NEMICS radiation oncology units – overview of services

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Key:
MVT – mega voltage therapy
KVT – kilo voltage therapy
IMRT – Intensity modulated radiation therapy
SRS – Stereotactic radiosurgery
TBI – Total Body Irradiation

A note on the data presented in this report

NEMICS has been provided with an extract from the Department of Health "Victorian Radiotherapy Dataset". 2010/2011 was the first year of data collection for both public and private radiotherapy providers. In 2011/2012, the department of health CSD unit notes that there was an improvement in reporting of data. It should be noted that the data collection process is still undergoing refinement and there are some issues with data quality. As such, caution should be exercised when interpreting this data.

Data presented in this report is for the public and private providers within NEMICS.

1. Overview

In the NEMICS region, there are four radiotherapy units:

- Austin Hospital (public)
- Peter McCallum Cancer Centre - Box Hill (public)
- Radiation Oncology Victoria (ROV) - Epping (private)
- Radiation oncology Victoria (ROV) – Ringwood (private)

Over June, interviews were undertaken with the service manager of each radiotherapy unit in the region. Key observations from these meetings, and from available data, are set out in this report.

Within the NEMICS region:

- There are 9 linear accelerators and 8 are operational (a 3rd linac located at Austin Hospital is not currently operational)
- Austin Hospital operates a satellite radiotherapy service in Ballarat (outside the NEMICS catchment)
- Only Austin Hospital has a superficial therapy and deep x-ray machine.
- Only ROV - Ringwood offer high and low dose brachytherapy.
- There is a brachytherapy machine on-site at Austin Hospital but the timeline for when it becomes operational is uncertain; contingent on Department of Health funding and Australian Clinical Dosimetry Service (ACDS) accreditation.
- There is no stereotactic radiosurgery (SRS) provision in the region but this modality is planned at ROV - Ringwood.
- NEMICS providers deliver radiotherapy for all patient cohorts, with the following exceptions:
    - ROV - Epping does not treat high acuity or medically complex cases where collocated services are required.
    - ROV - Epping does not deliver complex haematology (patients are referred to Peter McCallum Cancer Centre).
    - No NEMICS radiation therapy unit treats paediatric patients.
- There are acute inpatient beds available on-site for acute radiation reactions at all units except ROV - Epping whereat patients are transferred to The Northern Hospital.

2. Activity

Table 1 sets out the number of courses of treatment that were delivered by each NEMICS radiation oncology unit in 2010 - 11 and 2011 – 12. Table 2 sets out the number of courses per patient in 2011-12 and Table 3 shows the number of courses by modality and technique: (1) brachytherapy (2) kilo-voltage therapy (KVT) – conventional, deep x ray, and superficial x ray, and (3) mega-voltage therapy (MVT) – conventional, and IMRT

Table 1. Number of courses reported by Radiation oncology units 2010-11 and 2011-12

Radiation oncology unit	2010-11	2011-12
Austin Hospital	786	795
Peter McCallum Cancer Centre - Box Hill	868	839
ROV - Epping	378	522
ROV - Ringwood	719	940

Table 2. Number of courses reported per patient by Radiation oncology unit 2011-12

Radiation oncology unit	Number of courses per patient					
	1	2	3	4	5	6
Austin Hospital	659	47	7	4	1	
Peter McCallum Cancer Centre - Box Hill	728	39	7	3		
ROV - Epping	498	12				
ROV - Ringwood	826	51	4			
TOTAL	**2711**	**149**	**18**	**7**	**1**	**0**

Table 3. Number of courses of treatment by modality 2011-12

Radiation oncology unit	MVT Conventional RT	MVT IMRT	DXRT	SXRT	Brachytherapy	Total courses
Austin Hospital	596	155	7	35	2	**795**
Peter McCallum Cancer Centre - Box Hill	769	70			0	**839**
ROV - Epping	468	48			6	**522**
ROV - Ringwood	764	111	1		64	**940**

3. Capacity and access

According to modelling undertaken in the United Kingdom[1], about 52% of cancer patients should receive radiotherapy at least once during the course of their illness. This compares to an estimated 33%[2] of patients receiving radiotherapy as part of their treatment plan across Victoria according to the Department of Health who also report significant metropolitan and regional variation between newly diagnosed cancer patients in 2011. This under utilisation may be attributed to several factors:

Capacity: 8 of the 9 linear accelerators (linacs) are operational across NEMICS. NEMICS providers estimate that there is a shortage of 1.5 linacs to be able to deliver appropriate treatment for all patients within the NEMICS catchment area (including regional referrals) requiring radiotherapy.

Linac distribution: NEMICS providers report that linac distribution is about right for the NEMICS population. A satellite radiotherapy centre North of Epping would be well placed to service the population but that it is economically unviable. This is outside of the NEMICS catchment.

