

The impact of a new acute oncology service in acute hospitals: experience from the Clatterbridge Cancer Centre and Merseyside and Cheshire Cancer Network

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ABSTRACT – The 2008 National Confidential Enquiry into Patient Outcomes and Death highlighted an urgent need to improve the quality, safety and efficiency of care for cancer patients following emergency presentation to acute general hospitals. A network-wide acute oncology service (AOS) was therefore commissioned and implemented on the basis of recommendations from the National Chemotherapy Advisory Group (NCAG). Through a continuous programme of raising awareness regarding both the role of the AOS and the necessity of early patient referral to acute oncology teams, we have been able to establish an AOS across all acute trusts in our cancer network. The network-wide AOS has improved communication across clinical teams, enabled rapid review of over 3,000 patients by oncology staff, reduced hospital stay, increased understanding of oncology emergencies and their treatment, and enhanced pathways for rapid diagnosis and appropriate referrals for patients presenting with malignancy of undefined origin (MUO). These achievements have been made by developing a network protocol book for managing common oncology emergencies, by introducing local pathways for managing MUO and by collaborating with palliative care teams to introduce local acute oncology (AO) multi-disciplinary team (MDT) meetings.

Introduction

Merseyside and Cheshire Cancer Network (MCCN) provides cancer services for a population of 2.3 million people in the North West of England and the Isle of Man, and incorporates seven acute hospital trusts (Fig 1).

Clatterbridge Cancer Centre (CCC) provides tertiary inpatient chemotherapy, radiotherapy and day-case chemotherapy services, and is a stand-alone trust with no acute on-site services. In this trust, over 70% of systemic cancer treatments are deliv-

ered in local hospitals, which are supported by nine satellite chemotherapy clinics and one satellite radiotherapy unit. Chemotherapy services are nurse-led and consultant oncologists may not be on site. Owing to the geography of the region covered by the CCC, cancer patients who require acute medical care present to local hospitals. Before the establishment of an acute oncology service (AOS), these patients did not routinely receive specialist oncology review, although 24-hour telephone advice was made available by CCC for patients and healthcare professionals alike.

The aim of the AOS is to improve the quality of care for cancer patients following emergency presentation to acute general hospitals because of cancer- or treatment-related complications. Recent reports indicating the need for improved care of cancer patients presenting acutely to hospital^{1–3} show that these patients account for 5% of all acute hospital admissions, costing the NHS approximately £1 billion per annum.² There is a national increase in the use of systemic cancer treatments and a rapid expansion in availability of novel agents (including oral drugs). In addition, more treatments are being delivered locally rather than in tertiary cancer centres. These changes all contribute to the increase



Fig 1. The seven acute trusts within the Mersey and Cheshire Cancer Network with acute oncology teams now *in situ*. CCC = Clatterbridge Cancer Centre (with no accident and emergency department on site); COC = Countess of Chester Hospital; RLH = Royal Liverpool University Hospital; SHK = St Helen's and Knowsley Foundation Trust; SORM = Southport and Ormskirk Trust; UHA = University Hospital Aintree; W&H = Warrington and Halton Hospital; WTH = Wirral University Teaching Foundation Trust.

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Table1. Average length of stay for each acute oncology admission type before the inception of a network-wide acute oncology service.	
Type of Admission	Average LOS days (range)
Type 1 (new cancers)	11 days (7.5–16.1 days)
Type 2 (complications of cancer treatments)	9.1 days (5.7–14.1 days)
Type 3 (complications of cancer)	17.3 days (10.2–23.5 days)
LOS = length of stay.	

in patients presenting to local hospitals and being managed by non-cancer specialists.²

The 2008 National Confidential Enquiry into Patient Outcomes and Death (NCEPOD) evaluated deaths within 30 days of chemotherapy and highlighted serious concerns surrounding the care of patients who present with treatment-related complications, especially neutropenic sepsis.¹ In response, the National Chemotherapy Advisory Group (NCAG) conducted a comprehensive review of chemotherapy services in England and made a number of recommendations to establish a structured and formalised approach to managing acute cancer admissions.² The term ‘acute oncology’ (AO) refers to the management and treatment of patients who present acutely with cancer treatment side-effects or as emergencies with complications from a known or new cancer diagnosis. NCAG recommends that all hospitals with an emergency department (ED) should establish an AOS to co-ordinate the acute management of cancer patients in order to enhance the quality, safety and efficiency of inpatient care. Importantly, the discipline of acute oncology is now subject to cancer peer review.

