

# IMPROVING ACCESS TO RADIOTHERAPY FOR REGIONAL CANCER PATIENTS – THE NATIONAL RADIOTHERAPY SINGLE MACHINE UNIT TRIAL

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## Abstract

The National Radiotherapy Single Machine Unit Trial was a joint Australian and Victorian Government initiative to establish single machine radiotherapy service in regional areas. The trial arose in response to the need for decentralised radiotherapy services to improve access to treatment for rural patients. Key aims of the trial included assessing if single machine radiotherapy services could successfully be established and operated in regional areas, what impact they would have on patient access and radiotherapy utilisation and whether they could provide radiotherapy of equivalent safety and reliability to metropolitan services. An evaluation of the Single Machine Unit Trial was undertaken by the Victorian Department of Human Services to assess how well the trial aims were met. The Single Machine Unit Trial successfully demonstrated that single machine radiotherapy departments lead to more appropriate radiotherapy utilisation rates for rural cancer services, while providing quality of care comparable to larger metropolitan centres.

Planning of radiotherapy services has typically focused on the need for centralised services to optimise the utility of expensive equipment and achieve a critical mass of staff.<sup>1</sup> These services have traditionally been co-located within hospitals that provide a full range of higher level diagnostic and cancer treatment services in order to facilitate continuity of care, ensure high standards of maintenance<sup>2</sup> and offer patients and staff access to clinical trials. Supporting this perception was a report on the American Patterns of Care studies of the 1970s and 1980s, showing poorer outcomes and higher complication rates for patients receiving treatment at small, primarily privately operated centres with single megavoltage radiotherapy units.<sup>3</sup>

Balanced against this has been the need to improve access to cancer services for people of regional Australia. Studies show lower survival<sup>4</sup> and poor utilisation of radiotherapy<sup>5</sup> for regional cancer patients who do not have immediate access to radiotherapy, compared to those of metropolitan areas. Access to treatment also affects patient treatment choice, with studies showing higher rates of mastectomy compared to breast conserving surgery (and adjuvant treatment) for rural patients with early stage breast cancer compared to metropolitan patients.<sup>6,7</sup> Being away from loved ones and family concerns and the financial burden of travel and accommodation arrangements are key issues for patients whose radiotherapy treatment necessitates travel and accommodation.<sup>7</sup>

In December 1996, a report was released by the Australian Health Technology Advisory Committee (AHTAC)<sup>8</sup> summarising the key issues in the field of radiotherapy and making several key recommendations to improve radiotherapy services in Australia. With the

results of the Patterns of Care studies a couple of decades old, being more related to privately run units, and with huge advances in technology potentially making a number of their outcomes redundant, key recommendations were made around improving access to radiotherapy services through:

- radiation oncology being organised through networks of services that provided coordinated, comprehensive care in multimodal settings, and
- efforts being made to decentralise services to enhance access for consumers.

Further support for the development of decentralised radiotherapy services was provided in a 1998 report to the Victorian Government, *Review of Radiotherapy Services Victoria*, by the ACIL consulting group.<sup>9</sup> Importantly, as a means of more broadly distributing radiotherapy services, the report also recommended that single machine radiotherapy services be trialled in Victoria.

## National Radiotherapy Single Machine Unit Trial

The National Radiotherapy Single Machine Unit (SMU) Trial was a joint initiative between the Australian and Victorian Governments to provide radiotherapy services in rural areas of Victoria. The trial stemmed from the ACIL report's recommendations to establish radiotherapy services in rural and regional areas, and that single machine radiotherapy services could be successfully developed given appropriate safeguards and linkages. The aims of the trial were to improve access to, and utilisation of, radiotherapy services for rural Victorian cancer patients, while maintaining

standards of care which are clinically and socially acceptable.

The trial involved the establishment of SMU radiotherapy services in three rural Victorian towns – Ballarat, Bendigo (commenced in 2002) and Traralgon (2006). As recommended in the ACIL review, the SMUs were established in a hub-and-spoke model, with large metropolitan hub services responsible for managing and operating the SMU. This was to ensure adherence to appropriate clinical standards and levels of safety and quality. In addition, the model incorporates quality assurance guidelines and strong professional linkages between the hub and spoke staff, to facilitate appropriate treatment and referral practices, and includes guidelines for the types of cancers suitable for treatment at the SMUs.

As part of the SMU trial, an evaluation was undertaken by the Victorian Department of Human Services to assess how the establishment of the SMU radiotherapy services met the objectives of the trial. The trial compared radiotherapy access and utilisation pre and post the commencement of the SMUs, and also looked at the economic and quality outcomes associated with the provision of these services.

## Outcomes

### Access

In Victoria in 2001 there were 10,918 courses of radiotherapy provided by 16 public and seven private linear accelerators, 10,255 of which were for notifiable cancers. Of the total courses, 1% were provided to interstate or overseas patients, 26% to patients from regional Victoria and the remaining 73% to residents of metropolitan Melbourne.

In the first full year of operations of the SMUs at Bendigo and Ballarat, both services provided 374 courses. The total number of courses of radiotherapy provided to residents of regional Victoria increased 7.5% (from 2856 in 2001 to 3070 in 2002-03). Conversely, the number of courses provided to residents of metropolitan Melbourne decreased slightly and overall numbers of patients treated with radiotherapy in Victoria increased only slightly (~1%). The overall impact of the SMUs in the first year, rather than overall growth, was firstly, to redistribute regional patients from metropolitan to the new regional services, and secondly, to increase the number of regional patients receiving radiotherapy.