Treatment types: Table 4 shows the provision of these modalities, as well as brachytherapy, superficial x-ray therapy (SXRT), and Total Body Irradiation (TBI) across NEMICS radiotherapy providers.

[1] National Radiotherapy Advisory Group, *Radiotherapy: Delivering a world-class service for England*, 2007
[2] Cancer Strategy and Design Unit, Victorian Department of Health, 2013

Table 4. Number of machines and modalities across NEMICS radiotherapy providers

	No. of machines / YN	Operating days / times	Brachy?	SRS?	SXRT?	IMRT?	TBI?
ROV - RINGWOOD	2	M - F / 8 - 7pm (flex)	Y	N	N	Y	N
ROV - EPPING	2	M - F / 8 - 7pm (flex)	N	N	N	Y	N
Peter MacCallum - BH	2	M - F / 8 - 5.45pm	N	N	N	Y	N
Austin Hospital	3	M - F / 8 - 5.30pm	N - have machine, awaiting funding approval.	N	Y	Y	N - a priority for 2014+
TOTAL	**9**	**Range: 47.5 - 55 hrs pw**	**1**	**0**	**1**	**4**	**0**

Intensity-modulated radiation therapy (IMRT) is an advanced mode of high-precision radiotherapy that utilises computer-controlled linear accelerators to deliver precise radiation doses to conform more precisely to the three-dimensional shape of a tumour. IMRT is being used most extensively to treat cancers of the prostate, head and neck and CNS.

Stereotactic radiotherapy (SRS) describes the delivery of radiotherapy where the patient is immobilised in a rigid frame. This allows higher, and potentially more effective, doses to be delivered accurately to small targets. Stereotactic radiotherapy may permit standard doses to be delivered with fewer side effects.

International best practice[3] suggests that all patients should have access to Intensity Modulated Radiation Therapy (IMRT) and stereotactic radiosurgery (SRS). Whilst all NEMICS providers use IMRT, interviewees reported that usage varied between providers. There is no SRS provision within the NEMICS region.

Total Body Irradiation (TBI) is used to prepare patients to receive bone marrow transplants (HPCT) and there is no TBI provision within the NEMICS region. However, if Austin Health progress with their business plan to undertake Allogeneic Bone Marrow Transplants (refer to NEMICS service map report) then TBI would be made available on-site.

Currently there is only one brachytherapy facility among NEMICS providers (ROV – Ringwood, collocated with Ringwood Private Hospital administers high and low dose brachytherapy) despite the presence of a specialist hospital for gynaecological cancer in the region (Mercy Hospital for Women) and it being a common treatment modality for these patients. Currently, almost all Mercy Hospital for Women patients requiring brachytherapy get referred to Peter McCallum cancer centre in East Melbourne. Austin Hospital has a brachytherapy facility on-site and is awaiting DH funding approval and ACDS accreditation to operate the service.

Superficial x-ray therapy (SXRT) and deep x-ray therapy (DXRT) penetrate only up to the first few centimetres of tissue. By avoiding the deeper tissue layers, SXRT can reduce scarring. This is particularly important when treating facial lesions. DXRT is useful for the palliation of superficial bone lesions such as metastatic rib deposits. Austin Hospital has both superficial and deep x-ray therapy machines.

Service planning is required with the Department of Health to ensure that referral pathways are in place to allow all patients treated in the NEMICS region access to these modalities. NEMICS has a role here to facilitate this process.

[3] Ibid.

Access: Table 5 below sets out reported waiting times from referral to treatment by radiotherapy unit and modality. There is considerable variation between and within providers. The number of courses reported with negative wait times is also shown to indicate data reporting issues.

Table 5. Reported waiting times from referral to treatment by radiotherapy unit and modality 2011-12

Radiation oncology unit	Modality	Number of courses (excluding negative wait times)	Average wait time (days)	Median Wait time (days)	Max wait time (days)	Number (time between 1 and 199 days)	Average wait time (wait time between 1 and 199 days)	Number with zero wait time	Number with a negative wait time
Austin Hospital	MVT	751	22.30	20	133	728	23.01	23	0
Austin Hospital	BRY	2	0.50	0.5	1	1	1.00	1	0
Austin Hospital	KVT	42	18.64	16	58	40	19.58	2	0
Peter McCallum Cancer Centre - Box Hill	MVT	837	24.91	18	199	812	25.68	25	2
ROV - Epping	MVT	512	0.65	0	59	45	7.36	467	4
ROV - Epping	BRY	6	0.00	0	0	0	-	6	0
ROV - Ringwood	MVT	865	2.03	0	125	138	12.72	727	10
ROV - Ringwood	BRY	64	2.91	0	71	5	37.20	59	1
ROV - Ringwood	KVT	1	0.00	0	0	0	0	1	0

As ROV - Epping does not treat complex cases, high acuity and complex cases at The Northern Hospital do not have local access to Radiotherapy.

