were defined as the first treatment plan documented after each initial patient consultation. Chemotherapy included all cytotoxic agents (oral or intravenous (i. v.)), immunotherapy referred to checkpoint inhibitors, targeted therapy included non-cytotoxic anticancer agents whether antibodies or small molecules, while supportive/adjunct therapy was inclusive of bone antiresorptive therapy.

Day Treatment Centre encounters were inclusive of all ambulatory treatment (multi-drug regimens were recorded as single encounters for each day of treatment), procedures and education sessions. New-treatment education sessions were defined as nursing education encounters that occur at the commencement of all new intravenous (and some oral, intramuscular or subcutaneous) treatments. These routinely occur at CMN before every new therapy and are not restricted to patients commencing treatment for the first time.

Data were described using standard descriptive statistical methods. Statistical analysis was performed using the Fischer's exact test, 3×2 Chi-square, unpaired *t*-test and non-parametric Mann–Whitney test where applicable.

This research project was conducted under a waiver from the Hunter New England Human Research Ethics Committee (Au2021004-20).

Results

Inpatients became outpatients

Inpatient encounters comparing 2019 to 2020 are reported in Table 1, Figure 1 and Supporting Information Table S1. Numerically, fewer admissions took place in 2020 at both CMN (349 vs 265, –24%) and NPH (109 vs 80, –27%). Combined, admissions decreased by 21% in 2020 (458 vs 364); however, the most significant decreases were seen in March (159 vs 104, –35%) and April (161 vs 103, –36%). Mean combined daily admission rate decreased from 5.1 in 2019 to 3.8 patients per day in 2020 (–1.3, 95% confidence interval (CI) –2.0 to –0.6; *P* < 0.001). Mean LOS remained unchanged (combined mean LOS 6.4 vs 6.2 days; –0.2, 95% CI –1.0 to 0.6; *P* = 0.7). The total number of inpatient days was significantly reduced at both CMN and NPH (–23% and –20% respectively) with the combined total number of inpatient days reduced from 2842 to 2203, representing a 22% decrease. The most significant decreases were again seen in March (1089 vs 721, –34%) and April (1017 vs 568, –44%). The mean combined daily inpatients decreased from 31.9 in 2019 to 24.5 patients per day in 2020 (–7.4, 95% CI –9.6 to –5.2; *P* < 0.001).

Outpatients became remote patients

Outpatient consultations are reported in Table 1, Figure 2 and Table S1. Compared to 2019, a small increase in the number of clinic consultations was observed at CMN (3550 vs 3816, 7%) in 2020, unchanged at NPH (1315 vs 1256, –4%). Combined total clinic consultations increased by 4% (4865 vs 5072), which was consistent across each month and is consistent with the trend over

Table 1 Combined inpatient and ambulatory activity at Calvary Mater Newcastle and Newcastle Private Hospital

	2019	2020	Change	P-value
Inpatient				
Total admissions	458	364	-21%	
Mean daily admissions	5.1	3.8	-25%	<0.001
Mean length of stay (days)	6.4	6.2	-3%	0.72
Total inpatient days	2842	2203	-22%	
Mean daily inpatients	31.9	24.5	-23%	<0.001
Ambulatory				
Clinic consultations				
Total	4865	5072	4%	
Mean monthly	1622	1691	4%	0.01
Face to face	4859 (99.9%)	3623 (71%)	-25%	<0.001
Telehealth	6 (0.1%)	69 (1%)	1050%	
Telephone	0	1380 (27%)		
New-patient consultations				
Total	394	417	6%	
Mean monthly consultations	131.3	139	6%	0.42
Face to face	394 (100%)	394 (94%)	0%	<0.001
Telehealth	0	3 (1%)		
Telephone	0	20 (5%)		

Change column reflects relative difference between 2019 and 2020. Percentages may not add up to 100 due to rounding.

