CSIRO PUBLISHING

MODELS OF CARE | ARTICLE
https://doi.org/10.1071/AH23060

Australian Health Review
ahha

Optimal cancer care pathways – the ideal versus reality for patient-centric cancer care during COVID-19

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ABSTRACT

Objectives. To assess whether compliance with the nationally endorsed Optimal Care Pathways is evident in 75% of patients treated with curative intent treatment and if this compliance was impacted by the COVID-19 pandemic (hereinafter COVID-19). **Methods.** This retrospective study included patients undergoing curative treatment with radiotherapy in head and neck (HN), breast, lung and gastrointestinal malignancies between January 2019 and June 2021 in a single NSW outer metropolitan cancer service. For care delivered within the remit of cancer services, the primary outcome measure was the proportion of patients whose treatment complied with the Optimal Care Pathways recommended time frame. Secondary outcome measures included evaluating the effect of COVID-19 on the proportion of patients being treated within the recommended time frame. **Results.** There were $n = 733$ eligible patients across the five tumour streams with the majority being breast cancer patients comprising 65% ($n = 479$) of the cohort, followed by HN cancer patients ($n = 125$, 17%). None of the tumour subsites abided by the 75% compliance rate. Oesophageal cancer patients had the lowest compliance rate of 4% ($P < 0.001$), with a similarly low compliance rate for rectal cancer patients at 33% ($P = 0.002$). None of the hypothesis tests to assess for detriment in treatment time during COVID-19 were statistically significant ($P > 0.05$). **Conclusion.** Despite the availability of best practice guidelines, there is limited compliance throughout all cancer subtypes, which has not been negatively influenced by COVID-19. Improved awareness of the Optimal Care Pathways, and implementation of the associated infrastructure and systems, are required to support compliance.

Keywords: cancer services, clinical pathways, equity, health policy, health services, integrated care, optimal care pathways, radiotherapy.

Received: 3 April 2023
Accepted: 7 June 2023
Published: 28 June 2023

Cite this:
Samaranayake S *et al.* (2023)
Australian Health Review
47(4), 472–479. doi:10.1071/AH23060

Introduction

Cancer management has been well established as a time critical intervention, with delays leading to increased mortality and morbidity.[1–3] These delays can lead to increased rates of progressive disease, which have physical, financial and psychological implications for patients and their families, and a wider socioeconomic cost to society.[4,5]

To improve treatment outcomes for cancer patients, 'Optimal Cancer Pathways' have been developed around the world to assist clinicians in coordinating patient care in a timely manner.[6–9] These guidelines have been developed based on the best available data and expert consensus, and advocate for a timely progression of the patient through each component of their care pathway, from presentation to commencing treatment and beyond. The premise is to adhere to a patient-centric approach, reliant on an integrated care model with optimal care coordination.

In Australia, the Optimal Care Pathways (OCPs) are the only nationally endorsed guideline that encompasses the entire patient treatment journey, from symptom onset to completion of treatment and beyond, for 25 different tumour subsites.[6] Prior studies, both locally and internationally, show that adherence to a national cancer guideline can

improve overall survival.[10,11] Despite this, there is currently no state-wide or national approach in Australia to benchmarking holistic patient care paths, and hence the performance of integrated cancer services, against these pathways. The barriers to improving awareness of OCPs, their implementation and compliance are also poorly understood. Furthermore, the COVID-19 pandemic (herineafter COVID-19) has had a significant impact on cancer management paradigms worldwide, with little understanding of the long-term implications.[4,5,12]

Therefore, the study aimed to assess compliance of different tumour subsites to 'best practice' OCP recommendations and the impact of COVID-19. We hypothesised that at least 75% of patients would meet the OCP guidelines for each tumour subsite and that COVID-19 would have a negative impact. This is the only study in Australia that has assessed OCP compliance for multiple different tumour subsites, over a given period of time.[13–16]

Methods

A single institute retrospective study was conducted at the Central Coast Cancer Centre (CCCC), an outer metropolitan cancer service in NSW, Australia. Patients that underwent curative intent treatment inclusive of radiotherapy (RT), either in the adjuvant setting or definitive/neoadjuvant setting, for breast, head and neck (HN), lung, oesophageal and rectal cancers between January 2019 and June 2021 were included. Patients were categorised as 'Pre-COVID-19', if treated in 2019, or 'during COVID-19' if treated in 2020/2021. HN cancers were defined as either cancer of mucosal or cutaneous origin with cervical lymph node involvement. Ethics waiver was provided by the Central Coast Local Health District – Research Governance Office, as this project qualified as a Quality Improvement Audit.

