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FULL PAPER

The impact of the introduction of a palliative Macmillan consultant radiographer at one UK cancer centre

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Objective: The UK radiotherapy (RT) workforce needs novel strategies to manage increasing demand. The appointment of a palliative RT (PRT) consultant radiographer (CR) offers a potential solution to enhance patient pathways providing timely RT. This article examined the impact of one such appointment.

Methods: Two prospective audits were completed 1 year apart. All patients receiving PRT for bone metastases between 01/01/2014–31/03/2014 (Audit 1) and 01/01/2015–31/01/2015 (Audit 2) were included. Data collected included demographics, treatment site, dose, fractionation, treatment indication and professionals who planned the PRT. The patient pathway from decision to treat (DTT) to commencement of PRT was scrutinized.

Results: 97 patients were identified for Audit 1 and 87 patients for Audit 2. Demographics were similar. Figures relate to Audit 1 and in brackets Audit 2.

Indications for treatment: pain 55% (61%), metastatic spinal cord compression 41% (38%) and other neurological symptoms 4% (1%). The CR independently planned 13% (60%), being supervised for 36% (3%). Consultant clinical oncologists planned 43% (31%), with 7% (6%) planned by specialist registrars (SpRs). The pathway was enhanced in Audit 2, with 85% of patients treated within 14 days compared with 73% of patients treated in Audit 1. **Conclusion:** A CR has the potential to impact on the patient pathway, enabling quicker times from DTT to treatment. Continued audit of the role is required to ensure that it complements SpR training.

Advances in knowledge: Increasing longevity and improved systemic therapies have led to greater numbers of patients living longer with metastatic disease. The appointment of a CR offers a potential solution to the capacity difficulties faced by UK RT services.

INTRODUCTION

Increasing longevity and an improvement in systemic therapy have led to greater numbers of patients living longer with metastatic disease. It is predicted that cancer diagnosis rates will continue to increase; by 2030, 4 million people will be living with cancer in the UK.^{1–3} This will create greater pressure on the National Health Service (NHS) workforce to deliver services to meet patient needs in a timely fashion. In addition, the complexity of both radiotherapy (RT) and systemic therapy is increasing. There are concerns that the oncology consultant workforce has not grown proportionally to cope with demand. The Royal College of Radiologists estimates a shortfall of approximately 362 consultant clinical oncologists (CCOs) by 2018.⁴ Growth in demand for RT services could lead to delays in treatment pathways due to excessive pressure placed upon CCO time owing to the increasing quantity of patients without expansion of CCO numbers, in addition to lack of capacity on RT treatment units.

Proposals made by the Department of Health in 2000 to address access to RT included developing and expanding workforces to deliver an effective skill mix.⁵ The National Radiotherapy Advisory Group further supported this in 2007 by advocating radical workforce redesign centring on upskilling allied healthcare professionals (AHP) to address CCO shortages and recruitment difficulties.⁶ The National Radiotherapy Advisory Group stated that 20% of RT practice requires the higher level skills of a CCO, the remaining practice being suitable for appropriate delegation by non-medical advanced or consultant practitioners who have the necessary knowledge and expertise. The Royal College of Radiologists supported this concept, stipulating CCO involvement in job and work planning for the professional taking on the responsibilities previously carried out by a CCO.⁷ With the implementation of newer RT practices such as image-guided RT, stereotactic body radiation therapy and protons, in the future in the UK, current figures are expected to reflect the increasing

complexity of treatment requiring increased time and input from CCOs and the wider RT team.⁴