the past decade (data not shown). While face-to-face (F2F) consultations accounted for almost all ambulatory consultations in 2019 (99.8% CMN, 100% NPH), a striking decrease was seen in 2020 (70% CMN, $P < 0.001$; 77% NPH, $P < 0.001$; 71% combined, $P < 0.001$). No telephone (PH) consultations were recorded in 2019; however, they represented approximately one-quarter of all consultations in 2020 (29% CMN, $P < 0.001$; 23% NPH, $P < 0.001$; 27% combined, $P < 0.001$). Telehealth (TH) had minimal utility at CMN and NPH, 0.2% to 2% ($P < 0.001$) and 0% to 0.3% ($P = 0.06$) respectively. When analysed by month (Fig. 2), significant decreases were seen in March and April 2020 for F2F consultations (combined March 100% vs 81%, $P < 0.001$; April 99.8% vs 34%, $P < 0.001$) and an inversely proportional increase in PH consultations (combined March 0% vs 18%, $P < 0.001$; April 0% vs 63%, $P < 0.001$). The number of new-patient consultations was unchanged (combined monthly mean 131.3 vs 139; +7.7, 95% CI -15.9 to 31.2; $P = 0.42$), and some new-patient consultations occurred remotely (F2F 100% vs 94%, TH 0% vs 1%, PH 0% vs 5%; $P < 0.001$). We observed no reduction in the number of new patient referrals at CMN (data for NPH not presented).

Treatment; delivered

Combined Day Treatment Centre activity was essentially unchanged (Table 2; Fig. 3), although a consistent

decrease at NPH (Table S2) across the 2020 period was observed, due to the establishment of an alternative private chemotherapy unit in late 2019. Treatment encounters (excluding visits for education/procedures) decreased slightly (-10%; combined mean monthly encounters 1024 vs 921; -103, 95% CI -200 vs -5.6; $P = 0.04$), driven by the reduced NPH treatment activity. Similar proportions of chemotherapy, immunotherapy and supportive/adjunct treatments were delivered in 2019 and 2020, although a small increase in targeted therapy (18% vs 23% of treatment encounters, $P < 0.001$) was noted.

New treatment; risk adaption

Compared to 2019, a smaller proportion of CMN new patients were offered any active treatment in the 2020 study period (76% vs 68%, $P = 0.03$) (Table 3; Fig. 4). A smaller proportion of new patients were planned for palliative treatment (35% vs 28%, $P = 0.04$) while a greater proportion were offered observation alone (16% vs 23%, $P = 0.04$). No significant change was seen in the proportion of new patients planned for curative intent, chemoradiotherapy, neoadjuvant or adjuvant treatments between 2019 and 2020. When analysed by month, these changes were significant for March (active treatment 81% vs 63%, $P = 0.003$; palliative treatment 40% vs 25%, $P = 0.02$; observation 14% vs 27%, $P = 0.02$) but less evident in February and April. Similarly, no difference was seen in the proportion of new patients