The second year of operations (2003-04) showed both services significantly increasing activity, with the number of regional patients receiving radiotherapy increasing to 63% compared to 2002-03. Compared to 2001, an additional 348 regional patients received radiotherapy in 2003-04.

### Self-sufficiency

Self-sufficiency relates to the number of cancer patients from a particular region who received their treatment in that region. Prior to the SMUs commencing, all patients receiving radiotherapy from the SMU regions left their region to receive treatment. In contrast, in 2002-03 71%

of patients from the Ballarat catchment received radiotherapy locally, increasing to 77% in 2003-04. In the Bendigo region, self-sufficiency for radiotherapy increased from 47% in 2002-03 to 57% in 2003-04. A further 5% travelled to Ballarat. The larger population of the Bendigo region accounts for some of the difference between the proportions. Another factor is that the Bendigo service reached high capacity within two years of commencement, with waiting lists increasing as a result.

### Quality

While advances in technology may have rendered some of the poorer results from earlier studies of single machine radiotherapy services redundant,<sup>10</sup> services still face a number of potential problems. These include the absence of back up equipment (for use in the event of machine breakdown), the potential difficulty in attracting and maintaining staff at smaller facilities, and more limited opportunities for practitioners to discuss cases with colleagues.

The establishment of the SMUs in a hub and spoke arrangement with larger metropolitan radiotherapy services was designed to overcome or ameliorate these potential problems and maintain an appropriate quality of service. In addition to providing a back-up machine, the hub facility supports the SMU through providing a forum for the discussion of cases, relief staff and clinical and quality protocols to help ensure an effective high quality service.

A formal clinical audit of the quality of radio-therapeutic management was conducted as part of the SMU evaluation. Randomly selected patients from two hub and two spoke sites were audited using the validated<sup>11</sup> national peer review audit instrument developed and endorsed by the Royal Australian and New Zealand College of Radiologists. This instrument audits criteria that reflect documentation, quality processes and acceptability of clinical management and decision-making.

The full results of the clinical audit have been published elsewhere,<sup>12</sup> however in brief the results showed that the quality of care of patients treated with radiotherapy in the SMUs was equal to or greater than the care provided in the hub sites. In the hub sites, 79.6% of criteria audited were adequate, compared to 84.4% in the SMUs ( $p < 0.001$ ). Much of the difference was related to documentation and quality processes which were better in the SMUs. It was apparent that the modern equipment and clearly defined processes in the new departments was beneficial in improving quality of care. In terms of clinical management, there were no significant differences between the SMUs and the hub sites, however the only instances of sub-optimal management occurred in the hub sites.

## Broad implications

The evaluation of the National Radiotherapy SMU Trial has clearly shown that radiotherapy services can be successfully provided at single machine facilities under a hub-spoke model. Each of the broad objectives of the trial were met, with significant improvements in access

and radiotherapy utilisation demonstrated for residents of regions adjacent to the SMUs, and quality outcomes being the equivalent of and in some instances bettering those of the hub services. However, there are a number of factors to consider before developing this model in other areas.

Victoria's regional population is highly dispersed, with large regional centres and smaller towns located throughout the state. This is unlike many other states, which have substantial unpopulated areas between regional centres. One reason for this is Victoria's smaller size compared to other states, with few major regional towns more than a three hour drive from Melbourne. A benefit of this is that it removes the obstacle of excessive distance for services operating as hub-spoke models, improving the direct support capacity for regional radiotherapy services from hubs and providing a back-up (albeit a difficult one) for patients in the event of SMU breakdown. This has been particularly useful for contracted services, such as some equipment maintenance, with specialist support staff located in Melbourne able to perform site visits to the SMUs within reasonable timeframes.

The commencement of the SMUs led to substantial increases in demand for other cancer services within the local regions. This included increases in allied health referrals and significant increases in demand for chemotherapy. In addition, as patients from further afield were referred for radiotherapy, suitable patient and carer accommodation services was required. In most instances, pre-existing patient accommodation will not be sufficient to meet the additional demand from a radiotherapy service. These broader impacts require consideration in the development of regional radiotherapy services, not least in terms of the workforce implications.

The quality of care provided by adequately funded SMUs is at least equivalent to that provided in larger metropolitan centres in Victoria. Indeed, the appropriateness of care also compares favourably to audits of Australian-staffed radiotherapy departments outside Victoria.<sup>11,12,14</sup> This was not a surprising finding, as the levels of staffing, quality of staff training and quality of equipment and processes were the same as in larger centres (and in certain instances better). With modern radiotherapy equipment and appropriate funding, the applicability of the findings of the old American Patterns of Care studies has been superseded. Indeed, older established centres may learn some lessons from the newer SMUs, particularly in terms of applying modern processes and equipment

in order to improve patient care.

The outcomes of the National SMU Trial demonstrate the degree of unmet demand for radiotherapy services in regional areas. Prior to commencement of the SMUs, uptake of radiotherapy for regional cancer patients may have been low due to personal decisions based on time and costs associated with accessing treatment, or insufficient knowledge of this modality among referring clinicians in regional areas. A combination of both is likely, and the widespread regional media and community interest in the SMUs would have gone some way to meeting the AHTAC report's statement that "oncologists in general, and radiation oncologists in particular, have a role in ensuring that information is widely available, to assist referring practitioners in determining whether radiotherapy is an optimal course of treatment". Getting this message across from a distance of several hundred kilometres is challenging, although improving with video-conferencing and cancer reforms supporting practitioners in multidisciplinary care planning.

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