Consultant-level AHP practice has been identified as having four key roles; clinical expertise, professional leadership and consultancy, education, training and development, and service development and research.⁵ A consultant radiographer (CR) may provide autonomous, expert service for a specific primary disease site or treatment technique, proactively managing patient pathways and improving the decision-making process by actively participating in the multidisciplinary team (MDT) meetings, thereby ensuring prompt access to RT.⁵ It was felt that a CR with advanced clinical expertise and knowledge of the field could address a potential gap in service provision for patients requiring palliative RT (PRT) at one UK cancer centre. A Macmillan PRT CR was appointed with the main aim of the role being to improve patient outcomes by enhancing services, driving efficiency and reducing waiting times by having autonomous responsibility for PRT planning. It was anticipated that this would facilitate PRT to be given within 14 days of decision to treat (DTT), in line with recommendations, with best practice providing RT within 2 days.^{6,9} Additional responsibilities include provision of expert clinical practice and leadership and undertaking of a proportion of the PRT planning on behalf of the CCOs to further support an expedited patient pathway. Following the period of training, the CR has further developed their practice, receiving direct referrals from medical oncologists and palliative care consultants for patients requiring PRT for bone metastases and metastatic spinal cord compression (mSCC), impacting beneficially on the CCO workload and patient pathway. The aim of this study was to evaluate the initial impact of the appointment of a Macmillan CR by comparing two audit periods during the initial training period, the first prior to prescribing autonomous PRT within their scope of practice and the second 1 year on when the CR was practising independently.

METHODS AND MATERIALS

Two locally designed prospective audits were performed over two 3-month periods, 1 year apart. The audits were raised at, and were accountable to, the local clinical audit meeting and were bound by local governance and the Society and College of Radiographers Code of Conduct. All patients receiving PRT for bone metastases in accordance with the departmental PRT protocol were identified from MOSAIQ® (Elekta, Sunnyvale, CA), the department RT management system. The patient pathway from DTT to commencement of PRT was ascertained from MOSAIQ. Further data collected included patient demographics (age, gender and primary disease site) from the NHS Trust electronic notes system.

Treatment site and prescribed dose were verified from Prosoma® (Medcom GmbH, Darmstadt, Germany), the virtual simulation package on which individual treatments were planned. The profession of the member of staff planning the treatment [CCO, CR or specialist registrar (SpR)] was recorded.

The indication for PRT was ascertained and assigned to criteria including pain, mSCC, post-operative mSCC and other

neurological symptoms (e.g. cranial nerve involvement). Documented clinical response to treatment at follow-up outpatient clinic and 3-month survival was also recorded.

Data were collected on an excel® (Microsoft, Redmond, WA) spreadsheet.

Statistical methods, including *t*-test analysis, were undertaken to ascertain comparison of the data, including the proportion of the work undertaken by the CR, CCOs and SpRs and compliance with treatment timescale recommendations. Throughout the periods of the audits, the CR worked within local protocols, ensuring work carried out met the criteria agreed by the CCO team. The CR was accountable to both the head of RT and the CCOs, with responsibility for work undertaken remaining with the treating oncologist.

RESULTS

Patients receiving PRT to bony metastases were identified between 1/1/14 and 31/3/14 for Audit 1, during the CR induction period, and compared with patients receiving PRT between 1/1/15 and 31/3/15 for Audit 2, when the CR was planning PRT independently.

97 patients were included in Audit 1 and 87 patients in Audit 2. Table 1 illustrates that patient demographics were comparable between both audits. The mean age of patients in Audit 1 was 70 years (range 35–90 years) and the mean age in Audit 2 was 68 years (range 41–87 years).

The most common primary site requiring PRT to bony metastases was prostate cancer (36% Audit 1, 26% Audit 2) (Table 2). Bone pain was the most common indication for treatment (55% Audit 1, 61% Audit 2), followed by mSCC (39% Audit 1, 36% Audit 2).

The spine was the most common site to be treated (61% Audit 1, 77% Audit 2), followed by the pelvis (7% Audit 1, 20% Audit 2) (Figure 1).