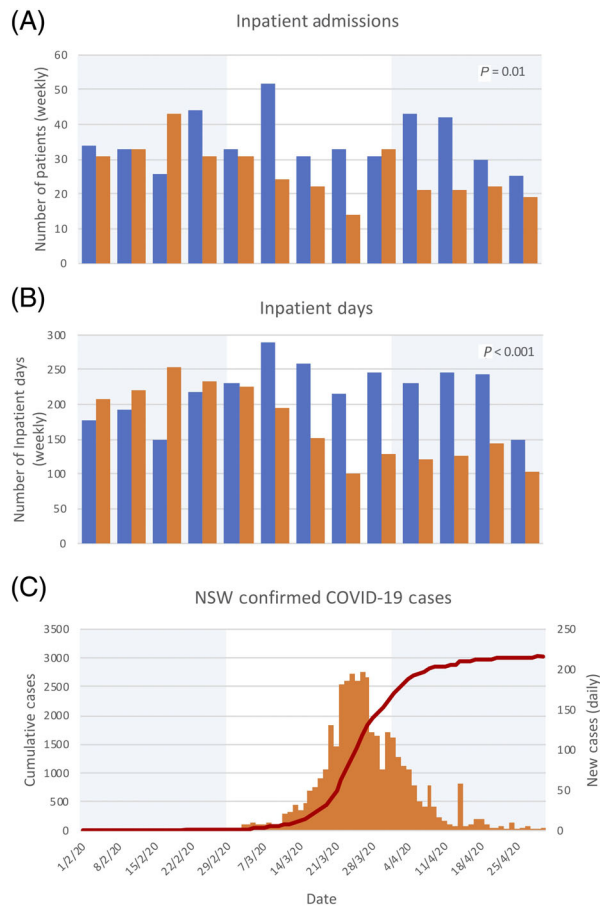


Figure 1 Inpatient admissions and length of stay fell sharply during COVID-19. There were fewer inpatient admissions (A) and inpatient days (B) in the analysed 3-month period in 2020 compared to 2019 ($P = 0.01$ and $P < 0.001$) with a temporal relationship observed between both of these outcomes and (C) incidence of new NSW COVID-19 cases. NSW COVID-19 data sourced from NSW government online dataset.¹² (A) and (B) reflect combined data from both Calvary Mater Newcastle (CMN) and Newcastle Private Hospital (NPH), and are displayed as the number of patients/individuals per week from 1 February until 30 April (for both 2019 and 2020). (■), 2019; (■), 2020; (■), new case per day; (—), total cumulative cases.

recommended chemotherapy, immunotherapy or targeted therapy. Rates of oral and i.v. new-patient treatment plans were unchanged between 2019 and 2020, as were the proportions of oral and i.v. chemotherapy regimens.

Clinical trials; risk aversion

Clinical trial activity across both sites decreased dramatically in 2020 compared to 2019, with a 33% decrease in actively recruiting trials (Table 4). The proportion of trials 'on hold' surged from 4% to 36% ($P < 0.001$) of all

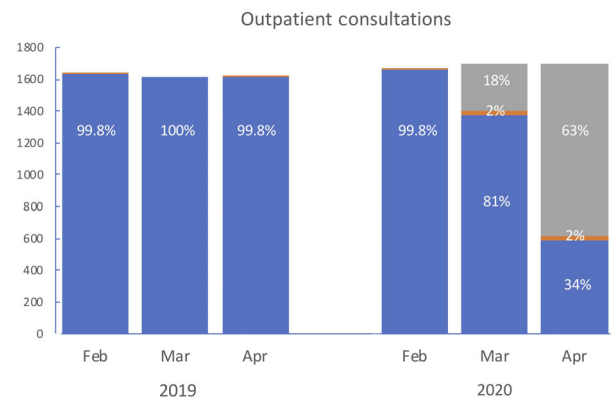


Figure 2 Outpatient consultations rapidly became remote-patient consultations during COVID-19. Summary of clinical consultations conducted in 2019 and 2020 at Calvary Mater Newcastle (CMN) and Newcastle Private Hospital (NPH). The number and relevant proportion of total outpatient consultations of either face to face (F2F), telehealth (TH) or telephone (PH) represented by month and comparing 2019 to 2020. All outpatient consultations that took place between 1 February and 30 April (both 2019 and 2020) included. Almost all outpatient consultations in 2019 were conducted F2F; however, proportionally this decreased significantly in 2020 (99.9% vs 71%, $P < 0.001$). Use of TH was marginally increased (0.1% vs 1%, $P < 0.001$); however, PH consultations substantially increased (0% vs 27%, $P < 0.001$). When analysed by month, no change was seen in February; however, significant differences were seen in March and April 2020 for F2F, TH and PH (all $P < 0.001$). (■), Face to face; (■), telehealth; (■), telephone.

active oncology trials across the sites. Fewer new trials were activated in 2020 compared to 2019 (5 vs 2), and 45% fewer patients consented to trial participation (62 vs 34).

Discussion

The present study demonstrates several important changes to care provision in our medical oncology services during the first 3 months of the COVID-19 pandemic in Australia. Fewer patients were hospitalised and the total number of inpatient days was substantially reduced, with the largest impact seen during the peak of Australia's first wave of cases. Possible explanations include higher clinician threshold to admit patients to hospital out of fear of patient exposure to COVID-19, and concerns regarding resource rationing in preparation for the anticipated influx of COVID-19 patients. Significantly, patients' fear of in-hospital COVID-19 exposure likely resulted in a higher threshold for presentation to hospital, leading to fewer emergency department visits, a cross-speciality trend seen worldwide.^{13,14} In contrast, the mean LOS remained unchanged from 2019 to 2020 suggesting that patients that required admission were