Data were collected from the Internal Multidisciplinary Meeting (MDM) database, Electronic Medical Records (EMRs), Powerchart, Varian ARIA – the radiation oncology (RO) EMR and MOSAIQ – the medical oncology (MO) EMR. Data collected included staging of malignancy, date of diagnosis (recorded as a mandatory data point in the RO EMR based on the date of biopsy), MDM discussion date and, where applicable, date of commencement and completion of surgery, chemotherapy (CT) and RT.

For each of the included tumour subsites, the recommended timeline provided by the OCP framework from MDM to treatment commencement was documented (Table 1). For the purposes of this study, only components of the timeline which fell within the remit of the cancer services was assessed.

For each patient and tumour sub-site, the mean time taken for each component, and the entirety of their care path, was calculated and compared to the recommended OCP guidelines. The student *t*-test was used to assess for statistically significant differences. The Mann Whitney *U* test was used to assess the impact of COVID-19 on treatment times pre-COVID-19 and during COVID-19. For lung cancer, the OCP guidelines recommend commencing treatment within 6 weeks of initial specialist review. Due to limited data regarding the initial specialist review dates, an assumption of commencing treatment within 3 weeks of MDM was used. SPSS Statistics 29 and Microsoft Excel were used to perform the statistical analysis.

Ethics

An Ethics waiver was provided by the Central Coast Local Health District – Research Governance Office, as this project qualified as a Quality Improvement Audit.

Results

A total of 733 patients treated at CCCC between 2019 and 2021 were included in the study population; the majority were breast cancer patients (n = 479, 65%). The number of patients within each tumour subsite is shown in Table 2,

Table 1. Summary of recommended timeframes as per the optimal cancer pathways for different tumour subsites for each component of treatment.

Cancer type	Surgical timing	Chemotherapy timing	Radiotherapy timing
Breast cancer – without adjuvant chemotherapy	Within 5 weeks of decision to treat		Within 8 weeks post surgery
Breast cancer – with adjuvant chemotherapy	Within 5 weeks of decision to treat	Within 6 weeks post surgery	Within 3–4 weeks post adjuvant chemotherapy
Head and neck – definitive radiotherapy			Within 4 weeks of MDM
Head and neck – adjuvant radiotherapy	Within 4 weeks of the MDM		Within 6 weeks of surgery
Lung cancer			Within 6 weeks of initial specialist referral
Upper GI (oesophogastric)		Within 2 weeks from MDM (if applicable)	Within 2 weeks from MDM (if applicable)
Rectal cancer	8–12 weeks post completion of radiotherapy		Within 3 weeks from MDM

Table 2. Summary of different cancer subtypes, and number of patients treated during COVID-19.

Cancer type	Number of patients total	Treated during COVID-19 (2020/2021)	Treated prior to COVID-19 (2019)
		n (%)	*n* (%)
Breast cancer (no adjuvant chemotherapy)	297	187 (63)	110 (37)
Breast cancer (with adjuvant chemotherapy)	182	113 (62)	69 (38)
Head and neck (definitive treatment)	41	21 (51)	20 (49)
Head and neck (adjuvant treatment)	84	68 (81)	16 (19)
Lung cancer	71	48 (68)	23 (32)
Oesophageal cancer	25	17 (68)	8 (32)
Rectal cancer	30	21 (70)	9 (30)

subdivided by treatment timing (pre-COVID-19 versus during COVID-19).

Overall, none of the tumour subsites reached 75% of patients complying with OCP timeframes. The compliance for the entire treatment pathway with the component care path comparisons are provided in Fig. 1.