In Audit 1, 43% of cases were planned by the CCO, 14% cases by the CR alone, 36% cases by the CR in conjunction with the CCO and 7% cases by the SpR. In Audit 2, the proportion planned independently by the CR had increased: 31% of cases were planned by the CCO, 60% cases by the CR alone, 3% cases by the CR in conjunction with the CCO and 6% cases by the SpR. This is illustrated in Figure 2. The proportion planned by the CR independently compared with the CCO had increased, although no statistical significance was found between the two audits ($p = 0.33$, *t*-test).

Table 3 demonstrates the length of the patient pathway in the two audits, detailing the time between DTT and receiving the first fraction of PRT, further subdivided into the individual stages of the pathway. The percentage of patients treated on the same day was 28% in Audit 1 and 31% in Audit 2. The overall pathway was enhanced in Audit 2, with 85% of patients being treated within the recommended 14 days compared with 73% patients being treated in Audit 1 ($p = 0.5$ *t*-test).^{6,9} Table 3

Table 1. Patient demographics

Demographics	Audit 1 (2014)	Audit 2 (2015)
Total number of patients	97	87
Gender	65 (67%) males	58 (67%) males
	32 (33%) females	29 (33%) females
Age (range) (years)	35–90	41–87
Mean age (years)	70	68

illustrates the patient pathway subdivided into the separate components of the number of days from DTT to the planning CT scan, from CT scan to date planned, from CT scan to treatment and from planning to treatment.

MSCC is recognized as a medical emergency; as such, the National Institute for Health and Care Excellence guidance from 2008 recommends prompt treatment within 24 h.¹⁰ Therefore, by removing these patients with this emergency condition from the audits, we found that 34 (58%) patients without mSCC were treated within the 14-day recommendation in Audit 1 and 43 (77%) patients in Audit 2 ($p = 0.25$ *t*-test).^{6,9}

Overall, the number of patients receiving PRT for mSCC rose from 24/38 (63%) patients in Audit 1 to 22/31 (71%) patients in Audit 2;

patients being treated for pain within 2 weeks increased from 30/53 (57%) patients in Audit 1 to 42/54 (78%) patients in Audit 2.

Documentation regarding response to PRT was limited. Pain status was recorded subjectively in 42 (43%) patients in Audit 1 and 24 (28%) patients in Audit 2. Of these patients, 26 (62%) patients were pain free in Audit 1, with 16 (38%) patients still experiencing some level of discomfort. In Audit 2, 18 (75%) patients were pain free. 69 (71%) patients were alive at 3 months in Audit 1 and 49 (56%) patients in Audit 2.

Within the two audit periods, the most commonly prescribed palliative regime was 8 Gy in 1 fraction; 50 (52%) patients in Audit 1 and 47 (54%) patients in Audit 2. Other regimes for initial PRT included 20 Gy in 5 fractions [44 (45%) patients in

Table 2. Data collected

Characteristics	Audit 1		Audit 2	
Primary site	Prostate	35 (36%)	Prostate	23 (26%)
	Breast	19 (20%)	Breast	14 (16%)
	Lung	11 (11%)	Lung	16 (19%)
	Other	16 (17%)	Other	24 (28%)
	Myeloma	12 (12%)	Myeloma	9 (10%)
	Kidney	2 (2%)	Kidney	1 (1%)
	Lymphoma	2 (2%)	Lymphoma	0 (0%)
Indication for treatment	mSCC	38 (39%)	mSCC	31 (36%)
	Cranial nerve involvement	4 (4%)	Cranial nerve involvement	1 (1%)
	Pain	53 (55%)	Pain	53 (61%)
	Post-operative (mSCC)	2 (2%)	Post-operative (mSCC)	2 (2%)
Localization	CCO	42 (43%)	CCO	27 (31%)
	CR	13 (14%)	CR	52 (60%)
	CR/CCO	35 (36%)	CR/CCO	3 (3%)
	SpR	7 (7%)	SpR	5 (6%)
Response	Documented	43% (42/97)	Documented	28% (24/87)
	Beneficial response	62% (26/42)	Beneficial response	75% (18/24)
Survival at 3 months	71% (69/97)		56% (49/87)	

CCO, consultant clinical oncologist; CR, consultant radiographer; mSCC, metastatic spinal cord compression; SpR, specialist registrar.