Methods

An initial undertaking aimed to define the potential AOS work load. CCC and MCCN jointly commissioned the National Cancer Services Analysis Team to provide an analysis of potential yearly AO workload, define admission categories and calculate current length of stay (LOS) for such patients. Information was collated from Hospital Episode Statistics for North-West NHS Trusts and Residents (HES 1997–2008), CCC radiotherapy data (‘MAXIMS’ database 2003–2008), CCC chemotherapy data (‘MAXIMS’ database 2003–2008) and North-West Cancer Registry data (2000–2006). The data came from 3,942 AO patients who were identified over a 12-month period. Three types of admission were defined: ‘type 1’, patients presenting acutely with a new cancer diagnosis, including MUO; ‘type 2’, patients presenting with complications of cancer treatment, and ‘type 3’, patients presenting with complications of a known cancer diagnosis.

Of the 3,942 patients, 43% (n=1,687) were type 3 admissions, 40% (n=1,600) were type 2 admissions, and 17% (n=655) were type 1 admissions. The overall average LOS was 12.8 days (range 9.6 to 16.3 days). Type 2 admissions were associated with the shortest LOS (9.1 days), followed by type 1 admissions (11 days),

whereas type 3 admissions experienced the longest LOS (17.3 days) (Table 1). A network-wide acute oncology service was implemented on the basis of this analysis.

Acute oncology service set-up and delivery

In response to NCAG’s recommendations, the network AOS was established using the following strategy.

The Clatterbridge Cancer Centre and Merseyside and Cheshire Cancer Network acute oncology team model

Each trust is supported by a team of two or three consultant oncologists (one being the lead AO consultant for the trust), one full-time equivalent cancer nurse specialist (CNS) and secretarial support. To meet demand, five new consultants were appointed, with the remaining AO sessions provided by existing CCC consultants. The oncologists are funded by CCC, whereas the CNS and administrative support staff are funded by the acute trusts.

The team provides a 5-day service, including one consultant programmed activity of AO support per day (Monday to Friday) and CNS support for 5 full days. The patients remain under the care of the admitting consultant within a the local trust, with the AO providing an advisory service. Each AOS oncologist also provides one or more site-specialised services at the trust where they provide AO support. The annual work plan for each AO team is supported by a local steering committee, as recommended by NCAG, which comprises:

- 1 lead AO consultant (chair)
- 2 trust lead cancer clinician
- 3 AO CNS
- 4 palliative care consultant and CNS
- 5 haematology consultant and CNS
- 6 emergency medicine consultant
- 7 acute medicine consultant
- 8 rehabilitation lead for malignant spinal cord compression (MSCC)
- 9 radiology lead.

As a network, we have developed protocols for the management of oncology emergencies presenting to the ED and acute medical units (AMU). Individual AO teams provide regular training for the ED and AMU healthcare professionals (HCP). In addition, we train physicians who participate in acute ‘on-take’ and liaise closely with the patient’s primary oncologist.

The lead AO consultant facilitates the development of cancer services within each trust, leads local and network AO audits, and works with information management and technology (IM&T) services to implement patient-flagging systems. Peer support is provided by local steering groups and the MCCN AO Clinical Network Group.

Network data AO collection

Since the inception of our AOS, information has been collected prospectively for each patient referred to the AO team using a standardised data set, which includes admission type,

cancer diagnosis, time from referral to first AO review, AO clinical benefit conferred by advising AO team, and length of hospital stay.

Results

12-month workload for the acute oncology service

From November 2010 to November 2011, AO teams across seven trusts reviewed 3,031 cancer patients. The total number each year is likely to exceed this as current analysis incorporates only 6 months for two trusts' teams (due to their later start-up). Successful engagement of each team with its host trust has ensured an awareness of our service, and its importance in enabling quality care for cancer patients. This is reflected in Table 2, which shows increasing referrals over time, with a plateau reached around 6 months following inception of the local service.

As expected, patients with common cancers (lung (26%, $n = 700$), breast (16%, $n = 442$), colorectal (14%, $n = 369$), whether presenting with complications from the cancer itself, from their cancer treatment or as a new diagnosis, account for the majority of admissions. The low number of haematological malignancies referred reflects established acute haematology services who already manage these patients (Fig 2).

Number of acute oncology patients per admission type

51% ($n = 1,542$) of patient admissions are due to complications of the cancer itself, whereas 30% ($n = 895$) are due to complications of cancer treatment, and 19% ($n = 564$) are new cancers presenting as an emergency, including MUO ($n = 290$) (Table 3). New cancers provide the smallest number of referrals because

patients who present with an obvious primary are correctly managed using existing pathways that refer them to an appropriate specialist.

Type1 admissions include MUO and cancer of unknown primary (CUP). The National Institute of Clinical Excellence (NICE) stipulates that these patients should be referred to a hospital CUP team⁴ for further management, with the particular aim of avoiding unnecessary and futile investigations and prolonged hospital stays. In our cancer network, the AO teams also provides this service, with the lead acute oncologist fulfilling the role of lead CUP consultant, and the AO CNS fulfilling the role of the CUP CNS.