For breast cancer, there was 51% ($n = 89$ of 174) and 59% ($n = 175$ of 297) compliance with the entire care path, from diagnosis to commencement of radiotherapy, for patients undergoing adjuvant CT and those not receiving adjuvant CT, respectively ($P = 0.104$ and $P = 0.707$, respectively). When comparing the individual timeframes against the OCP guidelines for breast cancer, there was 57–64% compliance. There was a statistically significant difference between the OCP recommended guideline and the CCCC cohort between the completion of adjuvant CT and commencement of RT ($P = 0.004$), with 64% ($n = 116$ of 182) compliance against the OCPs.

For patients with HN cancers who underwent definitive RT, there was 37% ($n = 15$ of 41) compliance with the OCP recommendation of commencing RT within 4 weeks of the MDM. For patients who underwent adjuvant RT for their HN cancers, there was 59% ($n = 27$ of 46) compliance with the OCP guidelines when assessing the entire treatment pathway from MDM to commencement of RT (38 patients had no recorded MDM date). For the initial component of the treatment pathway, from MDM to surgery, there was 72% ($n = 33$ of 46) compliance with the OCP guidelines ($P = 0.33$). The second component of the treatment pathway, from surgery to commencement of RT, the compliance with the OCP guidelines was 35% ($n = 29$ of 84) ($P < 0.001$).

For lung cancer, the mean time from MDM to commencement of RT was 37.61 days, compared to our assumed OCP timeframe of 21 days ($P = 0.009$). Seventeen percent ($n = 12$ of 71) of the patients complied with the OCP guidelines, whilst 27% ($n = 19$ of 71) of patients commenced treatment more than double the OCP recommended timeframe (> 42 days).

For oesophageal cancer, the mean time from MDM to commencement of RT was 38.68 days, compared to the OCP recommendation of 14 days ($P < 0.001$). Four percent ($n = 1$ of 25) of the patients complied with the OCP recommendation, whilst 60% ($n = 15$ of 25) of patients commenced treatment more than double the OCP recommended timeframe (> 28 days).

For patients with rectal cancer, there was 63% ($n = 12$ of 19) compliance with the OCP guidelines when assessing the entire treatment pathway from MDM to surgery (11 patients had no recorded surgery date within our database). When split into the individual components, there was 33% ($n = 10$ of 30) compliance with the OCP guidelines from MDM to commencement of RT ($P = 0.002$). For the second component of the assessed pathway, completion of RT to surgery, there was 79% ($n = 15$ of 19) compliance with the OCP recommended timeframe.

Patients who underwent adjuvant RT for their HN cancer during COVID-19, had improved treatment times, compared to patients that had adjuvant RT prior to COVID-19 ($P = 0.02$). For all other tumour subsites, there was no effect of COVID-19 on any portion of the treatment pathway ($P > 0.05$).

Discussion

These results are the first known publication in Australia benchmarking performance against the nationally endorsed OCPs for multiple different tumour subsites.[13–16] These results demonstrate that there is overall poor compliance by all tumour subsites, with inconsistency in performance of individual components. Despite being a single institution study, the results and implications are likely to be applicable to most cancer services across Australia.

Within Australia, the OCPs provide the only comprehensive approach to cancer treatment, inclusive of all treatment modalities. Despite this, there is no expectation or requirement to utilise these guidelines to provide a consistent comparison of cancer services performance across the States and Territories or the entire nation. Adaptation of OCPs as a single agreed national key performance indicator (KPI) for cancer services' performance has many potential