Figure 1. Sites of treatment.

Audit 1 and 34 (39%) in Audit 2] and 30 Gy in 10 fractions [1 (1%) patient in Audit 1 and 4 (4.5%) patients in Audit 2]. Comparing the prescribed doses with national guidance, 38 (72%) patients received 8 Gy in 1 fraction for pain in both Audit 1 and Audit 2.^{8,11–14} 24 (63%) patients were prescribed 20 Gy in 5 fractions for mSCC in Audit 1 and 20 (65%) patients in Audit 2.⁹

For patients undergoing retreatment, the doses prescribed in both audit periods included 8 Gy in a single fraction and 16 Gy in 4 fractions, with 7 (7%) patients receiving retreatment in Audit 1 and 9 (10%) in Audit 2.

DISCUSSION

Given the rising number of patients living with metastatic cancer, it is clear that the present UK workforce needs to consider alternative solutions to present work patterns. CCOs are under ever-increasing demands to deliver safe and effective care

Figure 2. Profession of the responsible planner. CCO, consultant clinical oncologist; CR, consultant radiographer; SpR, specialist registrar.

¹ Clinical Oncologist (CCO)

² Consultant Radiographer

³ Specialist Registrar

Table 3. Comparison of patient pathway

Stage of pathway	Audit 1	Audit 2
DTT–CT scan		
Same day	37% (36/97)	55% (48/87)
≤2 days	11% (11/97)	11% (10/87)
≤7 days	22% (21/97)	16% (14/87)
CT scan date planned		
Same day	52% (51/97)	60% (52/87)
≤2 days	23% (22/97)	22% (19/87)
3–7 days	24% (23/97)	16% (14/87)
8–14 days	1% (1/97)	2% (2/87)
CT scan–PRT		
Same day	37% (36/97)	32% (28/87)
≤2 days	12% (12/97)	14% (12/87)
3–7 days	27% (26/97)	28% (24/87)
8–14 days	20% (19/97)	25% (22/87)
15+ days	4% (4/97)	1% (1/87)
Overall DTT–PRT		
Same day	28% (27/97)	31% (27/87)
1–2 days	13% (13/97)	12% (10/87)
3–7 days	4% (4/97)	17% (15/87)
8–14 days	28% (27/97)	25% (22/87)
Total 0–14 days	73% (71/97)	85% (74/87)
>14 days	27% (26/97)	15% (13/87)

DTT, decision to treat; PRT, palliative radiotherapy.

to growing numbers of patients. The advent of the CR offers one potential solution to the increased demands placed on RT services within the NHS. These two prospective audits show that the introduction of a CR can take on some of the workload traditionally performed by the CCO, thus freeing up CCO time for contouring and further development of complex RT techniques.

The two audits demonstrate that the patient demographics were as one might expect, with the majority of patients treated for bone metastases having a hormone-related malignancy as their primary disease site [35 (36%) prostate and 19 (20%) breast malignancies in Audit 1; 23 (26%) prostate and 14 (16%) breast malignancies in Audit 2]. The main indication for RT was pain in both audits, highlighting the need for rapid access to treatment aimed at symptom relief. The poorer survival in Audit 2 may be reflective of the higher number of lung and other malignancies treated compared with breast and prostate malignancies which comparatively have a better prognosis.¹⁵