Table 2 Combined treatment related activity at Calvary Mater Newcastle and Newcastle Private Hospital

	2019	2020	Change	P-value
DTC encounters				
Total	3751	3444	-8%	
Mean monthly	1250	1148	-8%	0.08
Treatment encounters				
Total	3071	2763	-10%	
Mean monthly	1024	921	-10%	0.04
Chemotherapy	1959 (64%)	1780 (64%)	-9%	0.62
Immunotherapy	855 (28%)	748 (27%)	-13%	0.52
Targeted therapy	568 (18%)	636 (23%)	12%	<0.001
Supportive/adjunct therapy	88 (3%)	101 (4%)	15%	0.10

Percentages do not always add up to 100 as some patients received more than one type of treatment. Change column reflects relative difference between 2019 and 2020. Percentages in brackets refer to proportion of total treatment encounters. Targeted therapy included the following investigational agents: depatuxizumab mafodotin (ABT-414), epacadostat, ipatasertib, napabucasin (BBI-608) and BNC-105. DTC, Day Treatment Centre.

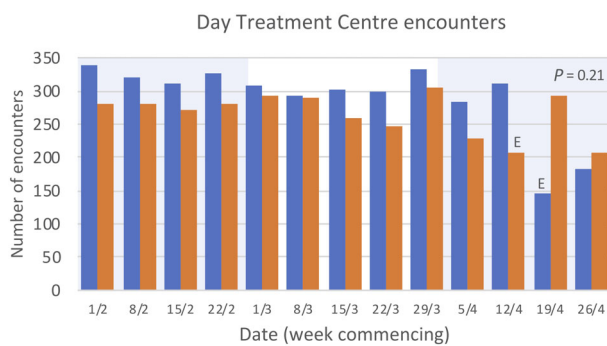


Figure 3 Ambulatory treatment was not significantly reduced during COVID-19. Comparison between 2019 and 2020 Day Treatment Centre encounters. Reflects combined data from CMN and NPH, displayed as the number of encounters per week from 1 February until 30 April (for both 2019 and 2020). ‘E’ indicates that Easter public holidays took place during that week. No change was seen in the 3-month Day Treatment Centre volume between 2019 and 2020 (3751 vs 3444 encounters). The differences observed during the weeks commencing 12 and 19 April were likely due to variation in the timing of Easter public holidays between 2019 and 2020. (■), 2020; (■), 2019.

able to receive similar levels of care and were not necessarily more unwell, although other measures (not analysed) such as the proportion of inpatients requiring intensive care may reflect this more accurately. Many oncology inpatient admissions are related to a febrile illness, most of which resolve as inter-current viral illness rather than neutropenic sepsis. We speculate that social distancing and improved hygiene implemented to control the spread of COVID-19 led to a decline in these presentations, in parallel to the sharp national decline in influenza-like illness in Australia.¹⁵

We saw a rapid switch from F2F outpatient care to a substantial volume of non-F2F care, including two-thirds telephone-based outpatient consultations in April 2020.

We note minimal uptake of existing video-based TH systems. These findings are similar to Medicare Benefits Schedule (MBS) data analysed by Cancer Australia, which reported 34% of ‘Consultant Physician Services’ were conducted by telephone and 6% by videoconferencing in April 2020.¹⁶ Anecdotally, several factors contributed to the minimal use of video-based communication including lack of familiarity (both clinician and patient), technical challenges (e.g. insufficient internet speed and connectivity) and specific TH workflow challenges compounded by already overbooked clinics with little available time to troubleshoot. Anecdotally, most patients expressed a preference for PH-based consultation, often after an initial attempt at TH. As we provide care to many regional and rural patients, poor data access and PH reception were also factors that impacted access to TH and PH-based care. These points are in keeping with findings of the Victorian COVID-19 Cancer Network Telehealth Expert Group survey, which identified lack of infrastructure and patient education as barriers to implementing TH.¹⁷ The promise and allure of digital health remain unfulfilled, at our service at least, but the lessons learned from our experience give guidance for the future.