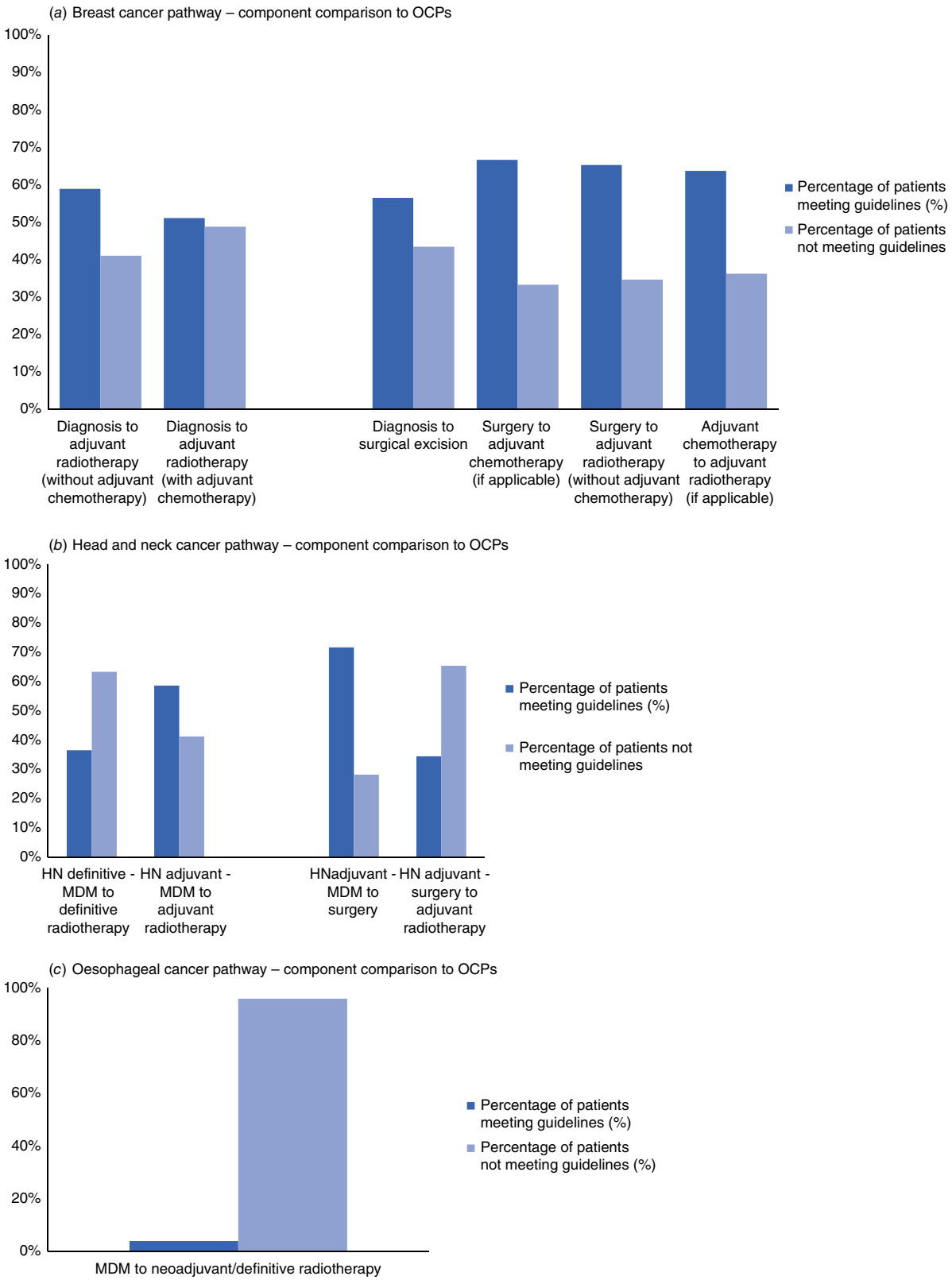

Fig. 1. Component breakdown of tumour sub-site pathways in comparison to OCP recommendations. (*a*) Breast cancer pathway – component comparison to OCPs. (*b*) Head and neck cancer pathway – component comparison to OCPs. (*c*) Oesophageal cancer pathway – component comparison to OCPs. (*d*) Lung cancer pathway – component comparison to OCPs. (e) Rectal cancer pathway – component comparison to OCPs.