Of the four NEMICS radiation services, only Austin Hospital reported delays in access to support services for oncology patients having radiotherapy. This was for the insertion of percutaneous gastrostomy feeding tubes done on-site and radiation oncology access to MRI.

Standards of practice: NEMICS radiation oncology services have documented evidence based protocols which are largely concordant. Some providers reportedly have older and more prolonged fractionation regimes, but these are still evidence based.

4. Workforce

Table 6 sets out staffing information across the four radiation oncology units in the NEMICS region.

Table 6. Staffing detail for NEMICS Radiation Oncology Units

Service requirements	ROV - Epping	ROV - Ringwood	Peter MacCallum cancer centre - Box Hill	Austin Hospital
Does the service comprise of the following specialties: medical physicists, biomedical engineers or technicians, and therapeutic radiographers?	Engineers work across ROV sites. Physicists and radiotherapists are based at each site	Engineers work across ROV sites. Physicists and radiotherapists are based at each site.	Physicists and radiation engineers are onsite. Biomedical engineer is based at East Melbourne Peter Mac.	Yes - all.
How many radiation therapists are there?	FTE 12.8 Do not follow AIR guidelines - use activity based staffing	FTE 17.5 Do not follow AIR guidelines - use activity based staffing	EFT 19.5	11-12 RTs per linac (1 extra for education) In line with AIR workforce recommendations.
How many registered nurses on each shift?	1 - Can flex to 2 as required.	1. Can flex to 2 as required.	Always min. 2 nurses on each shift	Always 2 on each shift
Is a radiation oncologist available 24 hours?	Consultants cover multiple sites - not staffed by sessions. Fit around patient appointments. Available on-call. All consultants see patients 1x weekly	Consultants cover multiple sites - not staffed by sessions. Fit around patient appointments. Available on-call. All consultants see patients 1xweekly	RO available 24 hrs and all patients are seen at least 1xweekly by the consultant. On site registrars available to see patients at any time	Available on-call.
How many qualified radiation oncology medical physicists are on-site during business hours?	2 (+ one trainee physist about to finish)	2 and a 3rd when delivering brachytherapy	1 onsite. 1.4 EFT	0-2. 1 on-site ~90% of time
Is there access to allied health professionals to meet patients' needs, as required (including dentists, speech pathologists and dieticians for head and neck patients)?	As low acuity cases only, less demand for Allied Health. Full tele-health facilities. Supportive care screening undertaken for Northern patients by ROV staff.	Dietician funded in-house as see large volume of head and neck patients - 1 EFT per fortnight. Full tele-health facilities.	Dietician and social work onsite - have allocated hours at Box Hill Peter Mac (1x weekly). Access dentist, O/T, psychology at East Melbourne Peter Mac. Speech pathologist at Eastern Health.	~70-80% access to Allied Health professionals at Austin. Problems with speech pathology, no dental access on-site, minor problems with dietician.
Does the service have capacity to support at least one radiation oncology fellow?	ROV is a non-accredited training centre. Does not currently have fellow.	ROV is a non-accredited training centre. Does not currently have fellow.	Have capacity. None currently in post.	Yes - 2 currently in post

Of note:

- AIR workforce guidelines are followed by Austin Hospital. ROV colleagues argue this is not an economical staffing model and use an activity based metric to determine staffing levels. This is reflected in the staffing levels of radiation therapists where there are 10-11 per linac at Peter McCallum cancer centre - Box Hill and Austin Hospital, and 6-9 per linac at ROV - Epping and ROV - Ringwood.
- Staff numbers for other disciplines (registered nurses, medical physicists, and engineers) have comparable numbers across sites.
- There are benefits of radiation oncology units being collocated with acute hospitals in terms of training and research as only these centres are accredited training centres.

The table sets out **access to allied health services**. There is no allied health presence at the ROV-Epping site as there is little demand for these services given the unit takes low acuity cases only. At ROV - Ringwood a dietician is funded in-house given the large volume of head and neck patients. At Peter McCallum cancer centre - Box Hill there is a dietician and social worker on-site once weekly. Speech pathology is accessed at Box Hill Hospital and other services (dentistry, occupational health, and psychology are accessed at Peter McCallum cancer centre - East Melbourne. At Austin Hospital, whilst there is a full allied health team, interviewees report circa 70% accessibility given competition with other services. There are reported problems with accessing speech pathology, dentistry, and dietetics at Austin Hospital's radiation oncology unit.