The audits illustrate that the introduction of the CR improved the patient pathway (DTT–first fraction of RT within 14 days) from 73 to 85%. This did not demonstrate any statistical

significance but was felt clinically significant in that the patient pathway ran more smoothly, with patient and staff feedback indicating that experience was improved. The CR timetable during the training period allowed for greater flexibility, thus enabling the provision of a more rapid service when localizing treatment. The CR planned 30 of the total number of patients on the same day the patient was scanned in Audit 2 (58% of their work), with 17 patients (63% of total work) planned by the CCO team. This was beneficial for patients experiencing acute pain from osseous disease who required prompt treatment and particularly those needful of PRT for mSCC or nerve root compression. Furthermore, during the training period, the CR developed close links with the local acute oncology service (AOS) creating a single point of contact. A smoother pathway for the local patients with mSCC not suitable for surgical intervention was facilitated, with the CR coordinating the treatment logistics. Adherence to the recommended pathway of PRT within 14 days increased significantly between the audit periods, with 42 (79%) out of 53 patients treated for pain in Audit 2 meeting this target, compared with 20 (38%) of 53 patients in Audit 1.^{6,9} The number of patients treated within 2 days rose from 4 patients (7% patients in Audit 1) to 8 patients (15% patients in Audit 2). The increased compliance correlated with the increased proportion of CR involvement in planning PRT and this demonstrates the potential for enhancing the patient pathway when capacity is available on treatment units. A single coordinator of PRT allows for greater control over the logistics of the patient pathway.

The CR demonstrated increasing independence within the PRT planning aspect of the role between the two audit periods. Autonomous planning for bone metastases rose from 13 (14%) in Audit 1 to 52 (60%) in Audit 2. Furthermore, the proportion of localization procedures requiring CCO approval decreased from 35 (36%) in Audit 1 to 3 (3%) in Audit 2. The apparent benefits of this increasing change in practice are threefold: (1) the CR has increased independence in their work, developing an expertise required of the role, leading to greater job satisfaction; this, in turn, encourages a desire to expand further, offering patients requiring PRT to other disease sites the chance to experience the benefits of the role. (2) The CCOs may be able to spend less time planning PRT, freeing up more time to focus on increasingly complex RT in their job plan. (3) Patients requiring PRT benefit from more rapid access to treatment, owing to fewer delays in treatment planning.

There were 10 less patients in the 3-month period covered by Audit 2 in 2015 than the equivalent period in Audit 1 (2014). The trend prior to this period had been one of increasing patient numbers. Reviewing equivalent data for the corresponding period patient numbers had risen steadily (63 patients in 2005, 72 patients in 2009 and 82 patients in 2013). In addition, the number of patients meeting the audit criteria in the subsequent months equated to 116 patients (01/04/2015–30/06/2015) and 84 patients (01/07/2015–30/09/2015), thus indicating that the decrease in workload was not typical. There is no evidence to indicate the reason for the reduction in the amount of PRT for bone metastases other than natural unaccountable variation.

Documentation of response to treatment was identified as an area for improvement. Qualitative tools could be adopted for this purpose, but these were not used during the periods covered by the audits. This has been identified as an area to improve upon for the future. Tools could include the asking of open questions to ascertain comparative pain status and requirement for analgesia or the use of a validated assessment tool such as the Brief Pain Inventory.¹⁶

The audit results prompted concern over the unacceptably low number of patients planned by SpRs. It is becoming more common for non-medical staff to undertake PRT localization in many UK cancer centres. However, non-medical PRT localization is not routinely available in every RT department, particularly during periods of on call. PRT planning is an essential skill that all SpRs should be given the opportunity to learn, develop and subsequently become expert in. Furthermore, with increased patient survival and expected rise in patients requiring PRT in the future, the need for SpR involvement may plausibly increase. A number of measures have been implemented within the department to encourage SpRs to further develop the knowledge and skills required for PRT. Following the presentation of the audits, PRT meetings were planned between the CR and SpRs in which case studies may be discussed, to aid the education of all members of staff involved. This allows the role of the PRT CR to complement and play an active part in SpR training, and work is ongoing, adapting to meet the needs of the SpRs on their regional rotation through the department.