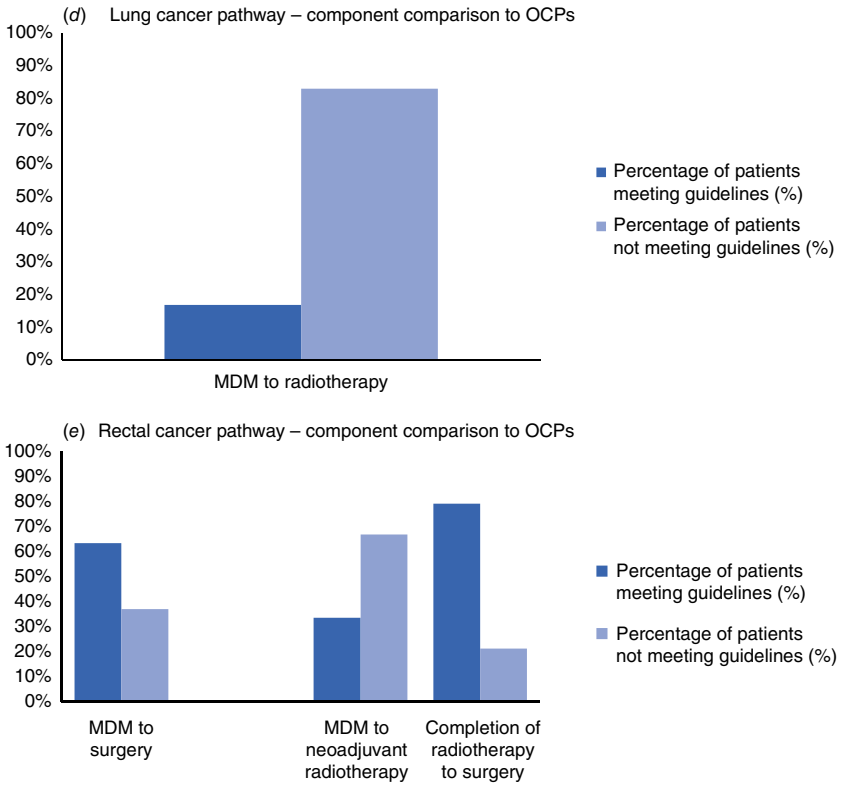

Fig. 1. (*continued*)

benefits. It would allow for a direct objective comparison of all services on a singular platform, and allow identification and addressing of enablers and barriers for compliance to ensure equitable cancer care for the Australian population.

There are, however, practical challenges to achieving the 'ideal' OCP recommendations within a complex healthcare system. These include concerns over limited evidence underpinning guidelines,[17,18] their dissemination and endorsement[19] and applicability of guidelines to the local setting.[20] All these factors potentially contributed to the limited compliance of these guidelines within the centre studied here.

The OCPs rely on an integrated cancer care continuum supported by care coordination. However, the primary health sector, diagnostic services and private health providers are not considered part of integrated cancer services as defined in the public health sectors. There is limited infrastructure to support connectivity between care providers, including capacity for comprehensive care coordination and real time data collection throughout the treatment pathway, in both the public and private sectors.[21] It is known that combining the implementation of a national guideline alongside a comprehensive cancer registry database can be effective at improving survival rates and reducing diagnostic wait times.[11] Therefore, state and national strategies need to acknowledge all stakeholders in the OCPs as part of an 'integrated cancer service' and establish a continuum of care inclusive of comprehensive patient-centric care coordination, data collection and data sharing capabilities.

Even within the specialist services comprising public sector integrated cancer services, there are a variety of different cancer guidelines available,[22,23] which may further impair compliance. For example, the Royal Australian and New Zealand College of Radiologists (RANZCR) has published guidelines recommending treatment times once a patient is deemed ready to commence RT, without any specific guidelines regarding different tumour subsites or the holistic pathway.[22] The lack of tumour subsite specific treatment guidelines by RANZCR, may be one factor accounting for poorer compliance rates noted for oesophageal and rectal cancer, which have shorter times to commence radiotherapy (2 and 3 weeks following MDM respectively). Similarly, the surgical benchmarking for oncological procedures in Australia is classed as a category one, which is 30 days from the ready for care date,[23] with no distinction between different tumour types or pathologies. This has led to an inability to compare patient-centric performance against set guidelines as an integrated model of care, rather than a 'silo based' performance of each discipline.

There are currently multiple diagnostic routes for patients who present with symptoms of cancer, causing potential delays and adding to the complexity of the disease and treatment.[24,25] These include emergency department presentations, inpatient consultations, general practitioner (GP) initiated diagnostic pathways (with both public and private diagnostic/imaging services) and GP initiated referrals to outpatient public and private specialist services.