Rapid access to oncology review

Effective oncology intervention depends on early referral from the admitting teams, and regular education ensures that this does occur. Mean time from admission to referral is currently 2.8 days (range 2.1 to 3.6 days), with a median referral time of 1 day (range 0 to 49 days).

Acute oncology cancer peer review measures indicate that each trust should have a system of 'onco-alerts', ensuring that the relevant AO team is alerted directly whenever a known cancer patient on treatment is admitted within the network.^{5,6}

Out of 3,031 referrals, however, 78% (2,364) actually came from HCP, with only 22% (667) being referred via an alert system. This reflects the need for adequate IM&T support to enable such procedures to exist. In the interim, our AO teams provide continuous education, especially of junior doctors and nurses (intake of whom regularly changes), on the importance of referring to AO at the point of admission. This was a practice change for many trusts as cross-referral was generally initiated

Table 2. Number of monthly referrals to each acute oncology team per Trust.

Month of admission	Trust 1	Trust 2	Trust 3	Trust 4	Trust 5	Trust 6	Trust 7
Nov 2010	11	44	55	Not active	Not active	Not active	Not active
Dec 2010	18	55	69	35	Not active	26	Not active
Jan 2011	23	45	43	40	Not active	34	Not active
Feb 2011	25	43	55	28	Not active	23	Not active
Mar 2011	83	37	56	34	Not active	30	Not active
Apr 2011	88	47	42	25	13	33	Not active
May 2011	80	55	50	43	19	48	21
Jun 2011	96	54	38	38	23	29	22
Jul 2011	84	64	49	31	21	39	19
Aug 2011	87	36	49	31	17	22	41
Sep 2011	74	46	45	43	20	29	18
Oct 2011	73	48	31	49	26	39	23
Nov 2011	0	0	0	32	23	26	20
Total	742	574	582	429	162	378	164

'Not active' indicates that an AO team is still being set up.
AO = acute oncology.

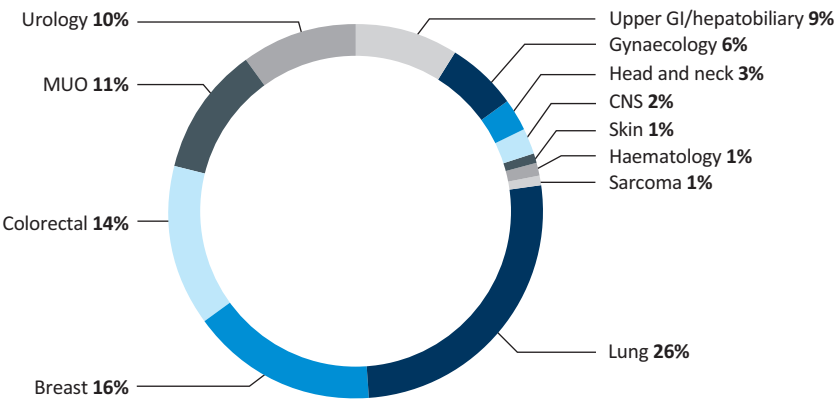


Fig 2. Number of acute oncology patients per tumour site across the seven acute trusts in the MCCN over a 12-month reporting period. Total number of patients referred to the service = 3,031. CNS = central nervous system; GI = gastro-intestinal; MUO = malignancy of undefined origin.

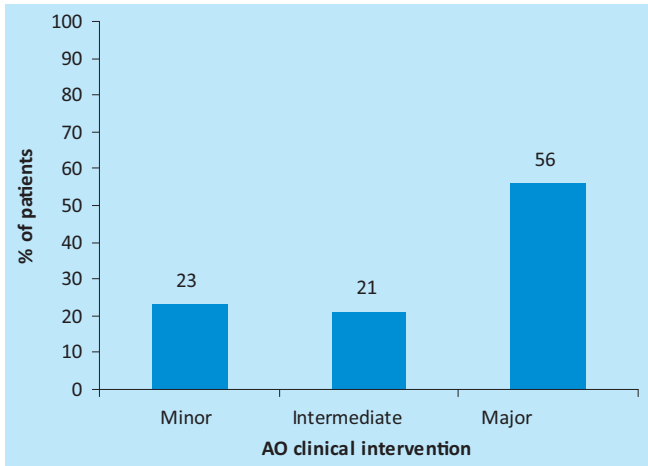


Fig 3. Quality of care provided by the AO teams. Patients are more likely to experience a major clinical benefit from being referred for acute oncology team intervention than either a minor or intermediate benefit. Major vs intermediate intervention, $p < 0.05$; major vs minor intervention, $p < 0.05$. AO = acute oncology.