Whilst the majority of PRT cases require simple treatment to facilitate prompt RT, and therefore swifter symptom relief, there are occasions when a more complex treatment plan is required. A weekly RT quality assurance (RTQA) meeting is held locally, specifically to discuss radical RT cases, attended by the complete CCO and SpR team, with representation from medical physics and RT staff.¹⁷ The more complicated PRT cases are discussed within the RTQA forum, allowing open debate and advice on the most appropriate management plan. This facilitates learning for all groups of staff and can provide assurance for patients that their treatment plan has been approved by consensus of opinion. Emergencies, such as mSCC, are now planned by the CR, with supplementary medication prescribed by doctors. These plans do not go through the weekly RTQA meeting unless a specific learning point is felt to be beneficial. Complementing the improvements in training and education of the CR and SpRs, a local protocol for PRT planning has been developed. The protocol was agreed and approved by the RT MDT, incorporating planning guidelines for different sites. Nevertheless, it is accepted that final PRT volumes are dependent on the clinical situation and are decided by the planning practitioner clinical judgment and discretion.

In the early period, CRs were potentially seen as a local solution to a local problem; however, the profile of the CR is rising nationally, with a gradual growth in the number of appointments;¹⁸ to date, there are 19 CRs registered with the Society and College of Radiographers and are employed throughout the UK, with varied specialties including breast, neuro-oncology and brachytherapy. PRT appears to be increasingly favoured as a site

specification. Whilst there is no evidence to indicate the reason for this, patient survivorship and quality of life are very much on the national agenda; a CR specializing in PRT can contribute to improving services, patient pathways and take on the aspects of clinical practice previously seen as unsuitable for non-medical staff to assume.⁶ Locally, the CR is developing their profile, with increased involvement within the MDT, particularly in the acute setting. The CR has become integrated into the acute oncology/cancer of unknown primary MDT and fostered improved links with the palliative care teams within the hospital and referring trusts, local hospices and community teams. The mSCC pathway has been expedited; in Audit 1, 24 (63%) out of 38 patients were treated on the same day as the DTT; this rose to 22 (71%) of 31 patients in Audit 2. It is anticipated that this trend will continue with the CR involvement in the consent and planning processes. Furthermore, AOS teams from external NHS Trusts who utilize the RT service at the cancer centre now have a named link to contact when a patient is identified at their trust.

The introduction of a PRT CR may improve quality of care by refocusing RT services around the needs of the patient. Furthermore, the CR provides professional leadership and consultancy for the cancer centre and other service providers. The CR role underpins the philosophy of the Department of Health, working to ensure services for cancer survivors are improved, providing personalized pathways of care, tailored one-to-one support and rapid access to appropriate facilities as and when required.^{2,19} In conjunction with the AOS team, prompt actions

should lead to reduced length of in-patient stays, readmissions and number of visits to the general practitioner.^{19,20} The CR enables increased accessibility to RT services for patients with cancer, reducing inequalities of service provision.

It is anticipated that the CR will expand the service to include all metastatic disease requiring PRT, which will have a positive impact on the patient experience and, furthermore, allow the CCOs to focus more of their time on the ever-increasingly complex requirements of advanced RT and systemic treatments. If the increasing demand for RT and the shortfall of CCOs within the NHS are as expected, it is likely that the necessity for advanced radiographers and CRs will increase accordingly. It is possible that a CR may be a necessary role within most departments to fill service requirements, with the speciality being determined locally.

CONCLUSION

It is evident from the results of the two audits that the introduction of the palliative Macmillan CR has had a beneficial impact within the department and has reduced the level of involvement of the CCO in some aspects of PRT, enabling consultants to focus on more complex RT techniques. Furthermore, the CR is usually able to plan PRT more promptly; this has a beneficial impact on the PRT pathway, allowing patients to be treated quicker and thus receiving the anticipated symptom control more swiftly. Continued audit of the role of the CR needs to be ongoing to ensure that it complements SpR training.

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