The Central Coast patient population is served by a single public sector comprehensive cancer service inclusive of

surgical, MO and RO services. Currently, cardiothoracic, transoral robotic surgery, hepatobiliary, reconstructive oncology and neurosurgery services are not available in the Central Coast, which may influence OCP compliance in these patient cohorts. Private sector services consist of a single RO centre with one linear accelerator, medical oncology, surgical oncology consulting rooms in addition to diagnostic services. Limited care-coordination is available for all cancer subsites, with a predominant focus on public sector patients. This complexity, and alternating treatment between the public and private systems, through the treatment and diagnosis pathway, may add to further difficulties in patients accessing timely health care.

The solution may lie in defining and implementing locally applicable streamlined, fast-tracked, referral, diagnostic and treatment pathways from point of a suspected cancer diagnosis. This would address the time delays and logistical challenges faced by patients and referrers.

Health sectors also need to account for unexpected challenges that impact the ability to adhere to ideal guidelines. This was highlighted by the impact of COVID-19 on the health system and the need for contingency plans to counter the negative outcomes for patients. Despite our study demonstrating no negative impact of COVID-19 on time to commencement of treatment, there has been a clear detriment to cancer management secondary to the pandemic overseas.[4,5,26] Our results pertaining to COVID-19 may be related to reduced diagnostic and screening services available in Australia during the pandemic[27] and therefore reduced wait list times for the commencement of cancer treatment. To reduce the impact of COVID-19 on diagnosis, pathways have also been adjusted in some countries, allowing primary care physicians increasing access to intervention and diagnostic investigations.[28]

Despite this being the first published study that benchmarks performance against multiple different OCPs,[13–16] there are several limitations, which relate to the fundamental issues discussed above. Firstly, given the complex nature of the diagnostic pathway, mainly conducted in the private health sector with no data linkage between primary and specialist health care, this component of the OCP prior to MDM discussion was excluded from this study. Regardless of the location of their surgery, the study captured patients who received radiotherapy at CCCC, however, the minority of patients who received radiotherapy in the private sector or out of area would not have been captured.

The CCCC, and the Central Coast in general, may also have region specific issues that may not be related to other Local Government Areas (LGAs) or cancer centres. The Central Coast is an outer metropolitan region, located approximately 1 h north of Sydney, with a significant distance to medical services, a known contributor to a poor prognosis for a more advanced stage of disease.[29] There are regions of disadvantage throughout the area, particularly at the northern end of the LGA with a lower average income per person, compared to the NSW average,[30,31] with socioeconomic status being a known contributor to advanced stage of diagnosis.[32] From a health perspective, there are also higher rates of comorbidities, including diabetes and cardiovascular disease within the district compared to overall NSW,[31] with a known association between comorbidities and delayed diagnosis.[33] It is unclear whether these factors have contributed to the poor OCP compliance at the CCCC and may influence compliance within other regions.

The current study has provided the impetus for developing a broader study comparing OCP compliance within other regional and outer metropolitan cancer services in the Northern NSW regions to understand the overall system issues impacting all health services and potential local nuances impacting *each region.*

Future studies should focus on identifying the major causes of delays at multiple steps of the diagnosis pathway. These studies should also assess different diagnostic routes (emergency presentations, inpatient vs outpatient, private vs public health care), to assess whether there are certain points that exacerbate delays in the diagnostic and treatment process. There is scope to survey stakeholders in the treatment pathway (GPs, subsite specific physicians/surgeons, medical oncologists, radiation oncologists, radiologists, pathologists), to understand clinician views on the causes of delays in commencing treatment for cancer patients. Patient experiences also need to be incorporated through validated patient reported outcome tools.

Conclusion

Despite the availability of nationally endorsed OCPs, our study confirms the challenges of demonstrating compliance as well as understanding and addressing barriers to compliance. We propose that the OCPs should be adapted as a single national guideline to benchmark performance of cancer services nationally with improved awareness and supportive infrastructure to promote equitable cancer care to all Australians.

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Data availability. The data that support this study cannot be publicly shared due to ethical or privacy reasons and may be shared upon reasonable request to the corresponding author if appropriate.

Conflicts of interest. The authors declare no conflicts of interest.

Declaration of funding. This research did not receive any specific funding.

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