Table 3. AOS defined levels of intervention.	
Major clinical interventions	Managing new cancers (including malignancy of undefined origin or cancers of unknown primary) Managing chemotherapy or radiotherapy complications Organising diagnostic tests Cancelling or preventing unnecessary tests Symptom management Preventing admission
Intermediate clinical interventions	Recommending referral to other teams, including other hospitals and the Cancer Centre Psychological support Collecting patient information
Minor clinical interventions	Checking progress of inpatients Organising follow-up

AOS = acute oncology services.

by doctors following the ‘post-take round’. Referral to AO on admission, by any relevant HCP, can lead to AO team assessment at least 24 hours earlier.

Rapid review by the acute oncology team

Cancer peer review measures recommend that patients are seen by AO within one working day of referral.⁵ In our network, this occurs for 92% of patients (range 86 to 99%) with remainder being seen within 48 hours.

Quality of clinical care provided by the acute oncology teams across the network

To assess the clinical benefit the service provides, the AOS defined levels of intervention, categorised as ‘major’, ‘intermediate’ or ‘minor’ as defined in Table 3. For the 1,403 patients for whom data is available, the majority of AO interventions were categorised as major (56%), compared to intermediate benefit (21%) ($p < 0.01$ Chi-squared test) or a minor benefit (23%) ($p < 0.01$) (Fig 3).

Reduction in length of stay (LOS)

In addition to providing specialist care, it was anticipated that the presence of an *in-situ* oncology team in each trust would also lead to reduced LOS. Twelve months post-inception, the average LOS has been reduced by 3.1 days, from 12.8 days (range 9.6 to 16.3 days) to (currently) 9.7 days (range 8.3 to 11.2 days, $n = 2,705$ admissions). This represents a saving of over 8,000 bed days with consequent financial savings for individual trusts, based on the average national excess bed tariff of £250. The true level of savings is, however, difficult to quantify accurately, as an estimate of £2 million is likely to be an overestimate. There is, however, no doubt that reducing LOS saves resources and frees up capacity, making a positive contribution towards QUIPP (Quality, Innovation, Productivity and Prevention)-saving targets.

Patient support

We have not formally assessed patient feedback through questionnaires, but the overwhelming response from patients and their carers has been positive. Oncology patients can feel vulnerable when being admitted to a non-cancer hospital and worry that the healthcare professionals they see will not understand about their cancer or its treatment. We have found that being seen daily by a specialist oncology nurse or doctor, who will advise on best management and who will also liaise with the patient’s primary (tumour-specific) oncologist (ensuring, for example, that appointments for

Table 4. Number of acute oncology patients per admission-type per Trust.

Admission type	Type 1		Type 2		Type 3		Other		Not recorded		Total
	n	%	n	%	n	%	n	%	n	%	
Trust 1	100	13%	154	21%	482	65%	0	0.0%	6	0.8%	742
Trust 2	130	23%	203	35%	239	42%	0	0.0%	2	0.3%	574
Trust 3	92	16%	248	43%	241	41%	0	0.0%	1	0.2%	582
Trust 4	121	28%	74	17%	203	47%	7	1.6%	24	5.6%	429
Trust 5	33	20%	49	30%	79	49%	0	0.0%	1	0.6%	162
Trust 6	46	12%	125	33%	200	53%	1	0.3%	6	1.6%	378
Trust 7	42	26%	42	26%	80	48%	0	0%	0	0%	164
Total	564		895		1,524		8		40		3,031

Type 1 admissions are for new cancer diagnoses including cancer of unknown primary; type 2 admissions are for complications of cancer treatment (radiotherapy, chemotherapy or targeted therapy); type 3 admissions are for complications caused by the cancer itself. The 'other' category includes referrals that did not fit criteria for acute oncology definition.

clinics or cancer treatments are rescheduled), gives enormous psychological support and feelings of safety to the patient and their carers. Similarly, a survey of 28 HCP at one trust who had used the service, rated the service as 'good' or 'very good'.

Conclusion

The CCC-MCCN Acute Oncology model provides high-quality specialist care to acutely unwell cancer patients, a service that has been achieved by positive engagement with each host trust. AO is now part of the National Peer Review Programme, and any hospital with an accident and emergency department should have an AOS *in situ*.⁵

The first 12 months has seen a process of service development which has been facilitated by continued support and collaboration between Clatterbridge Cancer Centre and each trust. It is important to recognise that each AO team should be adapted and configured to local service needs and existing network services. Nevertheless, AO can be used as a platform for innovation and to effect change. We recognise that there are different AO models currently in use,^{7,8} but we believe that our model is one of the first to be implemented throughout an entire network. Future aims centre around establishing a robust onco-alert system that will alert teams electronically when AO patients are admitted. We also aim to improve avoidance of unnecessary admissions through nurse-led AO clinics and partnerships with primary care, and through more engagement with discharge planning and elderly medicine at the point of admission so as to decrease the proportion of long-stay AO patients who may be recovered from the AO episode but (due to a multitude of factors) are not be discharged to the community in a timely fashion.

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