Australian¹⁸ and international reports note a reduction in cancer care referrals, including The Netherlands where a 25% decrease in cancer diagnoses within a month of the first confirmed COVID-19 case was reported,¹⁹ and the United Kingdom where a 75% decrease in urgent cancer referrals at the start of the pandemic generated alarm.²⁰ The decline in cancer diagnoses and referrals is thought to be partly a product of fewer GP presentations; Australian MBS data revealed a 10% reduction in GP visits (approximately 100 000) for chronic disease in March 2020.²¹ Additionally, elective surgery cancellations and furloughed cancer screening

Table 3 New-patient treatment decisions at Calvary Mater Newcastle

	2019	2020	Change	P-value
Total new patients	320	323		
Observation†	52 (16%)	74 (23%)	42%	0.04
Curative intent treatments†	131 (41%)	132 (41%)	1%	1.0
Palliative intent treatments†	113 (35%)	89 (28%)	−21%	0.04
Any active treatment†	244 (76%)	221 (68%)	−9%	0.03
Concurrent chemoradiotherapy†	40 (13%)	33 (10%)	−18%	0.39
Neoadjuvant treatment†	16 (5%)	22 (7%)	38%	0.40
Adjuvant treatment†	85 (27%)	90 (28%)	6%	0.72
Modality				
Chemotherapy				
Total‡	133 (42%)	124 (38%)	−7%	0.42
Oral‡	21 (16%)	26 (21%)	24%	0.33
Intravenous‡	114 (86%)	104 (84%)	−9%	0.73
Immunotherapy†	39 (12%)	33 (10%)	−15%	0.45
Targeted therapy†	86 (27%)	89 (28%)	3%	0.86
Intravenous treatments†	154 (48%)	134 (41%)	−13%	0.10
Oral treatments†	85 (27%)	93 (29%)	9%	0.54

†Percentages in brackets refer to proportion of all new-patient consultations. ‡Percentages in brackets refer to proportion of chemotherapy new-patient treatment decisions. Change column reflects relative difference between 2019 and 2020. As some patients received treatment with more than one modality, the sum does not equal the total number of treated patients. Concurrent chemoradiotherapy includes treatments with both palliative and curative intent.

programmes, for example, Breast Screen NSW, which suspended screening between March and June 2020, are proposed to contribute to a reduction in new cancer diagnoses. Despite these issues and contrary to concerns reported in social and traditional media, we observed no reduction in new patient referrals to our service, suggesting that urgent cancer surgery and diagnostic procedures continued during COVID-19. Our services are routinely oversubscribed so delayed declines and reductions in screen detected cancers may become apparent in coming months. Reduced screening and GP presentations also raise the risk for future patients presenting with more advanced disease.

The COVID-19 pandemic only subtly influenced active treatment recommendations. We note a small reduction in the proportion of new patients planned for active treatment and an inversely proportional increase in observation, which was largely accounted for by a reduction in palliative treatment; curative intent treatment recommendations were unchanged. Notably, no substantial shift from i.v. to oral treatment was observed, another anecdotally proposed perturbation.

New-patient treatment decisions do not reflect practice in patients on later lines of therapy, so it was reassuring that overall treatment volume was unchanged. This suggests that treatment continued without significant interruption and the continuum of care was maintained. The 25% decrease in treatment volume at NPH mirrored data prior to COVID-19 (not presented) and may reflect

increased competition and changing demographics within the private health sector. The consistency of this decrease throughout the 2020 3-month period, in contrast to other changes that were most apparent in March and April, suggests it was likely unrelated to COVID-19. It is notable that treatment was largely maintained and no patients contracted COVID-19, given that reports have highlighted a high mortality risk associated with COVID-19 and cancer.⁸ Published data are conflicting as to whether recent anti-cancer treatment is a risk factor for COVID-19 associated mortality with a report from Hubei, China, suggesting chemotherapy is a risk factor for death in hospitalised patients,²² a larger UK study failing to demonstrate an increased treatment risk,²³ and an Italian report suggesting that continuation of anti-cancer treatment in epidemic areas may be safe and feasible with adequate infection control measures.²⁴