5. Service and operational models

Given that there are two public and two private run units in the region, service and operational models vary accordingly:

- There are different models for planning patients' radiotherapy course of treatment at each site. Peter McCallum cancer centre – Box Hill plans treatment separately at each satellite unit whereas ROV have a centralised planning model. ROV colleagues argue that centralised planning with satellite delivery enables services to flex for capacity whereby planning is allocated to sites with capacity and delivered elsewhere rather than moving staff. Austin Hospital does not have any satellite units.
- ROV work with the Victorian Department of Health on shared care contracts. There has been a shared care contract in place at ROV - Epping with the state government and The Northern Hospital for 12 months whereby at a capped maximum fee and volume of patients per annum, The Northern Hospital patients are assessed for eligibility based on a number of criteria to receive their radiation treatment at ROV Epping through the public health system.
- There is no shared care contract in place at ROV – Ringwood. A business case has been submitted by ROV but declined due to State Government funding constraints.

In terms of **service network arrangements**, ROV – Epping radiation oncologists attend The Northern Hospital multidisciplinary meetings (MDMs) for all tumour streams and attend the lung multidisciplinary meeting at Austin Hospital.

ROV – Ringwood radiation oncologists attend Epworth Eastern and Maroondah Hospital multidisciplinary meetings for all tumour streams.

Austin Hospital radiation oncologists attend all Austin Hospital MDMs and have links in to Northern Health and an informal network with ROV.

Peter McCallum cancer centre – Box Hill are owners and tenants on the Epworth Eastern - Box Hill hospital site whereby Epworth Eastern and Box Hill Hospital are treated as stakeholders with full access to each other's services. All Peter McCallum cancer centre – Box Hill radiation oncologists attend multidisciplinary meetings at Box Hill Hospital and Peter McCallum cancer centre - East Melbourne. For many services, Peter McCallum cancer centre - Box Hill will make referrals within their internal service network (Peter McCallum cancer centre - East Melbourne) as well as their collocated Health services (Epworth Eastern and Box Hill Hospital).

6. Service co-locations

Table 7 sets out additional cancer support services relevant to the provision of radiotherapy and that is not set out elsewhere in this report. Services that are on-site at each radiation oncology unit, or where there are formal access arrangements to these services when they are not on-site, are indicated.

Table 7. Support service at NEMICS Radiation Oncology Units

Key: On-site | Access | No service

Radiation Oncology Unit:	ROV - Epping	ROV - Ringwood	Peter McCallum cancer centre - Box Hill	Austin Hospital
medication	Held onsite in a drug safe. Rarely dispense. Registered by DH as a day procedure centre.	Pharmacy onsite - Ringwood. Registered by DH as a day procedure centre.	On-site pharmacy (Slades) and EH PMCC	On-site in-house pharmacy
cardiology			Eastern Health OR access PMCC	
renal service	refer back to hospital		Eastern Health OR access PMCC	
renal dialysis, respiratory			Eastern Health OR access PMCC	

7. Key improvement areas for Radiotherapy provision at NEMICS providers

Many specialist radiotherapy services are not available within the NEMICS region. Patients are being referred outside of the region or by-pass their local provider for access to TBI, SRS, and brachytherapy. For example, Mercy Hospital for Women gynaecology cancer patients requiring brachytherapy are referred out of the region, as are The Northern Hospital patients requiring radiotherapy who are considered high acuity and complex cases.

Providers expressed concern that in addition to these gaps in provision, patients are unnecessarily commuting who could be treated closer to home and it is possible that this is due to historical clinical relationships dictating referral pathways. It is uncertain to what extent referral pathways are or are not geographically appropriate.

Modelling of projected demand for services premised on (1) appropriate delivery and (2) patients treated in an appropriate geographical radius, is required. There is currently capacity for a third linac both at the Peter McCallum cancer centre - Box Hill and Austin Hospital radiation oncology sites. Department of Health projections on demand, including future patterns of surgical oncology and placement of services, would support decision making on planning at each of these sites. Benchmarking what is acceptable in terms of capacity and waiting times would also support this process to comprehensively test adequacy of provision.

Interviewees were asked to comment on any other observed NEMICS regional service gaps in radiation oncology provision. They reported:

- Various organisational boundaries limits access to data which may adversely affect patients receiving the most appropriate course of treatment. Contracted providers (for example ROV – Epping's shared care contract in place to treat The Northern Hospital patients and Peter McCallum Cancer Centre – Box Hill treating Box Hill Hospital patients) are unable to access patient records. As such, they are unable to track patients who do not complete a full course of treatment, or patients who should be offered radiotherapy but are not.
- One provider felt that alternative operational models would help to standardise treatment regimens and benefit from resource efficiency gains. For example, public-private partnerships whereby payment was contingent on meeting quality targets. ROV report that they are able to charge the state $1,500 per patient under their shared care model compared to $4,700 per patient in the public sector.
- The region would benefit from a government health programme grant that lines up with a State Cancer Action Plan in order to get linac location licenses to service areas of need.