The reduction in clinical trial activity was pronounced, and appears reflective of risk-mitigation by commercial and academic sponsors. Anecdotally, this seemed driven in part by safety and ethical considerations reducing the need for non-standard-of-care visits and investigations; however, it had implications for existing patients limiting potential therapeutic options. The sustainability of clinical trial teams that rely on funding obtained through commercial trial participation has also been threatened and may have flow-on effects on the ability of Australian institutions to undertake clinical trials and support academic endeavours. Australia's success in suppressing COVID-19

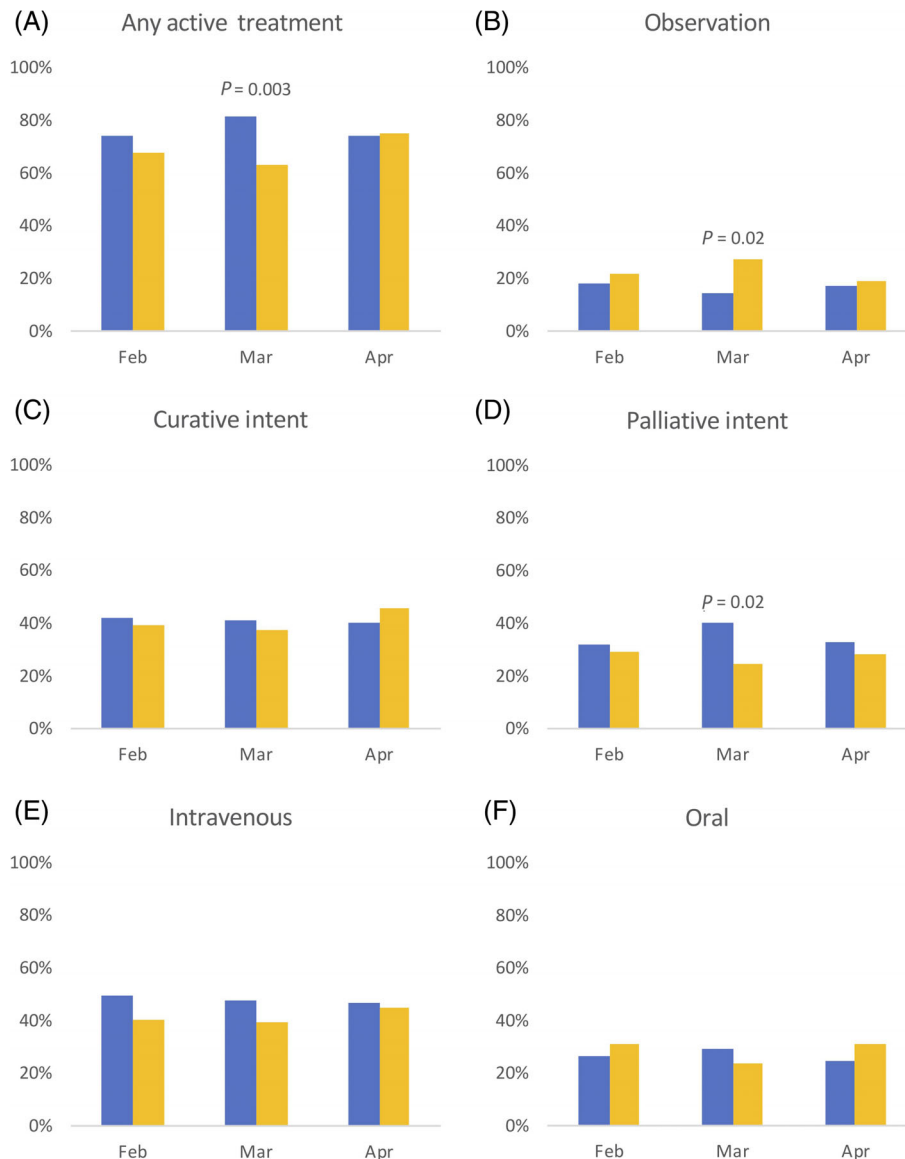


Figure 4 Patients were more likely to be recommended observation than palliative therapy during COVID-19. New-patient treatment decisions in 2019 and 2020 grouped by (A) active treatment, (B) observation, (C) curative intent, (D) palliative intent, (E) intravenous treatment and (F) oral treatment. Compared to 2019, a smaller proportion of new patients overall were planned for any active treatment (76% vs 68%, $P = 0.03$) in 2020. A smaller proportion of new patients were planned for palliative treatment (35% vs 28%, $P = 0.04$) while a greater proportion were planned for observation alone (16% vs 23%, $P = 0.04$). When analysed by month, these changes were significant during March (active treatment 81% vs 63%, $P = 0.003$; palliative treatment 40% vs 25%, $P = 0.02$; observation 14% vs 27%, $P = 0.02$), but not February or April. There was no apparent change in recommendations with curative intent, or in the distribution of intravenous versus oral therapies. Graphs demonstrate the proportion of new-patient consultations that concluded with the indicated treatment recommendation as a percentage of all new patients seen in the relevant month between 1 February and 30 April (2019 and 2020). (■) 2019; (■) 2020.

may make us an attractive destination for sponsors, and a rapid resurgence of trial activity is expected.

Many of the findings in the present study are at least partly reflective of various executive and ‘self-imposed’ departmental COVID-19 policies. Our staff and patients

were subject to NSW Health and government enforced restrictions regarding quarantine following overseas travel, potential exposure to COVID-19 and COVID-19-related symptoms. A CMN departmental decision to switch all appropriate outpatient consultations to TH or

Table 4 Combined clinical trial activity at Calvary Mater Newcastle and Newcastle Private Hospital

	2019	2020	Change	P-value
Clinical trials				
Total	47	47	0%	
Actively recruiting	45 (96%)	30 (64%)	−33%	<0.001
On hold	2 (4%)	17 (36%)	750%	
Newly activated	5 (11%)	2 (4%)	−60%	0.43
Patients newly consented	62	34	−45%	
Trial outpatient consultations	615	621	1%	

Change column reflects relative difference between 2019 and 2020. Percentages within brackets refer to proportion of total clinical trials.

PH was enacted from mid-March, and all clinicians within both our services were recommended to incorporate Medical Oncology Group of Australia-endorsed guidelines¹⁰ regarding risk mitigation, prioritisation of patients and resources and additional patient support.

Our analysis is limited by its retrospective nature, short 3-month study window and use of only one prior comparison period. Incorporating older (e.g. 2018) data may have increased the strength of our comparisons, however the rapidly increasing volume of patient treatments and pace at which oncology treatments are changing presents an increasing confounder. Importantly, while at least 277 cases of COVID-19 were diagnosed within the Hunter New England local health district during our study period,¹² none of our patients was diagnosed with COVID-19, and our findings may not accurately reflect the impact of a second wave of COVID-19 infections, such as recently experienced in Victoria. Extrapolation of our data to other local cancer services is also limited by the varying models of cancer service delivery that exist within Australia, such as chemotherapy-at-home, which our services do not provide. Most importantly, while quantitative measures suggest maintenance of service with adaptation, the qualitative experience of patients during the COVID-19 pandemic will take time to evolve and will be hard to measure; how many of the deferred physical examinations will represent missed therapeutic opportunities?

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Conclusion

The COVID-19 pandemic impacted medical oncology care provision and patient engagement in a variety of ways. Our services adapted rapidly to meet the changing demands of fewer inpatients, less F2F outpatient contact and a large reduction in clinical trial activity. The continuum of care was largely defended despite heightened infection control, resource reallocations and growing service volumes. The impact of COVID-19 on patient qualitative outcomes remains uncertain and Australian cancer clinicians face an ongoing challenge as we continue to adapt to the evolving pandemic landscape and anticipate a potential wave of delayed cancer presentations. Accelerated interest in digital health mandates stronger investment and better implementation. All these challenges reveal new opportunities.

Acknowledgement

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Data availability statement

Data supporting the findings presented in this analysis can be made available on reasonable request.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web-site:

Table S1 Inpatient and ambulatory activity at Calvary Mater Newcastle and Newcastle Private Hospital.

Table S2 Treatment related activity at Calvary Mater Newcastle and Newcastle Private Hospital.